

Understanding the Impact of Effective Teenage Pregnancy Prevention Programs

By Jennifer J. Frost and Jacqueline Darroch Forrest

A review of five rigorously evaluated adolescent pregnancy prevention programs shows that all five incorporate an emphasis on abstinence or delay of sexual initiation, training in decision-making and negotiation skills, and education on sexuality and contraception. Four of the five directly or indirectly provide access to contraceptive services. Comparisons between treatment and control groups show that all four programs that measured changes in rates of sexual initiation among adolescents had a significant effect on that outcome, reducing the proportion of adolescents who initiated sexual activity by as much as 15 percentage points; the programs were most successful when they targeted younger adolescents. Three of these four programs also significantly increased rates of contraceptive use among participants relative to controls; the most successful programs, which increased contraceptive use by as much as 22 percentage points, provided access to contraceptive services and targeted adolescents who were younger and those who were not yet sexually experienced. Two programs significantly decreased the proportion of adolescents who became pregnant; these programs were the two that were most active in providing access to contraceptive services.

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Few issues have so divided politicians, school boards, policymakers and the public as what to do about out-of-wedlock teenage pregnancy. Whether one believes that unmarried teenage mothers should be denied welfare benefits or provided with financial assistance and special case-management programs, preventing unintended births to adolescents is politically and socially appealing to everyone. But each time the issue arises, people voice the same questions: “Which interventions work?” “Which programs are the most effective in preventing unintended teenage pregnancies?” “How effective is each program?” “Given different levels of effectiveness and different costs, which programs will give the biggest bang for the buck?” “Should we invest in programs that promote abstinence, teach skills, provide contraceptives or give incentives, or should

we cut benefits?” “What mix of possible strategies will be most productive?”

Scientific inquiry has not yet provided definitive answers to many of these questions. However, we have learned much in the last decade from the experiences of the few pregnancy prevention programs that have been designed and implemented with a scientific evaluation component. It may be useful to look closely at what we have already learned from these programs as the debate on welfare reform and unmarried teenage mothers intensifies. If some programs have promoted more responsible sexual conduct among adolescents, widespread implementation of similar types of programs would be an important first step in reducing the nation’s unacceptably high rates of teenage pregnancy and childbearing.

Although many attempts have been made to alter adolescent sexual and childbearing behavior, ranging from informal efforts to formal programs, from small, short-term programs to large-scale, long-term projects, most of these undertakings have not been accompanied by rigorous-

ly conducted outcome evaluations. Thus, anecdotes describing “successful” programs are often followed by unpublished reports that may or may not confirm that a “significant” change occurred in the behavior of program participants. Because most of these reports are neither published in a peer-reviewed journal nor widely circulated within the scientific community, it has been difficult to assess the overall impact of interventions aimed at reducing unintended teenage pregnancy and to inform public policy regarding which strategies are likely to have the greatest impact. Moreover, the paucity of information and the confusion over how to interpret available data have led to an unwarranted sense of pessimism that has discouraged the replication of programs with documented success.

Recently, several formal outcome evaluations of pregnancy prevention programs have been published in peer-reviewed journals and other publications. These few programs have received considerable attention both from the media and from professionals interested in designing and implementing effective programs. Two recent reviews have summarized many of the approaches taken by adolescent pregnancy prevention programs and have attempted to identify the programs and program components that have had the greatest success in changing adolescents’ behavior.¹ We attempt here to expand on the information presented in previous reviews by looking specifically at the size of the effects resulting from different interventions and by considering the representativeness of each program and study population and, hence, the generalizability of individual findings to other circumstances.

This exercise should help to clarify the implications of current program findings for future policy decisions and program development. Specifically, based on what we now know, just how effective are the teen-

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age pregnancy prevention programs for which evaluations have found statistically significant outcomes, and how strong an effect might be expected if more adolescents were exposed to similar sorts of programs? Furthermore, what important gaps still exist in our knowledge of the effectiveness of pregnancy prevention programs? What further research is needed to fill these gaps?

Programs and Their Evaluation

Program Selection Criteria

We have not attempted to conduct a meta-analysis of all research aimed at reducing adolescent pregnancy and childbearing. Although such an exercise might be extremely useful and could add some methodological rigor to the comparison of program effects, it would be premature given the current state of evaluation research reporting in this field. A meta-analysis must include both the value and the standard deviation for each outcome measure and the *p* value describing the significance of each finding (for non-significant as well as significant results), statistical indicators that are not always included in the published reports.

Therefore, instead of reviewing the entire universe of adolescent pregnancy prevention programs, we focused on a limited number of programs whose outcomes have been scientifically evaluated. Our choices were based largely on the quality of program evaluation and on criteria intended to maximize comparability of program effects. All programs were conducted in the United States and had as a primary goal the prevention of unintended first pregnancies among adolescents. Each one either was initially begun as a research or demonstration project or added an evaluation component, with the specific intention of ascertaining program impact on adolescent behavior in at least one of three areas: the initiation of sexual activity, the use of contraceptives, or the rate of pregnancy and childbearing.

All of the five programs we selected—Postponing Sexual Involvement,² Reducing the Risk,³ School/Community Program,⁴ Self Center⁵ and Teen Talk⁶—grew out of theoretical and program developments in education and public health that suggested the potential usefulness of particular approaches or program elements. The sidebar on this page summarizes the elements of each program.

We included only interventions that used either education or training of adolescents, or both, as a way of producing modifications in behavior. Thus, we omitted clinic-based programs or school-based

clinics that were designed to increase adolescent access to contraceptives but lacked a specific educational component, as well as programs that focused on preventing second or higher order births among adolescents or on affecting the outcomes or behavior of adolescent parents.

Because adolescent sexual behavior changes over time and is affected by the media, parents, peers and other social factors, one must compare the behavior of program participants with that of a control group. Otherwise, it is difficult to separate the effects of the program from the effects of other factors in the lives of adolescents and from the inevitable increase in sexual experience that occurs as a cohort of adolescents matures.

All the programs we reviewed used an evaluation methodology in which program participants were assigned to a treatment group and compared with a control group of adolescents. Thus, we omitted programs that allowed participants to

choose between participation in the treatment group and participation in the control group. We also required that the results of the evaluation be published in a peer-reviewed journal and that the report include results for both participants and controls on at least one of the three outcome measures.

As far as we know, these are the only programs meeting all our criteria. Having a favorable outcome was not a criterion for selection; however, the fact that all of these programs have demonstrated favorable outcomes for at least some participants may reflect, in part, the tendency of both researchers and publishers to report positive findings.

School-Based Approaches

Almost all the programs that met the above evaluation criteria were school based. This does not imply that other types of programs, such as those based in clinics or community organizations or

TEENAGE PREGNANCY PREVENTION PROGRAMS

Postponing Sexual Involvement

A school-based educational curriculum that was initially implemented in Atlanta, Georgia, among eighth graders, Postponing Sexual Involvement is based on social influence and social inoculation theories and takes the position that youth this young should abstain from sex. The classes, which are taught by older teenagers (11th and 12th graders), include activities to help youth identify the source of and motivation behind pressures to engage in risky behavior (including sex) and to assist them in developing skills that will help them resist such pressures. These classes are accompanied by a series of sessions on human sexuality (including discussions of contraceptives) that are taught by hospital staff. A total of 10 classes are presented over a three-month period.

Reducing the Risk

A second school-based educational curriculum, Reducing the Risk, was initially implemented in several schools in California. Targeted to high school students (primarily 10th graders), it is based on several social learning theories and includes activities that teach adolescents the skills they need to resist pressures to engage in risky behavior. The classes attempt to instill students with the norm that unprotected intercourse is to be avoided, either by not having sex or by using contraceptives. The curriculum, which consists of 15 sessions presented over a three-week period, is presented by specially trained high school teachers.

School/Community Program

This program, which used a multifaceted approach to reduce teenage pregnancy in a rural community in South Carolina, included several components that generated active community participation. First, district teachers, administrators and special service personnel attended graduate-level courses covering issues related to sexuality education and adolescent decision-making, self-esteem, communication, and influences on sexual behavior. Program staff helped teachers integrate sex education into ongoing courses at all grade levels (kindergarten through 12th grade). The project recruited clergy, church leaders and parents to attend minicourses and used newspaper and radio to spread its messages. Concurrently, a school nurse who was active on the program's task force provided contraceptives to students, and a comprehensive school-linked

clinic in an adjacent building provided students with contraceptive services and supplies.

Self Center

The Self Center program linked school-based sexuality and reproductive health education and counseling with the provision of medical services at a nearby clinic. These services were implemented in both a senior and a junior high school located in Baltimore, Maryland, in the community surrounding Johns Hopkins University. Commitment for the program was first obtained from the schools superintendent, principals, health committee and health department. A team consisting of a social worker and nurse practitioner staffed each school's Self Center every morning, conducting homeroom and classroom lectures, informal individual counseling, small-group rap sessions and educational encounters. These health care workers also made appointments for students to obtain contraceptive and reproductive health care services at a nearby clinic where they were employed in the afternoons.

Teen Talk

Teen Talk, an educational curriculum based on the health belief model and social learning theory, was designed for use in both educational and community-based settings and consists of six two- to two-and-a-half-hour sessions. The goal of these sessions is to alter adolescent behavior by raising teenagers' awareness about the probability that they might personally become pregnant or cause a partner to become pregnant; the serious negative consequences of teenage maternity and paternity; the personal and interpersonal benefits of delayed sexual activity and consistent, effective contraceptive use; and the psychological, interpersonal and logistical barriers to abstinence and consistent contraceptive use. The curriculum includes both presentation of factual information and small-group discussions in which adolescents are confronted with the risks and consequences of adolescent pregnancy and are then presented with information and techniques for avoiding these risks and consequences, including role-playing exercises that give adolescents a chance to practice communicating in sexual situations. The curriculum was designed to be implemented either by family planning or health agency staff or by school staff trained in a two-day workshop.

Table 1. Summary of program components, participant characteristics and evaluation design of five selected adolescent pregnancy prevention programs

Program and location	Program components	Program intensity	Population characteristics	Groups compared	Evaluation design	Follow-up period	% followed
Postponing Sexual Involvement (Atlanta)	Abstinence; life skills; sex ed.; contraceptive ed.; contraceptive access†	10 classes over 3 mos.	Low-income; urban; black	8th graders (487 participants; 178 controls)	Matched school design; participants and controls selected using birth and poverty criteria	1.0–1.5 yrs.	84
Reducing the Risk (California)	Abstinence; life skills; sex ed.; contraceptive ed.	15 classes over 3 wks.	Mixed income; rural and urban; mixed race and ethnicity	9th and 10th graders (586 participants; 447 controls)	Random assignment of classes	1.5 yrs.	73
School/Community Program (South Carolina)	Abstinence; life skills; sex ed.; contraceptive ed.; contraceptive access‡	Varied	Low-income; rural; mixed race	14–17-year-old girls (all in program area vs. all in adjacent areas)	Matched area design with baseline and follow-up measures	3–6 yrs.	na
Self Center (Baltimore)	Abstinence; life skills; sex ed.; contraceptive ed.; contraceptive access‡	Continuous	Low-income; inner-city; mostly black	Middle school and high school students (all in program and control schools who were present for tests)	Matched school design with baseline and follow-up measures	3 yrs.	na
Teen Talk (Texas and California)	Abstinence; life skills; sex ed.; contraceptive ed.; contraceptive access†	6 sessions (12–15 hours) over 2–3 wks.	Low-income; rural and urban; mixed race and ethnicity	13–19-year-olds (722 participants; 722 controls)	Random assignment of classes and individuals	1 yr.	62

†Indirect access provided by program staff, who were workers from family planning clinics. ‡Program staff provided contraceptive services on site or nearby. Note: na=not applicable.

those focusing primarily on media campaigns, are ineffective. Rather, such programs are more difficult to evaluate and less likely to have funding for rigorous evaluation. On the other hand, schools provide a natural laboratory for attempts to change adolescent behavior and efforts to document that change. Students are a captive audience for the intervention and can usually be reinterviewed one or more years after the intervention without too much difficulty. In addition, teenage pregnancy prevention programs are increasingly trying to work with young men as well as with young women, and schools provide a forum in which programs can easily be directed at both sexes.

School-based approaches do have drawbacks, the most important of which is the exclusion of adolescents who are not in school. For example, students who drop out after the intervention are frequently lost to follow-up, so the program’s effect on their behavior is often unknown. Such programs also fail to reach young men who, although no longer teenagers themselves, are responsible for the majority of the pregnancies experienced by teenage girls.⁷

Program Components

Because most pregnancy prevention programs are made up of more than one component, it is difficult to determine which components make a difference, which make the biggest difference, or whether all

components are necessary. In addition, comparisons between programs are problematic because the number of sessions and the length of the intervention period vary from program to program. For example, Reducing the Risk consists of 15 classes administered during a three-week period, Postponing Sexual Involvement is made up of 10 classes during a three-month period, and the Self Center is available continuously to students and offers periodic formal presentations throughout the school year. Table 1 provides information on the important components of each program, the characteristics of the participants, and some information about the evaluation design. All programs incorporate an emphasis on abstinence or delay of sexual initiation, life skills training, sexuality education and contraceptive education.

The programs described in Table 1 present abstinence as the best way to avoid unintended pregnancy and sexually transmitted diseases (STDs) and urge adolescents to delay intercourse until they are older. Of the five programs, Postponing Sexual Involvement places the strongest emphasis on abstinence, teaching that adolescents younger than 16 are not yet mature enough to handle the consequences of sexual activity. Unlike some curricula (to date not adequately evaluated) that focus *only* on abstinence and fail to provide adolescents with any other information or education, Postponing Sex-

ual Involvement and the other programs reviewed here include many additional components, such as life skills, sexuality education and contraceptive education.

Life skills refers to a component of many pregnancy prevention programs that is increasingly being recognized as critical to their success. It consists of activities that help students build decision-making skills, set goals for their lives, learn how to say no to sex and to negotiate within relationships. These activities often include role-playing exercises in which students act out various situations they might encounter.

Another component, sexuality education, refers to the inclusion of broad-based curricula covering a variety of sexuality-related issues, from the growth and development of the human body and reproductive physiology to the development of healthy sexual attitudes and values. Such curricula may or may not provide specific information about the use and availability of contraceptives.

Contraceptive education is specific to curricula that discuss methods of contraception, how such methods are used and the effectiveness of each in preventing pregnancy or sexually transmitted infections. In addition, such curricula may include information on where adolescents can obtain different contraceptive methods.

Contraceptive access indicates the emphasis placed by the program on improving access to contraceptive services among

sexually active participants. As Table 1 shows, we identified two formats through which the reviewed programs provide contraceptive access. In the first, more indirect, format, found in Postponing Sexual Involvement and Teen Talk, at least some of the presentations on contraception and reproductive health were conducted by staff from a nearby family planning clinic.

In the second format, program staff take a more direct role in providing contraceptive access. For example, at the Self Center in Baltimore, the health care personnel who conducted classroom presentations and small-group discussions during school hours also scheduled appointments for sexually active students at the clinic, where they provided reproductive health care and contraceptive services. In South Carolina's School/Community Program, a school nurse who was initially a member of the program's task force provided contraceptive counseling and services to sexually active students at the school and at an adjacent school-linked comprehensive clinic that opened during the program period.

Participant Characteristics

The programs covered here have been conducted in a variety of communities across the country. Table 1 provides comparative information on the socioeconomic characteristics of the adolescent participants in each program. Most programs were implemented in low-income areas, with two located in inner-city areas with predominantly black populations—Postponing Sexual Involvement in Atlanta and the Self Center in Baltimore. Two others were conducted in low-income areas of Texas and California (Teen Talk) and rural South Carolina (School/Community Program). The fifth program (Reducing the Risk) was implemented in areas that were mixed in terms of race, ethnicity and income level.

These programs have targeted low-income areas because of very high levels of adolescent sexual activity and pregnancy in these communities. However, such targeting complicates comparisons between programs, because observed differences could be a function either of different program components or of the different environments and characteristics of the population receiving the intervention.

Furthermore, although we have amassed a fair amount of information about the effects of pregnancy prevention programs on the behavior of low-income black youth, we know little about the effects of programs on the behavior of other minority youth, particularly Hispanics, or

the effects on middle- or upper-income adolescents. Among some minority youth, sociocultural factors such as age at marriage or the level of acculturation of recent immigrants are likely to affect the relative success of programs in changing adolescent behavior. Among middle- or upper-income youth, lower pregnancy rates and higher abortion rates among those who do get pregnant are likely to affect the numerical or proportionate effect of programs on adolescent behavior, simply because of the difference in incidence of the type of behavior these programs are designed to change.

These interventions have focused on adolescents in middle school, high school or both. Some programs have included adolescents within a wide age range, while others have focused on adolescents at only one or two grade levels. The few programs reported on here that were implemented in middle school settings among adolescents in their preteen and early teenage years are remarkable, given that most school sex education courses are taught at age 14 or older, in grades nine and 10. Only 30% of public secondary school teachers surveyed in 1987 indicated that sex education was taught in the seventh grade in their school.⁸ However, more than half of the teachers thought that, by the end of the seventh grade, students should have received instruction about sexual decision-making, abstinence, STDs, birth control methods and homosexuality. This view is supported by national data showing that 9% of 12-year-olds and 16% of 13-year-olds have had intercourse.⁹

Evaluation Design

To measure the effectiveness of pregnancy prevention programs, all of the evaluations we reviewed here used either a quasi-experimental design or a true experimental design in which the behavior of participating adolescents (the treatment group) was compared with the behavior of similar adolescents not exposed to the program (the control group). For example, the evaluations of Reducing the Risk and Teen Talk both used designs in which classrooms in several schools were randomly assigned to receive either the program curriculum or an alternative or traditional curriculum (Table 1). The evaluation then compared the behavior of students attending the program classrooms with the behavior of students in classrooms receiving the alternative curricula.

Because the effectiveness of each program was measured by the differences between treatment and control students, it is

important to recognize variations in the different alternative or traditional curricula received by control students. At each Teen Talk site, the intensity of the alternative curriculum was similar to that of Teen Talk; like Teen Talk, the alternative curricula were often newly instituted, innovative programs that included small-group discussions and sessions covering sexual decision-making. In contrast, the classrooms using the Reducing the Risk curriculum were compared with classrooms in which a traditional sex education course was taught.

In the evaluation of the Self Center, students attending the program school were compared with students attending a matched school that did not have a similar program in place. This evaluation also compared the behavior of all students at the target school prior to the intervention with the behavior of all students at the school after the Self Center had been in operation for three years.

The evaluation of Postponing Sexual Involvement focused on participants and controls who had been born in poverty and continued to live in poverty. To identify these students, researchers located all youth who had been born at Grady Memorial Hospital in 1971–1972, whose families had received recent services from the hospital and who had entered the eighth grade in an Atlanta area school in the fall of 1985. The evaluation design then divided this cohort of young people according to whether they were attending eighth grade at one of the schools using the Postponing Sexual Involvement curriculum or were enrolled at a nonprogram school. (This evaluation report does not discuss what, if any, sexuality education courses were available at the nonprogram schools.)

Evaluators of four of the five programs we reviewed assessed program impact by administering a posttest to both participants and controls anywhere from six months to three years after the initial intervention. On average, most follow-up occurred between one and two years after the program was administered. Table 1 lists the time periods between intervention and follow-up for each of the programs under review and the proportion of adolescents participating in the pretest who were successfully followed for this period. For the School/Community Program in South Carolina and the Self Center in Baltimore, follow-up percentages are not applicable because the same adolescents were not necessarily surveyed at each point. The Self Center evaluation included anonymous baseline and follow-up tests completed by every student who was at school

Table 2. Calculation of the effects of selected pregnancy prevention programs on the percentage of adolescents with sexual experience

Program, sexual experience at baseline and gender	Treatment group			Control group			Mean difference
	Base-line	Follow-up	Change	Base-line	Follow-up	Change	
Postponing Sexual Involvement							
All	25	43	18	23	48	25	-7*
No experience	0	24	24	0	39	39	-15*
Girls	0	17	17	0	27	27	-10*
Boys	0	39	39	0	61	61	-22*
Reducing the Risk							
All	37	55	18	38	61	23	-5
No experience	0	29	29	0	38	38	-9*
Girls	0	29	29	0	37	37	-8
Boys	0	28	28	0	39	39	-11
Self Center							
All girls†	na	45	na	60	na	na	-15*
Teen Talk							
No experience	0	30	30	0	29	29	1
Girls‡	0	27	27	0	22	22	5
Boys‡	0	36	36	0	44	44	-8*

*p<.05. †The Self Center evaluation compared all girls aged ≥15 when the program began with all girls aged ≥15 who were exposed to the program for three years. ‡Percentages estimated after controlling for respondents' age, race, educational status, religiosity and pretest attitudes toward sexual activity and contraceptive use. Note: The School/Community Program did not measure changes in sexual experience; na=not applicable.

on the days the tests were administered, and the program in South Carolina calculated pregnancy rates for all adolescent women in the area over several years.

For purposes of truly evaluating program effectiveness, the window of follow-up often used is too short. Furthermore, it is difficult to determine whether the results of early follow-up are likely to overestimate or underestimate actual program effectiveness. For example, students who participate in a program may have lower levels of sexual activity, higher levels of contraceptive use and fewer pregnancies in the short run, but these differences may lessen later on as program participants "catch up" with students not participating in the program.

On the other hand, short-term differences or similarities in teenage pregnancy between program and nonprogram students may change as the adolescents get older. In comparison to the entire period when adolescents are at risk of unintended pregnancy, the period covered by most evaluations is relatively short. However, extending the period of follow-up beyond one or two years presents additional costs and challenges for evaluation research. For example, students who remain in the study through the end of follow-up may come from families that are stabler and better off than are those of students who drop out or change schools and are lost to follow-up.

Finally, the evaluation of pregnancy prevention programs is based on adolescents' reports of their own behavior before and after the intervention. Thus, it is important

to determine, to the degree possible, whether adolescents are reporting actual behavior or what the program has taught them is the desirable answer. In the evaluation of Postponing Sexual Involvement, the investigators checked information on sexual behavior, contraceptive use, pregnancies and STDs obtained through follow-up phone interviews against data taken from the adolescents' medical records at Grady Memorial Hospital. They found discrepancies in only 1% of the cases.

Magnitude of Effects

The literature on the comparison of effect size across research studies describes several techniques for calculating effect size depending on the outcome measure and analytical methods used by each study.¹⁰ One of the most commonly used measures of effect size is the standardized mean difference between treatment and control groups in the outcome measure reported. The standardization process usually involves dividing the difference between treatment and control scores by the standard deviation of the outcome score. (The standard deviation may be the standard deviation of the control group's outcome score or it may be a standard deviation pooling treatment and control group scores. The assumption behind this procedure is that the actual population standard deviation is similar across groups.) When comparing effect size across research studies, as is done in meta-analyses, one of the principal reasons for standardizing mean differences is to eliminate variation among study effects resulting

from the use of different outcome measures (e.g., different scales used to measure achievement or behavioral or psychological traits) and thereby create a common metric that can be compared across studies.

In this review, however, we are comparing treatment and control groups using the same measures across all studies (proportions sexually active, proportions using contraceptives or proportions becoming pregnant). It is therefore analytically accurate and substantively preferable to use unstandardized mean differences in this context. By doing so, we can compare the effects of each program according to the actual proportions of adolescents who modified their behavior relative to the proportion of controls who did so.

Tables 2, 3 and 4 show the levels of sexual experience, contraceptive use and pregnancy experience in the treatment and the control group before each program began or in its early stages (baseline) and the levels after the program had been running for some time (follow-up). The tables also present the amount of change that occurred between baseline and follow-up for each group. Finally, the tables show the unstandardized mean difference between the treatment and the control group in the change that occurred during the period studied and indicate whether this effect was statistically significant. Because the statistical significance of the difference between groups in the amount of change is a result of both the levels of change and the size of the study groups, a small absolute effect for one program may be statistically significant, while a larger effect for another program may not.

Delaying Sexual Initiation

In any cohort of adolescents, the proportion who have had sexual intercourse increases with the passage of time. The goal of programs is therefore to reduce the proportionate increase in the number of teenagers initiating sexual activity. To determine whether the programs we reviewed achieved such reductions, we compared the rate of increase among students who participated in a program with the rate among students with similar characteristics who did not.

For example, among all eighth graders (boys and girls) who participated in the Postponing Sexual Involvement program, 25% were sexually experienced at baseline (Table 2). At the end of the ninth grade, 43% of the program students were sexually experienced (an overall increase of 18 percentage points). In comparison, the proportion of sexually experienced stu-

dents in the control group rose from 23% at baseline to 48% at follow-up (an overall increase of 25 percentage points). Thus, the increase in the proportion of students who were sexually active was seven percentage points less among program participants than among controls.

The comparable mean differences attributable to Reducing the Risk and the Self Center were five percentage points (not statistically significant) and 15 percentage points, respectively. Again, differences in effect size should be interpreted cautiously because of variations among programs in the age, race and ethnicity of participants and the location of the intervention, as well as variations in evaluation methods and timing.

If we consider only the adolescents who were not sexually experienced when they began participating in the Postponing Sexual Involvement and Reducing the Risk programs, the difference at follow-up between program participants and controls in the proportion who had initiated sexual activity was 15 and nine percentage points, respectively; both differences were statistically significant. The comparable mean difference reported for Teen Talk—the only other program that reported effects separately for adolescents who were not sexually experienced when the program began—was not statistically significant.

In the three programs for which data were available by gender for adolescents who were sexually inexperienced at baseline, the effect on male sexual initiation was greater than the effect on female sexual initiation. For example, the difference between participants in Postponing Sexual Involvement and controls was 10 percentage points among girls and 22 percentage points among boys. In Reducing the Risk, the comparable proportions were eight and 11 percentage points; however, these effects were not significant because of the reduced sample sizes. Finally, the effect of the Teen Talk curriculum on participants who were sexually inexperienced at the beginning of the program reached significance only among adolescent boys, with an eight percentage-point mean difference between participants and controls.

Thus, all four programs that measured change in the rate of sexual initiation had significant effects. In each program, the proportion of participants who were sexually experienced rose between baseline and follow-up, but the increases in at least some groups were significantly smaller than the increases among adolescents in the control groups. Overall, these findings point to the value of early intervention as a means of

postponing the initiation of sexual activity.

Although the greatest proportionate reduction in sexual initiation occurred among participants in the Postponing Sexual Involvement and Self Center programs, it is unclear whether these programs produced larger effects than other programs because of elements of their curricula, because of characteristics of the participating adolescents or because of differences in evaluation design or in the relative effectiveness of the alternative curricula offered to some control students. The Postponing Sexual Involvement, Reducing the Risk and Teen Talk curricula have all been adapted for and implemented among different populations of adolescents in other schools. To date, evaluations of these efforts have not been completed, and thus the findings reviewed here have yet to be confirmed.

Increasing the Use of Contraceptives

Can adolescents respond effectively to competing messages? Can a pregnancy prevention program succeed with the philosophy that although abstinence is best, contraceptive protection is next best? Based on the experiences of three of the programs reviewed here, the answer is yes. Postponing Sexual Involvement, Reducing the Risk and the Self Center not only demonstrated an ability to delay the initiation of sexual activity among participants, but significantly increased the proportion of sexually active teenagers using contraceptives (Table 3).

Teenagers who were not sexually experienced

at baseline showed the most impressive effects: Among those who began sexual activity during the follow-up period, the mean difference between participants in Reducing the Risk and controls (who received an alternative curriculum) in the percentages using contraceptives all or most of the time was 30 percentage points six months after the intervention and 11 points 18 months after the intervention. For Postponing Sexual Involvement, the mean difference between participants and controls was approximately 17 percentage points. However, adolescents participating in the Teen Talk program who initiated sexual activity during the follow-up period were not more likely to have used an effective method at last sex than were comparison teenagers. In fact, girls who participated in Teen Talk were significantly less likely to have used any method the last time they had sex, suggesting that at least some of the alternative programs received by the controls were more effective at increasing contraceptive use.

Among all sexually active students attending the Baltimore schools that used the Self Center program, the mean difference between participants and controls in the percentage protected at last intercourse by any method requiring advance preparation was approximately 22 percentage points for girls and seven percentage points for boys.

Part of the variation in effect size between programs may be a function of participants' socioeconomic background or age or of regional variation in the pro-

Table 3. Calculation of the effects of selected pregnancy prevention programs on the percentage of sexually active adolescents using contraceptives

Program, sexual experience at baseline and gender	Treatment group			Control group			Mean difference
	Baseline	Follow-up	Change	Baseline	Follow-up	Change	
Postponing Sexual Involvement							
No experience	0	"nearly half"	50	0	"close to one-third"	33	17*
Reducing the Risk							
All	58	65	7	63	67	4	3
No experience							
6 mos.	0	100	100	0	70	70	30*
18 mos.	0	75	75	0	64	64	11
Self Center							
Girls	57	77	20	55	53	-2	22*
Boys	48	56	8	51	52	1	7*
Teen Talk							
No experience							
Girls	0	35	35	0	65	65	-30*
Boys	0	55	55	0	65	65	-10

*p<.05. Notes: The outcome measures used to assess contraceptive use were: **Postponing Sexual Involvement**—the percentage of sexually active teenagers consistently using contraceptives; **Reducing the Risk**—the percentage of sexually active teenagers using contraceptives all or most of the time; **Self Center**—the percentage of sexually active teenagers protected at last intercourse by a method requiring preparation; **Teen Talk**—the percentage who used the pill, the condom, the diaphragm, foam or the sponge at last intercourse. The School/Community Program did not measure changes in contraceptive use.

Table 4. Calculation of the effects of selected pregnancy prevention programs on the percentage of adolescents becoming pregnant or causing a pregnancy

Program, sexual experience at baseline and gender	Treatment group			Control group			Mean difference
	Base-line	Follow-up	Change	Base-line	Follow-up	Change	
Postponing Sexual Involvement							
No experience							
Girls	0	3.0	3	0	4.3	4.3	-1.3†
School/Community Program							
All girls‡	7.7	3.7	-4.0	(a) 9.0 (b) 7.5	7.1 8.2	-1.9 0.7	-2.1 -4.7*
Self Center							
Sexually active girls§	23	17	-6	27	37	10	-16*
Teen Talk							
No experience							
Girls	0	9	9	0	13	13	-4
Boys	0	7	7	0	3	3	4

*p<.05. †Significance of pregnancy findings not reported because of the small number of cases. Among 168 participants without sexual experience at baseline, five became pregnant, while among 70 similar control girls, three became pregnant. ‡Average adjusted pregnancy rates for all teenage girls in the program area of Bamberg County (Denmark) compared with the pregnancy rate in (a) the nonintervention half of Bamberg County and (b) one of the three noncontiguous counties that served as controls. (All three had significantly higher pregnancy rates at follow-up.) §Approximate percentages based on cumulative life-table calculations of pregnancies for sexually active females becoming pregnant in the 20 months prior to the baseline and follow-up surveys (see: L.S. Zabin, 1992, reference 5, Figure 7.3, p. 173). Specific pregnancy results for Reducing the Risk were not published, but were reported as not significant.

portion of sexually active teenagers who would use contraceptives without the program. Programs may be able to bring about a larger proportionate increase in use in areas where adolescent contraceptive use is relatively low than in areas where a majority of sexually active teenagers use contraceptives regularly.

For example, large changes in contraceptive use occurred among participants in Postponing Sexual Involvement in Atlanta, even though the actual rates of use at follow-up were relatively low: Half of the adolescents who participated in the program before initiating sexual activity were method users at follow-up, compared with one-third of nonprogram teenagers. In contrast, in the California schools where Reducing the Risk was implemented, 75% of the sexually active students who received the program before initiating sex reported consistent contraceptive use, compared with 64% of nonprogram students. The difference between the two California groups at follow-up was much smaller than the one between the two Atlanta groups (11 percentage points vs. 17 percentage points). These comparisons indicate the importance of looking closely at local levels of adolescent sexual experience and contraceptive use before setting program goals or projecting the effects of new program activity.

Of the three programs that demonstrated a significant increase in contraceptive use, the Self Center was the most active in providing contraceptive services (through a school-linked clinic); Postponing Sexual Involvement indirectly promoted access to contraceptive services by using staff from

Grady Hospital's family planning program to provide education in the schools and encourage use of the hospital's services by sexually active adolescents.

Reducing Teenage Pregnancy

Although several programs have demonstrated an ability to influence teenage behavior regarding sexual activity and contraceptive use, few have been able to show that such behavior changes actually contribute to lower rates of pregnancy or childbirth. Evaluators face numerous problems in calculating accurate outcome rates. Collecting accurate data on pregnancies is difficult unless there is some way to verify self-reported behavior using medical records. Even if evaluators have access to reliable data, the follow-up period is often too short to assess whether real change is occurring. The populations being evaluated are not very large and pregnancy rates must therefore be calculated using a small number of events that may fluctuate greatly from year to year. Finally, pregnant adolescents are more likely to drop out of school and be lost to follow-up—a problem that would disproportionately affect the group (treatment or control) that had the greater number of pregnancies.

Among the three programs that demonstrated a significant impact on sexual initiation and contraceptive use, the only one to demonstrate a significant impact on teenage pregnancy rates was the Baltimore Self Center (Table 4), which was also the program most active in arranging for contraceptive care for sexually active students. In the Baltimore treatment schools, 23% of sexually active teenage

girls had experienced a pregnancy during the 20 months prior to program initiation. This percentage fell to 17% during the 20 months preceding the follow-up survey, while the proportion of sexually active girls becoming pregnant at the comparison school rose from 27% to 37% during the program period. Thus, the 16-percentage-point mean difference reflects not only the absolute decrease in the pregnancy rate at the program school, but also the substantial increase at the nonprogram school during the period evaluated.

A fourth program, which did not include an evaluation of change in sexual activity or contraceptive use, has also demonstrated a significant impact on the proportion of adolescents becoming pregnant. In rural South Carolina, a comprehensive school- and community-based program lowered the proportion of girls aged 14–17 who became pregnant from 7.7% during the period prior to the program (1981–1982) to 3.7% after the program had been fully implemented (1984–1986), a decrease of four percentage points. In comparison, the change in the proportion of girls becoming pregnant during the same period in six nearby counties and the nonintervention half of the program county varied from a decline of 1.9 percentage points to an increase of 0.7 percentage points. The change in pregnancy rates in the program area was significantly greater than the change experienced by four of the seven control areas.

However, researchers continuing to follow the impact of this program found that the reduction in pregnancy rates was not sustained. Although broad community support was generated initially, this support deteriorated when some segments of the community realized the extent to which school staff were promoting contraceptive use among students. The program was changed in ways that greatly reduced student access to contraceptives, and the percentage of adolescents in the program area becoming pregnant rose to 6.6% in 1987–1988, a percentage that was no longer significantly lower than the level in any of the control areas.

Conclusions

Our review of the impact of five carefully evaluated pregnancy prevention programs leads us to several conclusions. First, these programs significantly changed the behavior of participating adolescents. Their evaluations show that all four of the programs that measured adolescent sexual and contraceptive behavior delayed the initiation of sexual activity among many

teenagers and that three of these four programs increased the proportion of sexually active teenagers using contraceptives.

The failure of most programs to demonstrate a significant change in the pregnancy experience of participants relative to controls should not discourage attempts to initiate pregnancy prevention programs or cause us to dismiss their real achievements in altering adolescent sexual and contraceptive behavior. Given all the inherent problems, measuring program impact on pregnancy rates is very difficult.

If fewer adolescents are sexually active, and if more of those who are sexually active consistently use effective contraceptives, fewer adolescent pregnancies will occur. Fewer adolescent pregnancies will lead to fewer adolescents giving birth, as well as to fewer adolescents who turn to abortion to end an unintended pregnancy.

Second, we can use the data from these program evaluations to speculate about the effects that might result from widespread implementation of programs similar to those we have reviewed here, although the size of these effects, and therefore the numbers of adolescents who might be expected to alter their behavior, vary widely from program to program and within programs according to participant characteristics. We know little about the processes behind such variations, but we can make some generalizations based on our review.

For example, among adolescents who received the Postponing Sexual Involvement and Teen Talk curricula, boys were more likely than girls to remain abstinent, perhaps because the support the program provided for that behavior is seldom given to males in our society. The role-playing exercises and interactive discussions in these programs may have encouraged boys to think about their relationships in new ways.¹¹

The programs we reviewed have demonstrated that they can reduce the rate of teenage sexual initiation by as much as 15 percentage points during the year or two following participation. This effect appears to be greatest when programs target younger adolescents. Among older teenagers, for whom delay of sexual activity is less likely, programs are more likely to affect the use of contraceptives. Given the size of the effects on contraceptive use in the programs reviewed here, widespread implementation of similar programs might increase the percentage of sexually active adolescents who consistently use contraceptives by as much as 22 percentage points.

Finally, we must acknowledge that even widespread replication of these or similar programs would not eliminate teenage pregnancy in the United States. The problem and its determinants are too deeply intertwined with poverty, disadvantage and teenage sexual and interpersonal relationships to be responsive to short-term programs implemented after many teenagers have already become sexually active. None of the programs reviewed here persuaded all participants to remain abstinent or to use contraceptives, and none kept all girls from becoming pregnant.

Throughout the 1980s, the proportion of teenagers engaging in sexual intercourse rose, and the age at which they first did so decreased.¹² Thus, programs that focus on promoting abstinence and delaying the initiation of teenage sexual activity have a formidable task. Evidence that participants in some programs delayed their first intercourse is encouraging, even if levels of sexual experience among participants eventually equal those among nonparticipants. Adolescents who delay intercourse are more likely to have stable relationships, to make better choices of partners and to be more skilled at communicating and at negotiating sexual behavior and contraceptive use. Current data indicate that those who begin intercourse at an older age are more likely to use a contraceptive the first time they have sex.¹³

The data from these five evaluations point to the need for continued program development and evaluation in a number of areas. We need to test alternative approaches and combinations of program components. We also need to implement and evaluate interventions similar to those reviewed here in different groups and settings. For example, most of the participants in these programs were black adolescents living in low-income areas. The effects of program implementation might be different among adolescents with higher family income and those who are white or Hispanic. For example, at any given age, such adolescents are less likely to have had intercourse than are those who are poor or black, so interventions directed to them may show larger effects on contraceptive use.

We need not only more program evaluations, but more detailed reports of the analytical methods used in and the results of such research. Given appropriate information, future reviewers of pregnancy prevention programs will be able to use meta-analysis and other techniques to shed light on questions we have had to leave unanswered. At the same time, research is needed to determine how such

factors as poverty and media messages about sexuality and relationships affect adolescent sexual and childbearing behavior so that we can address environmental influences that foster early sexual activity, pregnancy and childbearing.

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