

Effective Curriculum-Based Sex and STD/HIV Education Programs for Adolescents

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ABSTRACT—*High rates of teen pregnancy and sexually transmitted disease (STD) are important problems in the United States. Curriculum-based sex and STD/HIV education programs have been proffered as a partial solution. This article reviews evaluations of the impact of such programs that met specified criteria and finds that about two thirds of programs had a significant impact on behavior. The proportion having a negative impact was less than expected by chance. Those having a positive impact had such effects as delaying the initiation of sex, reducing the frequency of sex or the number of sexual partners, and increasing the use of condoms or other contraceptive methods. Positive findings were robust across different groups of youth and replication of programs in different locations. Programs with 17 specific characteristics were much more likely to be effective than programs without these characteristics. These programs alone cannot dramatically reduce teen pregnancy and STD, but they can contribute to the reduction of those problems.*

KEYWORDS—*sex education; HIV education; adolescents; teen pregnancy; teen rates of sexually transmitted disease; sexual behavior; quantitative studies*

Despite recent declines, the U.S. teen pregnancy rate remains very high relative to that of other developed nations. In 2002, among all

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females aged 15–19, about 75 per 1,000 became pregnant (Guttmacher Institute, 2006). The rate is higher for African Americans (134 per 1,000) and Hispanics (132 per 1,000) than for non-Hispanic Whites (48 per 1,000; Guttmacher Institute, 2006). All told, more than 30% of girls in the United States become pregnant before they reach the age of 20 (National Campaign to Prevent Teen Pregnancy, 2006). In 2001, about 82% of these teen pregnancies were unintended (Finer & Henshaw, 2006). Consistent with this very high teen pregnancy rate is the very high teen birth rate (40 births per 1,000 for 15- to 19-year-old females in 2005; Martin, Hamilton, Ventura, Menacker, & Kirmeyer, 2006).

These teen pregnancies and births generally have negative consequences for those involved, especially when the girls in question are younger than 18 years of age (Hoffman, 2006). Girls in this group are less likely to complete high school or attend college and are more likely to have large families and to be single parents. They work as much as women who delay childbearing for several years but their earnings must provide for a larger number of children (Hoffman, 2006; Maynard, 1997). Compared with children born to mothers older than age 18, their children have less supportive and stimulating home environments, lower cognitive development, worse educational outcomes, higher rates of behavior problems, higher rates of incarceration (if male), and higher rates of adolescent childbearing themselves (Hoffman, 2006; Maynard, 1997).

Teen sexual activity also leads to high rates of sexually transmitted disease (STD). Although young people aged 15–24 represent 25% of the sexually active population in the United States, they account for about half of all new cases of STD (Weinstock, Berman, & Cates, 2004). This means that nearly 4 million cases of STD occur annually among teens (Kaiser Family Foundation, American Social Health Association [ASHA], 1998). In addition, about one third of all sexually active young people become infected with an STD by age 24 (Kaiser Family Foundation, American Social Health Association [ASHA], 1998). The rates of STD are typically much higher for African

American teens and slightly higher for Hispanic teens than they are for White teens.

These high rates of teen pregnancy and STD are caused by teens' having unprotected sex. On average, almost 13 years elapse between the age at which adolescents become fertile (about 12.6 years for girls and 14.0 years for boys; The Alan Guttmacher Institute, 2002; U.S. Census Bureau, 2004) and the age at which they marry (about 25.3 years for girls and 27.1 years for boys; The Alan Guttmacher Institute, 2002; U.S. Census Bureau, 2004). This creates a long period during which young people need to avoid unintended premarital pregnancy and STD, either through abstinence from sex or the use of condoms or other forms of contraception.

The proportion of teens who have ever had sexual intercourse increases steadily with age. For example, across the United States in 2005, 34% of 9th graders and 63% of 12th graders reported ever having had sexual intercourse (Centers for Disease Control and Prevention, 2006). Although most sexually experienced teenagers report that they use contraception, especially condoms and oral contraceptives, at least some of the time (Suellentrop, 2006), many teenagers, like adults, do not use contraceptives correctly and consistently and thereby expose themselves to risks of pregnancy or STD (Abma, Chandra, Mosher, Peterson, & Piccinino, 1997).

Accordingly, many schools, youth-serving organizations, and adolescent reproductive health professionals have developed and implemented a wide variety of education programs to reduce unintended pregnancy and STD among young people. Some of these programs are based on a written curriculum and are implemented with groups of young people. These programs are particularly well designed to be implemented both in schools, where they can potentially reach large numbers of youth, and in clinic and community settings, where they can reach other youth, including potentially higher risk youth who have dropped out of school. Typically, these programs strive to delay the initiation of sex, increase the return to abstinence, reduce the number of sexual partners, or increase condom or other contraceptive use. This review summarizes the results of those studies meeting specified criteria.

METHOD

To be included in this review, each study had to meet a number of intervention and evaluation criteria. In terms of intervention, the program studied had to be a curriculum- and group-based abstinence, sex, or STD/HIV education program (as opposed to an intervention limited to spontaneous discussion, one-on-one interaction, or broad school, community, or media awareness activities). The program also had to focus primarily on sexual behavior (as opposed to a variety of risk behaviors such as drug use, alcohol use, violence, and sexual behavior), target adolescents of middle school or high school age, and be implemented in the United States.

In terms of evaluation, the research had to have a sample size of at least 100 and include a reasonably strong experimental or quasi-experimental design with well-matched intervention and comparison groups and both pretest and posttest data collection. The research also had to include measures of program impact on one or more sexual behaviors (i.e., initiation of sex, frequency of sex, number of sexual partners, use of condoms or contraception, and composite measures of sexual risk, such as frequency of unprotected sex), pregnancy rates, birth rates, or STD rates. For those behaviors that can change quickly, impact had to be measured for at least 3 months; for those that change less quickly, impact had to be measured for at least 6 months. Finally, the study had to have been completed or published in 1990 or thereafter. (To be as inclusive as possible, we did not limit studies to those published in peer-reviewed journals.)

Studies meeting these criteria were coded according to whether or not they had a significant impact on each sexual behavior specified above for either the entire sample or an important subsample (e.g., males or females or sexually experienced or inexperienced youth). The methods for identifying and coding these studies are described more fully in Kirby (2007).

RESULTS

Fifty-five studies of curriculum-based programs were found that met these criteria. Seven of them were abstinence programs and 48 were comprehensive programs that encouraged both abstinence and the use of condoms or other forms of contraception if sexually active. (The references for these studies are marked with an asterisk in the list of references.)

Of all 55 programs, 15% focused only on reducing teen pregnancy, 45% focused only on preventing STD/HIV, and about 40% focused on both. The greater emphasis on STD/HIV prevention undoubtedly reflects concern about young people contracting HIV and the resources devoted to reducing STD/HIV transmission.

Impact on Behaviors

These studies demonstrate very clearly that a substantial percentage of sex and STD/HIV education programs significantly decreased one or more types of sexual behavior and that such programs did not increase sexual behavior, as some people have feared (Table 1).

More specifically, of those studies that measured impact on one or more sexual behaviors, 41% delayed the initiation of sex, 31% decreased the frequency of sex (which includes returning to abstinence), and 40% reduced the number of sexual partners. In contrast, none of them hastened the initiation of sex, none increased the frequency of sex, and only one program increased the number of sexual partners. Given the large number of coefficients observed for impact on sexual behavior, the increase found with this one program is less than would have been expected by chance.

Table 1
Curriculum-Based Sex and STD/HIV Education Programs:
Number of Studies Reporting Effects on Different Sexual
Behaviors and Outcomes

Outcomes measured	All programs (N = 55)	
	N	%
Delay sex		(n = 39)
Hastened initiation	0	0
No significant results	23	59
Delayed initiation	16	41
Reduce frequency of sex		(n = 26)
Increased frequency	0	0
No significant results	18	69
Reduced frequency	8	31
Reduce number of partners		(n = 27)
Increased numbers	1	4
No significant results	15	56
Reduced number	11	40
Increase condom use		(n = 36)
Reduced use	0	0
No significant results	21	58
Increased use	15	42
Increase contraceptive use		(n = 10)
Reduced use	1	10
No significant results	5	50
Increased use	4	40
Reduce sexual risk taking		(n = 24)
Increased risk	0	0
No significant results	9	38
Reduced risk	15	62

Of the studies that measured the use of condoms and other forms of contraception, 42% reported an increase in condom use and 40%, an increase in contraceptive use. Recognizing that STD/HIV transmission and pregnancy can be reduced either by reducing sexual activity or by increasing condom or contraceptive use, some studies developed composite measures of sexual activity and condom use, such as “frequency of unprotected sex” or “number of unprotected sexual partners.” These measures are strongly related to STD/HIV transmission and pregnancy. Programs were very effective at reducing these measuring of unprotected sex—with 62% having a positive impact.

Overall, these studies strongly indicate that the programs were far more likely to have a positive impact on behavior than a negative impact. Across all 55 studies, about two thirds (64%) had a significant positive impact on one or more of the relevant sexual behaviors or outcomes and more than one third (38%) had a positive impact on two or more behaviors. For example, *Becoming a Responsible Teen* increased abstinence, reduced the number of sexual partners, increased condom use, and reduced unprotected sex (St. Lawrence et al., 1995). Similarly, the *Safer Choices* intervention delayed the initiation of sex among Hispanic youth and increased both condom and contraceptive use among both boys and girls of all races/ethnicities (Kirby et al., 2004). More generally, these studies indicate that it is

possible both to reduce sexual behavior and to increase condom or contraceptive use.

In contrast, only 4% had a significant negative impact on one or more of these behaviors or outcomes and none had a negative impact on two or more behaviors. As noted above, given the large number of coefficients observed (about eight per study), this is less than the percent expected by chance.

Abstinence Versus Comprehensive Programs

Because of the small number of abstinence studies meeting the criteria for this review (seven studies), fewer conclusions about these programs can be reached. However, the results of the seven studies do demonstrate clearly that some intensive abstinence-until-marriage programs are not effective at changing behavior, either by delaying sex, increasing the return to abstinence, or reducing the number of sexual partners (Trenholm et al., 2007). They also do not affect condom or contraceptive behavior. It remains true that there is very little evidence that any abstinence program delays the initiation of sex. However, there is weak evidence that one abstinence program may have delayed the initiation of sex among middle school youth (Denny & Young, 2006). The evidence certainly suggests that abstinence programs will not “eliminate risk,” as some proponents of abstinence programs claim, and thus there will remain a need for comprehensive programs to address the issues facing youth who do have sex.

These results do not mean that all abstinence programs are ineffective. Indeed, the number of abstinence programs that have been evaluated remains small, especially given the diversity of abstinence programs. Furthermore, in the future, studies demonstrating that one or more abstinence programs are effective at delaying the initiation of sex may be published. Presently, however, no abstinence programs show strong evidence of achieving this goal.

In contrast, comprehensive programs have strong evidence that they can delay the initiation of sex, reduce the frequency of sex and number of sexual partners, or increase condom and contraceptive use (Coyle et al., 2001; Jemmott, Jemmott, Braverman, & Fong, 2005; Jemmott, Jemmott, & Fong, 1992, 1998; St. Lawrence et al., 1995). Given that 48 of the 55 studies were studies of comprehensive programs, the results for comprehensive programs only are very similar to those for all studies in Table 1.

Magnitude and Duration of Effects

Although Table 1 summarizes the percentage of programs that had effects on each behavior, it does not summarize the magnitude of the impact of these programs. Estimating the magnitude is difficult. On the one hand, effective programs had meaningful behavioral results. The following examples are from studies that used experimental designs and found effects lasting between 12 and 31 months. *Safer Choices* reduced the mean number of acts of sexual intercourse not protected by a condom

from 3.82 times in a 3-month period to 2.44 times, a 37% reduction (Coyle et al., 2001). *Making Proud Choices! A Safer Sex Approach to STD, Teen Pregnancy, and HIV/AIDS Prevention* reduced the percentage of youth who reported unprotected sex during the previous month from 10.8% to 5.4%, a 50% reduction, and also reduced the mean number of acts of unprotected intercourse during the previous month from 0.51 to 0.17, a 67% reduction (Jemmott, Jemmott, & Fong, 1998). *Becoming a Responsible Teen* reduced the percent of sexually inexperienced youth who initiated sex during a 12-month period from 31% to 12%, a 63% reduction (St. Lawrence et al., 1995). And *SIHLE* (Sistas, Informing, Healing, Living, Empowering) increased the consistent use of condoms by about 30% (DiClemente et al., 2004). These are the studies that had the strongest evidence for success.

However, for several reasons, these improvements in behavior are somewhat misleading, and people implementing the programs in question should not expect to obtain such positive results. First, although all these results measure important aspects of sexual risk taking or pregnancy, they are also among the largest effects in each study. Typically, these studies did not have such large effects on other behavioral outcomes. For example, *Making Proud Choices!* did not have as large an impact on delaying the initiation of sex as it did on reducing unprotected sex. Second, although all these results were statistically significant, all the estimates had rather large confidence intervals—meaning that chance probably affected the size of some of these results. In theory, chance could either enhance or diminish the apparent effects of these programs. However, given that the cited effects were among the largest, it is likely that chance enhanced some of them and that replications would be more likely to report smaller effects.

Robustness of Findings

The findings on the programs examined were remarkably robust. The different programs were effective in different communities and cultures throughout the country. They were effective, for example, with youth in low- and middle-income communities in both rural and urban areas, and they were effective in school, clinic, and community settings. The programs were also effective with both younger and older youth and with both males and females. (It is encouraging that programs increased reported condom use, even among females who had less direct control over condom use.) Not every program was effective with every group, but one or more programs were effective with each of these groups.

Robustness was also demonstrated in replication studies. A critically important question is whether or not a program that has been found to be effective when designed, implemented, and evaluated by a well-funded and highly skilled research team will subsequently be effective when implemented by others in different communities. Four curricula have been evaluated two or more times and have demonstrated continued effectiveness when implemented with fidelity by others

in different communities (Hubbard, Giese, & Rainey, 1998; Jemmott, 2005; Jemmott et al., 1992, 1998; Jemmott et al., 2005; Kirby, Barth, Leland, & Fetro, 1991; St. Lawrence, Crosby, Brasfield, & O'Bannon, 2002; St. Lawrence et al., 1995; Zimmerman et al., 2008). It is less clear whether effective programs remained effective if they (a) were shortened considerably, (b) omitted activities that focus on increasing condom use, or (c) were designed for and evaluated in community settings but were subsequently implemented in classroom settings.

Impact of Programs on Risk and Protective Factors That Affect Sexual Risk Behaviors

Although the summary above provides strong evidence that a majority of the programs had an impact on sexual risk behaviors, it does not specify *how or why* they did. Those questions can be informed by examining what impact the programs had on the risk and protective factors they attempted to modify in order to change behavior. Of the studies that measured impact on the following risk and protective factors, about half or more found a statistically significant impact:

- Knowledge about HIV and STD (including methods of preventing STD/HIV and pregnancy).
- Perceived risk of HIV or STD.
- Values and attitudes regarding sexual topics (e.g., abstinence and condoms).
- Self-efficacy to refuse sex, to obtain and use condoms, and to avoid risk.
- Motivation to avoid sex or restrict the number of sex partners.
- Intention to use a condom.
- Intention to avoid risk.
- Communication with partner.
- Communication with parents.
- Avoiding situations that could lead to sex.

In sum, the evidence was strong that many programs had positive effects on relevant knowledge, awareness of risk, values, attitudes, self-efficacy, and intentions—the very factors specified by many psychosocial theories as being the determinants of behavior. Furthermore, all these factors have been demonstrated empirically to be related to their respective sexual behaviors (Kirby, Lepore, & Ryan, 2005). Thus, it appears highly likely that changes in these factors contributed to the changes in sexual risk-taking behaviors.

Common Characteristics of Effective Curriculum-Based Programs

An in-depth coding of the effective curricula and a smaller number of ineffective curricula led to the identification of 17 common characteristics of effective programs. The methods used to identify these characteristics are discussed in Kirby, Laris, and Roller (2006). The 17 characteristics of effective curricula describe their development, content, and implementation. The large majority of the effective programs reviewed here incorporated most of these 17 characteristics and were much more likely

to change behavior positively than were programs that did not incorporate many of these characteristics.

The 17 characteristics, described more fully in Kirby et al. (2006), are presented in Table 2. A tool to assess whether or not curricula incorporate these characteristics has also been developed (Kirby, Roller, & Wilson, 2007).

Programs that were effective consistently gave a clear message about behavior, most commonly, some version of the

following: “You should always avoid unprotected sex. Abstinence is the safest and best behavior. If you have sex, always use protection against pregnancy and STD.”

The teams of people who developed the effective curricula appeared to create logic models when they designed their curricula. That is, they specified (a) the health goals they wished to achieve (e.g., reductions in teen pregnancy or STD), (b) the behaviors they wanted to change in order to achieve these

Table 2
The 17 Characteristics of Effective Curriculum-Based Sex and STD/HIV Education Programs

The process of developing the curriculum	The contents of the curriculum itself	The process of implementing the curriculum
<ol style="list-style-type: none"> 1. Involved multiple people with different backgrounds in theory, research, and sex and STD/HIV education to develop the curriculum 2. Assessed relevant needs and assets of target group 3. Used a logic model approach to develop the curriculum that specified the health goals, the behaviors affecting those health goals, the risk and protective factors affecting those behaviors, and the activities addressing those risk and protective factors 4. Designed activities consistent with community values and available resources (e.g., staff time, staff skills, facility space, supplies) 5. Pilot tested the program 	<p data-bbox="610 638 911 665">Curriculum goals and objectives</p> <ol style="list-style-type: none"> 6. Focused on clear health goals—the prevention of STD/HIV and/or pregnancy 7. Focused narrowly on specific behaviors leading to these health goals (e.g., abstaining from sex or using condoms or other contraceptives), gave clear messages about these behaviors, and addressed situations that might lead to them and how to avoid them 8. Addressed multiple sexual psychosocial risk and protective factors affecting sexual behavior (e.g., knowledge, perceived risks, values, attitudes, perceived norms, and self-efficacy) <p data-bbox="630 1192 987 1220">Activities and teaching methodologies</p> <ol style="list-style-type: none"> 9. Created a safe social environment for youth to participate 10. Included multiple activities to change each of the targeted risk and protective factors 11. Employed instructionally sound teaching methods that actively involved the participants, that helped participants personalize the information, and that were designed to change each group of risk and protective factors 12. Employed activities, instructional methods, and behavioral messages that were appropriate to the youths’ culture, developmental age, and sexual experience 13. Covered topics in a logical sequence 	<ol style="list-style-type: none"> 14. Secured at least minimal support from appropriate authorities such as departments of health or education, school districts, or community organizations 15. Selected educators with desired characteristics (whenever possible), trained them, and provided monitoring, supervision, and support 16. If needed, implemented activities to recruit and retain youth and overcome barriers to their involvement (e.g., publicized the program, offered food, or obtained consent) 17. Implemented virtually all activities with reasonable fidelity

health goals, (c) the risk and protective factors that have a causal impact on these behaviors, and (d) activities that would improve those risk and protective factors. They often used health and sociopsychological theories (e.g., social cognitive theory, the theory of planned behavior, the health belief model, and other theories) to identify the important mediating factors (e.g., knowledge, attitudes, perception of norms, self-efficacy, intentions), which in turn affect behavior. Sometimes they also used instructional theory to determine what types of activities would produce positive change in these mediating factors.

Effective curricula incorporated multiple activities designed to improve each of the important mediating factors. These activities, geared to the students' gender, age, and level of sexual experience, got youth actively involved and helped them personalize the information. They included, for example, games to increase students' knowledge, role-playing exercises to improve their skills to say no to sex or to insist on using condoms or contraception, and anonymous voting activities about what sexual behaviors are right for them (e.g., abstinence or having sex with protection) to change perception of peer norms. The activities also had youth describe the characteristics of the situations that might lead to unintended, unwanted, or unprotected sex and then had them describe strategies for avoiding these situations or getting out of them. If programs were implemented in schools, then they were typically quite long (e.g., 11 or more sessions) in order to include enough activities to change the mediating factors and behavior.

In order to implement these activities, effective programs, especially school-based programs, provided training to the educators, received parental consent, and implemented virtually all the activities.

DISCUSSION

The evidence for the positive impact on behavior of comprehensive sex and STD/HIV education programs for adolescents is quite strong and encouraging.

- Two thirds of the programs that emphasized both abstinence and condoms/contraception had a significant positive impact on behavior. Many either delayed or reduced sexual activity or increased condom or contraceptive use or both.
- The evidence is also strong that these programs did not have negative effects. In particular, they did not hasten or increase sexual behavior, as some people have feared they might.
- These studies clearly demonstrate that it is possible both to delay sex and to increase use of condoms or other forms of contraception with the same programs. In other words, a dual emphasis on abstinence and on use of protection for those who do have sex is not confusing to young people; rather, it is realistic and effective.
- In contrast, programs that encouraged abstinence without encouraging condom or contraceptive use currently have

little evidence that they delay the onset of sex or otherwise affect sexual behavior.

- Some comprehensive programs had long-term effects lasting several years, but most failed to measure impact for that long a period.
- Most programs also improved psychosocial mediating factors known to be related to sexual behavior. These studies help explain how or why programs are effective and increase confidence in the positive behavioral outcomes.
- Positive findings were quite robust across different communities, settings, and groups of youth.
- Curricula that were effective typically incorporated 17 characteristics that described their development, content, and implementation.

Despite this evidence for the success of many programs, there are important limitations to both the 55 studies and this review of them. For example, few studies described their respective programs adequately, none examined programs for youth engaging in same-sex behavior, many were statistically underpowered, most did not adjust for multiple tests of significance despite having multiple tests, few measured impact on either STD or pregnancy rates, and still fewer measured impact on STD or pregnancy rates with biomarkers. And, of course, there are inherent publication biases that affect the publication of studies: Researchers are more likely to try to publish articles if positive results support their theories and programs, and journals are more likely to accept articles for publication if results are positive. Fortunately, some of these biases counteract each other.

Although 55 studies may seem like a large number, the relatively small number of studies clearly demonstrating lack of any behavioral impact makes it more difficult to identify the important characteristics that distinguish effective programs from ineffective ones. The small number of studies demonstrating no impact also precludes formal statistical meta-analyses that could more rigorously test the importance of each of the 17 characteristics of effective programs.

These study limitations point to areas for further research. For example, future studies should examine the impact of programs for important groups of youth previously neglected in past studies (e.g., gay and lesbian youth). Future studies should better measure impact on psychosocial mediating factors and both pregnancy and STD rates (without neglecting sexual behavior) in order to better understand the important pathways through which programs have an impact ultimately on pregnancy and STD. And, of course, to the extent feasible, they should use randomized trials with adequate statistical power and appropriate statistical analyses.

Given the strong evidence that comprehensive programs emphasizing both abstinence and use of condoms and contraception can change behavior in positive ways, perhaps the single most promising strategy for policy makers and educators is to implement programs with strong evidence that have been

shown to be effective with adolescent populations similar to those being targeted. These programs include curricula found to be effective in both school and community settings (Barth, 2004; Coyle & Fetro, 1998; DiClemente et al., 2006; Fetro, Barth, & Coyle, 1998; Jemmott, Jemmott, & McCaffree, 2002; St. Lawrence, 2005). These programs should be implemented both widely and with fidelity.

The second most promising strategy is to select and implement widely programs that incorporate the 17 key characteristics of programs that have been effective with populations similar to those being targeted. Programs with these characteristics are also more likely to change behavior. If implemented broadly with fidelity, these and other programs with evidence of success can contribute to further reductions in teen pregnancy and STD in this country.

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