

Effectiveness of Abstinence-only Intervention in Middle School Teens

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Objectives: To examine effectiveness of abstinence-until-marriage curriculum on knowledge, beliefs, efficacy, intentions, and behavior. **Methods:** Nonrandomized control trial involving 2069 middle school students with a 5-month follow-up. **Results:** Intervention students reported increases in knowledge and abstinence beliefs, but decreases in intentions to have sex and to use condoms. Intervention did not influence sexual initiation or condom use; however, intervention students who had sex during the

evaluation period reported fewer sexual episodes and fewer partners than did controls. **Conclusions:** Abstinence-until-marriage interventions can influence knowledge, beliefs, and intentions, and among sexually experienced students, may reduce the prevalence of casual sex. Reduction in condom use intentions merits further study to determine long-term implications.

Key words: abstinence, sexual behavior, interventions, adolescent

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National data has documented a decline in the rate of sexual activity among adolescents over the past 10 years, with the percentage of sexually experienced high school students dropping from 54.1% in 1991 to 45.6% in 2001.¹ However, for most, the age of sexual initiation still occurs during the teen years,² and the rates of early sexual initiation (ie, prior to age 13) remains

high, particularly among minority youth.^{2,3} In 2001, rates of early sexual initiation among African Americans were twice that of Hispanic youth and 3 times that of white youth (16.3%, 7.6%, 4.7%, respectively).²

The consequences of and risks related to early sexual initiation are well documented,⁴⁻⁹ including increased likelihood of multiple partners and the increased risk of teen pregnancy and STDs, as well as the social and emotional consequences such as reduced likelihood of finishing high school, the increased likelihood of being a single parent, and the likelihood of regretting having been sexually active so early in life.^{5,9,10}

For these reasons, health educators and public health officials continue to seek effective methods to reduce the incidence of early sexual initiation and the rates of high-risk sexual activity among young adolescents.¹¹ A common approach is the classroom-based curriculum, and over the past decade the content of these curricula have increasingly focused on

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abstinence.^{12,13} This evolution has been influenced by the concerns listed, as well as a change in the federal welfare law in 1996 that has allocated at least \$50 million per year since then to abstinence-only education.^{14,15} The premise of this law is to encourage teens to abstain from, or at the very least postpone, sexual initiation, arguing that a delay in initiation would reduce the number of years of sexual activity and the potential number of partners, which in turn would reduce the exposure to disease and risk of pregnancy. A delay is also thought to be beneficial as it provides more time for adolescents to develop the cognitive and emotional maturity needed in a healthy sexual relationship.¹⁴

The eligibility criteria for funding through this federal mechanism is quite explicit, with the law outlining specific characteristics (see Appendix, page 434) that programs must include, such as the physical, social, psychological, and emotional consequences of early sexual experimentation and the value of sexual abstinence.¹⁵ In addition, it is assumed that because sex in a monogamous, married relationship is the expected standard of behavior, discussion of contraceptives (ie, condoms) as protection against disease is not included in the list.

This has led to concerns by health educators that the absence of contraceptive information in abstinence-only programs will place adolescents at a higher risk for STDs once they engage in sexual intercourse because they will lack the information needed to protect themselves from pregnancy or disease.¹³ In addition, some argue that due to the strong emphasis on virginity there is an inherent focus on the sexually uninitiated, potentially ignoring or alienating the sexually experienced.¹⁶ However, few studies have assessed these concerns. In fact, there have been only a few published evaluations of abstinence-only programs,^{13,17-19} as compared to the numerous evaluations of more comprehensive sex education curricula (see reviews^{12,20-23}).

The purpose of this study was to examine the effectiveness of a school-based, Title V compliant, abstinence-until-marriage curriculum taught to middle school adolescents. Using a theoretical framework that draws primarily from social cognitive theory,^{24,25} we hypothesized that the intervention would affect sexual be-

havior both directly and indirectly through cognitive mediators (eg, knowledge, beliefs, efficacy, intentions) that are considered to be antecedent to sexual behavior in adolescents¹³ and that these effects could be modified by the adolescent's gender and prior sexual experience.

We hypothesized that students exposed to the intervention would report an increase in knowledge regarding HIV/AIDS, stronger beliefs in abstinence, greater confidence in resisting sexual advances, and greater intentions to abstain from sex in the future when compared to a control group of their peers. Due to the lack of contraceptive information, we hypothesized that there would be no group differences in condom-use efficacy or in the intention to use a condom in the future. Moreover, due to the emphasis on abstinence and the emotion-focused nature of the message, we hypothesized that the intervention would be strongest among the sexually inexperienced and female students. With regard to behavior, we hypothesized that the inexperienced students exposed to the intervention would be less likely to initiate, but that there would be no group differences in sexual activity (frequency, number of partners, condom use) among the sexually experienced.

METHODS

Participants

The study population comprised 3017 adolescents in seventh and eighth grades enrolled in 5 urban and 2 suburban middle schools in the Midwest during the 2001-2002 school year. Students were participants in a county-wide, state-funded teen pregnancy prevention initiative, with programming carried out by school-agency partnerships and the curriculum focus (eg, abstinence-until-marriage, abstinence-based/safer sex) varying across schools. Data for the current study were derived from the 7 schools that were assigned by the school districts to receive the abstinence-until-marriage (For Keeps) curriculum. The authors served as the independent evaluators of the county-wide program (ie, funded through the local Children and Family First Council) and were granted usage of the data for research purposes. The authors have no affiliation or conflicts of interest (financial or otherwise) with the evaluated program. IRB approval was sought and granted by the authors' institutional review board.

Curriculum

For Keeps is a 5-day (40-minute sessions) classroom-based curriculum that stresses abstinence until marriage and focuses on the benefits of abstinence and the physical, emotional, psychological, and economic consequences of early sexual activity. The curriculum emphasizes character development, and future orientation, and presents virginity as a "gift" that is shared in marriage at a time when individuals are more prepared for sexual relationships. It also emphasizes how teen pregnancy and disease can interfere with life goals, the need for and development of resistance skills, and the links between alcohol, drugs, and vulnerability to sexual advances/desires, all deemed important elements of successful prevention programs involving teens.¹⁴ The curriculum does emphasize that condoms are not 100% effective in preventing pregnancy and disease, but more emphasis is placed on how condoms and other contraceptives do not protect adolescents from the emotional consequences of sexual activity (eg, broken hearts). Finally, the curriculum is designed to address both the sexually experienced and inexperienced by emphasizing the value of renewed abstinence among the sexually experienced. In this project, the curriculum was taught by outside facilitators, recruited and trained by the locally funded agency.

Data Collection

All students were assessed at baseline via self-administered paper-based surveys (72 questions), 1 to 5 days prior to the intervention. Classrooms within each school were then assigned, based on class scheduling, to either the intervention or control arm of the study, with the intervention classrooms receiving the abstinence-until-marriage curriculum in the fall semester. (Authors of study were contracted evaluators of this community-based program and unable to dictate randomization of classrooms to intervention and control arms). A post intervention survey (70 questions) was completed by all students after a period of time ranging from 16 to 25 weeks after the end of the curriculum (mean=149 days or approximately 21 weeks). Students in classrooms assigned to the control arm then received the curriculum during spring semester, following the posttest survey.

In order to match pre- and posttest data of individual students, unique identifiers were asked (initials, classroom, date of birth, student ID, gender, race, and last 4 digits of the home phone number). Although this approach led to the loss of some data due to the inability to match information, this was considered preferable in order to assure confidentiality. All surveys were scanned using Teleform™ technology.

Only students in school on the day of data collection were assessed. Absent students were not pursued for baseline or follow-up surveys. According to the initial class rosters, 86% (3017/3490) of students enrolled in the participating classes were assessed at baseline; however, these estimates may also include those who transferred, were on suspension, or did not attend school on a regular basis, potentially attenuating the inclusion rate.

Parental consent was collected by the facilitating agency prior to program implementation. Parents were informed of the program, via a letter from the principal, approximately 2 weeks prior to the start of the curriculum with informational meetings held at each school to discuss the curriculum and survey content. Parents who did not wish their child to participate in the program and/or the pre-post test were asked to return a "decline to participate" form or to contact the school directly. All others are assumed to provide consent to the program (ie, passive consent).

Measures

Demographics. Baseline demographic measures included age (in years), gender (F=1, M=0), living arrangements (dual parents=0, other=1), self-identified ethnicity (assessed with 3 index variables for African American, Hispanic, and Other, respectively, with white students serving as the reference category), and whether students attended an urban (1) or suburban (0) school.

Knowledge. HIV/STD knowledge was assessed using a 7-item index with a true/false/not sure format, scoring the number of correct responses (range=0-7). Item examples include: "AIDS can be cured" and "a pregnant woman who has a STD can give it to her baby."

Abstinence values. Beliefs in abstinence were assessed with 2 composites of 2 items each, one assessing the belief

in abstinence until “older” and the other in abstinence until “marriage.” Examples from domains include “I believe people my age should wait until they are older before they have sex” and “It is important to me that I get married before having sexual intercourse.” Responses to these items range from (1) definitely no to (4) definitely yes.

Self-efficacy. Self-efficacy was assessed with 2 composites of 2 items each: *impulse control efficacy*, assessing the adolescent’s confidence in his or her ability to resist sexual advances; and *condom-use efficacy*, assessing the confidence in his or her ability to (a) obtain and (b) correctly use a condom (or explain use to a partner). Responses for both efficacy composites ranged from 1 to 4, based on the original response categories of (1) totally unsure to (4) totally sure; thus, the higher the score, the greater the efficacy.

Behavioral intentions. Behavioral intentions included intentions to have sex and to use a condom in the future. Intention to have sex was assessed with 2 single-item questions: intention to have sex in the next 3 months and in the next year, with responses ranging from (1) not at all likely to (4) definitely likely. Intention to use a condom was assessed with a single item, asking the likelihood of using a condom in the future, with similar response categories.

Behavioral outcomes. With the exception of frequency of sexual intercourse and condom use, binary measures of sexual activity served as our primary outcomes. Prior sexual experience was assessed at baseline (“ever had sexual intercourse?” no=0; yes=1). At follow up, sexual activity was assessed as reports of sexual intercourse during the evaluation period (no=0; yes=1). Specific to these episodes of recent sexual intercourse, students were asked the frequency of intercourse, which was included in the analyses as both a continuous variable and dichotomized at the 75/25 split as (5 times or fewer=0 and 6 or more=1). The number of sexual partners during the evaluation period was dichotomized into 1 partner (0) and 2 or more (1) to reflect multiple partnerships. Condom-use frequency was assessed by a question asking how often a condom was used during sexual intercourse during the evaluation period, with responses ranging from never (0) to every time (4). We utilized the mea-

sure as a continuous variable and as a dichotomous variable reflecting consistent condom use with those reporting use every time (1) being compared to all other responses (0).

Although we acknowledge the limitation of grouping adolescents based on very different circumstances or experiences, for descriptive brevity, we refer to adolescents who report ever having sexual intercourse as referred to as “sexually experienced” and adolescents who report sexual intercourse during the evaluation period are referred to as “sexually active.”

Analyses

To test the impact of the curriculum on the change in cognitive mediators, general linear model (GLM) analyses were used, with group membership (Intervention=1; Controls=0) as the fixed effect and covariates (age, gender, ethnicity, urban vs suburban school, sexual experience at baseline, time from pretest to posttest, and baseline measure of the outcome variable) included, producing adjusted group means for comparison. Intervention effects, when found, indicate that the change in the variable (eg, knowledge) is significantly different (larger) in the intervention group than the control group. To test whether intervention effects were conditional upon gender or sexual experience at baseline, all significant direct effects analyses were repeated, adding 2 cross-product terms (group * sexually experience and group * gender) after the main effects. These results are discussed separately within each results section.

Sexual behavior at follow-up was assessed using logistic regression (for binary outcomes) and linear regression (for continuous variables), including the same set of covariates and interaction effects as discussed above.

All analyses were conducted both in SPSS 11.5²⁶ and then in STATA 8.0²⁷ using the cluster option to test and adjust for clustering effect of the classroom assignment.

RESULTS

As shown in Table 1, 3017 students from the 7 middle schools were assessed at baseline. Of these, 2069 (69%) students completed a follow-up survey that could be successfully linked to their pretest survey through the demographic identifiers. The followed/matched (referred

Table 1
Characteristics of Followed vs Nonfollowed Students

	Followed n = 2069	Not Followed n = 948
Demographics		
Gender (Percent female)	51.3 ***	45.0
Age (Percent <13)	37.6 ***	30.8
Race		
<i>White</i>	19.1 ***	15.0
<i>African American</i>	72.8	74.7
<i>Hispanic</i>	6.0	6.2
<i>Other</i>	2.1	4.1
Parents/Guardians in Home		
<i>Percent living with 2 parents</i>	51.6***	42.4
School Location (percent urban)	52.5***	69.2
Behavioral Mediators^a		
Knowledge Score (0-7)	4.12 (1.56)	4.11 (1.54)
Belief in Abstinence Until Older	3.07 (0.89) ***	2.81 (0.94)
Belief in Abstinence Until Marriage	2.59 (1.03) ***	2.37 (1.03)
Sexual Impulse Control	3.05 (0.92) ***	2.93 (0.95)
Condom-Use Efficacy	2.53 (1.03) ***	2.75 (1.04)
Intention to Engage in Sex in the next 3 months	1.53 (0.89) ***	1.77 (1.03)
Intention to Engage in Sex in the next year	1.76 (1.04) ***	2.03 (1.14)
Intention to Use Condoms in future	3.54 (0.89)	3.52 (0.92)
Behavior		
Percent Ever had sex	23.1 ***	34.9
Percent Reporting sex in previous 3 months ^b	46.2 **	57.3

Note.

* P<.05; ** P<.01; *** P<.001

a Scales range 1 to 4 unless otherwise noted.**b** Among those ever having sexual intercourse.

to as "followed" students hereafter) students were more likely to be female, younger, white, living in a 2-parent home, and attending a suburban school than students who were not followed. Followed students also differed in their sex-related attitudes and behaviors, reporting higher levels of abstinence beliefs, and impulse control, and lower levels of condom-use efficacy, sexual intentions, and actual sexual experience than those not followed. There were no differences, however, in the proportion of followed students (53%) or nonfollowed students (55%) who received the abstinence-until-marriage intervention.

As shown in Table 2, 1096 (53%) of the followed students received the abstinence-until-marriage intervention, and 973

(47%) served as controls. On average, the students in the sample were 13 years of age; a little over half were female and a similar proportion (52%) lived with 2 parents and attended an urban (53%) school. The sample was predominantly African American (73%), followed by white (19%) and Hispanic/Latino (6%) students, and students of other racial/ethnic groups (2%). Less than a quarter (23%) of students were sexually experienced at baseline; however, among these students, nearly half (46%) reported having sex during the past 3 months.

The intervention and control groups differed on 2 variables at baseline: more suburban schools included intervention classrooms than did urban schools, and the length of time between the pretest

Table 2
Baseline Characteristics of Followed Sample

	Total n = 2069	Control n = 973	Intervention n = 1096
Demographics			
Gender (Percent female)	51.3	50.7	51.8
Age (mean, s.d.)	12.8 (.76)	12.8 (.77)	12.8 (.75)
Race			
<i>White</i>	19.1	17.8	20.3
<i>African American</i>	72.8	74.3	71.4
<i>Hispanic</i>	6.0	5.6	6.3
<i>Other</i>	2.1	2.3	1.9
Parents/Guardians in Home			
<i>Percent living with 2 parents</i>	51.6	50.6	52.5
School location (Percent urban)	52.5	57.6	48.1 ***
Days to follow-up (mean, s.d.)	149.4 (18.6)	146.9 (18.1)	151.6 (18.7)**
Behavioral Mediators^a			
Knowledge Score (0-7)	4.12 (1.56)	4.08 (1.52)	4.16 (1.60)
Belief in Abstinence Until Older	3.07 (0.89)	3.08 (0.90)	3.07 (0.88)
Belief in Abstinence Until Marriage	2.59 (1.03)	2.61 (1.01)	2.57 (1.03)
Sexual Impulse Control	3.05 (0.92)	3.09 (0.90)	3.02 (0.93)
Condom-Use Efficacy	2.53 (1.03)	2.55 (1.03)	2.52 (1.03)
Intention to Engage in Sex in the next 3 mo.	1.53 (0.89)	1.54 (0.89)	1.52 (0.89)
Intention to Engage in Sex in the next year	1.76 (1.04)	1.77 (1.04)	1.74 (1.04)
Intention to Use Condoms in future	3.54 (0.89)	3.54 (0.90)	3.55 (0.89)
Behavior			
Percent Ever had sex	23.1	23.3	22.9
Percent Reporting sex in previous 3 months ^b	46.2	46.5	45.9

Note.

* $P < .05$; ** $P < .01$; *** $P < .001$

a Scales range 1 to 4 unless otherwise noted.

b Among those ever having sexual intercourse.

and posttest differed between with intervention and controls, with the follow-up period being approximately 5 days longer for intervention students than controls. Otherwise, the intervention and control students were nearly identical with regard to sociodemographic characteristics and baseline sex-related attitudes, perceptions, and behaviors.

Cognitive Mediators

Table 3 provides the results of the multivariate analyses examining the intervention effects on the cognitive mediators. The results from STATA revealed minimal impact of clustering, affecting only one variable of interest – the inten-

tions to abstain from sex in the next 3 months (see specific results below). All other relationships remained relatively unchanged with the largest change in standard error being .002. As a result of this and due to the more intuitive results from SPSS, the unadjusted clustering analyses are presented in the tables.

HIV/STD knowledge. Students exposed to the intervention demonstrated and maintained a significant increase in HIV/STD knowledge at follow-up when compared to controls ($P < .001$; partial $\eta^2 = .012$). These results did not differ by gender or sexual experience at baseline.

Belief in abstinence. Students exposed to the intervention reported a significant

Table 3
Impact of Intervention on Behavioral Mediators, Total Sample^a

	Control n = 973	Intervention n = 1096	Partial η^2
HIV/STD knowledge scores (0-7)	4.41 (.05)	4.70 (.04) ***	.012
Belief in abstinence until older (1-4)	3.02 (.02)	3.12 (.02) ** (b)	.005
Belief in abstinence until marriage (1-4)	2.50 (.03)	2.64 (.03) ***	.010
Sexual impulse control (1-4)	3.03 (.03)	3.08 (.02)	
Condom-use efficacy	3.05 (.03)	3.06 (.03)	
Intention to engage in sex in the next 3 months	1.77 (.03)	1.69 (.03) *	.002
Intention to engage in sex in the next year	2.00 (.03)	1.91 (.03) **	.004
Intention to use condoms in future	3.65 (.03)	3.53 (.03) ** (c)	.006

Note.

* $P < .05$; ** $P < .01$; *** $P < .001$

a Reporting the mean and standard error. All models control for gender, age, ethnicity, sexual experience at baseline, urban vs suburban living, time from intervention to posttest (in days) and initial measure (to assess change).

b Significant interaction effects were found. Intervention effects on beliefs until older were only found among females and the sexually inexperienced at baseline.

c Significant interaction effect was found. Intervention effects on condom-use intentions was found only among the sexually inexperienced at baseline.

increase in their beliefs in being abstinent until older ($P < .01$; partial $\eta^2 = .005$) and abstinent until marriage ($P < .001$; partial $\eta^2 = .010$) at follow-up than did controls. A significant interaction was found in the model predicting abstinence-until-older beliefs, with the intervention effect being found only among female students and sexually inexperienced at baseline ($P < .02$).

Efficacy - impulse control and condom-use. No intervention effects were found with regard to students' perception of confidence in resisting sexual advances or in their confidence to obtain and use a condom.

Intentions - sex and condom use. Students exposed to the intervention reported a decline in their intention to have sex in the next 3 months ($P < .05$; cluster adjusted P value $< .09$), and in the next year ($P < .03$; partial $\eta^2 = .004$), as well as a decline in their intentions to use a con-

dom in the future ($P < .01$; partial $\eta^2 = .006$) when compared to controls. That is, although they reported lower intentions to have sex in the future, they also reported lower intentions to use a condom if they had sex. The intervention effects on intentions to have sex did not differ by gender or sexual experience at baseline (ie, significant for all groups); however, the impact on condom-use intentions was found only among the sexually inexperienced (irrespective of gender; $P < .05$).

Behavioral Outcomes

Table 4 provides the results of the multivariate analyses examining the intervention effects on behavioral outcomes. Although some of the results were conditional on sexual experience at baseline, there were no gender*group interactions found in any of the behavioral analyses.

The unadjusted rate of sexual intercourse among the sexually inexperienced

Table 4
Multivariate Results:^a Impact of Abstinence-Until-Marriage Intervention on Sexual Behavior Among Middle School Adolescents

	OR (95%CI)
Among all students (n=2069)	
Recent Sex ^{b,c}	0.85 (0.62, 1.15)
Among sexually inexperienced students at baseline (n=1462)	
Recent Sex ^{b,c}	0.83 (0.52, 1.33)
Among sexually experienced students at baseline (n=439)	
Recent Sex ^{b,c}	0.87 (0.58, 1.31)
Among all students who reported sexual intercourse during evaluation period (n=311)	
Frequency of sexual intercourse ^d	$\beta = -1.74$ s.e.=0.83 $\beta = -.127$ * ^e
Multiple episodes of sexual intercourse (6 or more vs 5 or less)	0.47 (0.26, 0.84) *
Two or more sexual partners	0.50 (0.30, 0.83) **
Consistent condom use ^f	1.19 (0.71, 1.99)

Note.

* P<.05; **P<.01; ***P<.001

a All models adjusted for gender, age, race, sexual experience at baseline, and time between pretest and posttest.

b Defined as sexual activity during the time between pretest and posttest.

c Results from binary logistic regression: odds ratio and 95% confidence intervals associated with group membership (intervention vs control).

d Results from linear regression: unstandardized coefficient (β), standard error, and standardized coefficient b(beta) associated with group membership (intervention vs control).

e Results from linear regression: unstandardized coefficient (β), standard error, and standardized coefficient b(beta)

f Defined as using a condom during every sexual encounter during the evaluation period.

was 5.6% (n=75/1329; 5.2% for intervention group; 6.1% for controls), and the rate of continued sexual activity among the sexually experienced was 52.2% (n=211/404; 51.2% for intervention group; 53.4% for controls). When examined within the multivariate model (Table 4), controlling for covariates, students exposed to the intervention were not statistically different from controls in their reporting of sexual activity during the 5-month period. Moreover, these results were similar for both the sexually inexperienced and experienced at baseline.

The final analyses tested the interven-

tion effects on frequency of sexual intercourse, number of partners, and condom use among students who said that they had sexual intercourse at least once during the 5-month period. Results revealed that students exposed to the intervention reported fewer episodes of sexual intercourse (P<.05) and fewer partners (P<.01) during the 5-month period than did controls. Although the effects were most pronounced among the sexually experienced at baseline when compared to those who initiated during the evaluation, the differences were not statistically significant. Lastly, there were no group differ-

ences observed with regard to condom use, when examined as a continuous measure or as a binary measure reflecting consistent condom use, nor did the relationships vary by sexual experience at baseline.

DISCUSSION

This study examined the effectiveness of an abstinence-until-marriage sex education intervention intended to increase abstinence beliefs and intention, increase efficacy in situational resistance, reduce early sexual experimentation among the sexual inexperienced, and encourage renewed abstinence among the sexually experienced. We found that compared to controls, intervention students reported significant increases in their HIV/STD knowledge, their personal beliefs about the importance of abstinence, and their intentions to remain abstinent in the near future when queried 5 months after the completion of the school-based program. The program did not have an effect on students' confidence to avoid a risky sexual situation, and intervention students who were sexually inexperienced at baseline reported a decrease in their intention to use a condom in the future.

With regard to the impact on sexual intercourse, intervention results (ie, odds ratio) went in the hypothesized (ie, protective) direction; however, the group differences were not statistically significant. That is, the program did not significantly reduce the likelihood of sexual initiation among the sexually inexperienced, nor did it reduce the likelihood of sexual intercourse among the sexual experienced.

In contrast, and somewhat surprising, our study revealed that although sexually experienced students were not more likely to abstain from sex during the follow-up period, those who did engage in intercourse reported fewer episodes and fewer sexual partners than did their sexually active peers who did not receive the intervention. That is, although the incidence of abstinence did not increase in this group, students who engaged in sexual intercourse during the evaluation period appeared to reduce the amount of casual sex, as evidenced by fewer episodes of sex and fewer sexual partners reported in the 5-month period.

Some of the study results seem counterintuitive in nature, particularly

the impact of the intervention among the already sexually experienced. Some have argued that the abstinence-until-marriage message will not appeal to students who have already had sex.¹⁶ Yet, sexually experienced intervention students were just as likely to report increases in their abstinence-until-marriage beliefs and intentions to remain abstinent in the future as their inexperienced peers. It is possible that it is because of their prior sexual experience that the abstinence message is appealing. Researchers have shown that young adolescents are highly motivated by affective cues,²⁸ and sexual intercourse certainly has strong affective appeal. Although certainly not all adolescents, some may have found that the experience of sexual intercourse was far less romantic, exciting, or pleasurable than they had expected,⁵ and perhaps for some, the initial act of sex may have been forced, unwanted, or unintended.^{4,5} Thus, the appeal of sex may have been lessened by reality, giving more consideration to the alternative, a similarly affective, emotion-focused message.

One of the most concerning findings is the decline in condom-use intentions among the sexually inexperienced, with possible implications being that these adolescents will be less likely to use a condom when they engage in sexual intercourse. However, we did not find that rates of condom use among sexual initiators were different from those of similar controls. One explanation for the decline in intentions without behavioral impact may be due to the small sample size of sexual initiators, reducing the power to detect smaller differences. Another plausible explanation is that the decline in intentions is a reflection of the increased values in abstinence until marriage, based on reasoning that if they are waiting until they are married to have sex, they will not need to use a condom.

Due to the paucity of rigorously evaluated abstinence-only programs,¹³ it is unclear whether our results are generalizable to other abstinence-only programs or only the specific program evaluated in this study (ie, Operation Keepsake). Kirby concluded in his most recent review of teen pregnancy prevention programs¹³ that there have been only 3 studies of abstinence-only programs and none of these offered evidence that they delay initiation or reduce the frequency of

sexual intercourse.

Postponing Sexual Involvement (PSI) is one of the most highly cited “successful” abstinence programs^{12,14,23,29,30} based on an initial study that found significant reduction in sexual initiation among adolescents exposed to the intervention.¹⁷ The success was limited to the sexually inexperienced, with the program having little to no impact on sexual behavior of students sexually experienced at baseline or those who engaged in sexual intercourse after the program. However, the measures assessing sexual behavior (eg, frequency, partners, etc) were severely limited. Kirby and colleagues evaluated the impact of PSI among more than 10,000 adolescents in California and found no intervention effects on sexual initiation or on frequency of intercourse of number of partners among the sexually active.³¹

In their randomized trial involving a comparison of a safer-sex curriculum to an abstinence-based curriculum,³² Jemmott and colleagues reported that the abstinence-based curriculum had a short-term protective effect on sexual initiation, but these effects washed out by 6 months. However, the abstinence-based program was not found to impact frequency of sex, frequency of unprotected sex, or condom use, with the exception of a protective effect on condom use at 12 months. Thus, our results do seem to be unique in that the program did appear to have an effect on sexual behavior of the sexually experienced. However, we do not know whether these effects are sustainable beyond the 5-month follow-up.

In interpreting the results of this study, a number of limitations must be considered. First, although the analyses revealed statistically significant intervention effects, it is important to point out that the effect sizes are quite small, ranging from .004 to .012. Thus, fueled by a large sample size, we are able to detect fairly small changes in the cognitive variables that we attribute to the intervention. This may be due to actual small changes, but also is a function of the measurement. For example, even the baseline measures of the outcome variables (eg, knowledge at baseline) explain less than 25% of the variability in the outcomes (eg, knowledge at follow-up), which suggests that the stability of the measures were not optimal.

Second, because of the broader objectives of the prevention initiative in which this abstinence-until-marriage curriculum took place, we applied a theoretical model that is more traditionally used in studying comprehensive sex education curricula,³² which has a strong emphasis on condom use. With the exception of abstinence beliefs and abstinent sexual behavior, our model did not include some of the core constructs of this particular abstinence-until-marriage curriculum, such as self-value, character development, or limit-setting efficacy. On the other hand, it enabled us to examine the intervention effects on contraceptive use, a desirable component to a rigorous examination of abstinence-only programming.¹³ As research on abstinence-only programs expand, so will the need for more explicit theoretical models that will help us to better understand the underlying mechanisms at work with this intervention approach.

Third, due to the limitations in data collection (eg, single day of collection), the students included in this study were not representative of all middle school adolescents. However, the similarity of characteristics of the intervention and control groups and the similarity in follow-up within the 2 groups suggest that group assignment bias was not an issue. Thus, although generalizability was not optimal, the group equity at baseline provided increased confidence in the intervention results.

Fourth, along this similar vein, classrooms within schools were assigned, increasing the chance for contamination across groups. However, the results of the current study are remarkably similar to the evaluation results from a prior year of this county-wide program where schools, rather than classrooms, were randomized, suggesting that contamination effects are likely to be small. Moreover, we found that the classroom assignment (ie, clustering of students within classrooms) did not influence our outcomes.

Fifth, our design is limited to 2 points in time, a limitation that does not allow for full examination of the intervention effects on behavioral outcomes. For example, in order to determine whether a change in the cognitive mediators (ie, intentions) had an independent effect on behavior, at least 3 waves of data are required. With only 2 waves we cannot

disentangle the causal order of the reports of the mediator and the behavior at follow-up.

Finally, as pointed out by Kirby,³³ a 6-month follow-up is considered to be the minimum needed to measure the impact of an intervention on initiation of sex, whereas 2-4 months follow-up is needed to accurately measure the impact of the intervention on frequency of sexual intercourse or condoms use among the sexually active. Due to the promise to schools that all students would receive the intervention during the same school year, 5 months was the maximum period available for follow-up. Thus, our length of follow-up does not meet the 6-month criteria outlined by Kirby,^{13,33} and that could affect our findings. In particular, additional follow-up time would have allowed more sexually inexperienced students to initiate sexual intercourse, creating larger proportions to compare, which provides more statistical power to detect small group differences.

In conclusion, this study provides some evidence that an abstinence-until-marriage program can affect short-term sexual behavior among adolescents. Although the program did not impact sexual initiation among the sexually inexperienced, it had a significant, unexpected effect on sexually active students, with a possible reduction in casual sex as evidenced by the reduction in multiple partners and frequency of sexual intercourse. The reduction in condom use intentions among the sexually inexperienced merits further study to determine the long-term implications; however, in this study, the reduction did not equate to less consistent condom use.

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REFERENCES

1. Trends in the Prevalence of Sexual Behaviors (1991-2001). *Centers for Disease Control and Prevention* [Internet site]. January 12, 2004. Available at: <http://www.cdc.gov/nccdphp/dash/yrbs/pdf-factsheets/sex.pdf>. Accessed March 8, 2004.
2. Youth Risk Behavior Surveillance-United States, 2001. *MMWR*. June 28, 2002;51(SS-4).
3. Miller KS, Boyer CB, Cotton G. The STD and HIV epidemics in African American youth: Reconceptualizing approaches to risk reduction. *Journal of Black Psychology*. 2004;30(1):124-137.
4. O'Donnell BL, O'Donnell CR, Stueve A. Early sexual initiation and subsequent sex-related risks among urban minority youth: the reach for health study. *Fam Plan Perspect*. 2001;33(6):268-275.
5. Dickson N, Paul C, Herbison P, et al. First sexual intercourse: age, coercion, and later regrets reported by a birth cohort. *Br Med J*. 1998;316(7124):29-33.
6. Aten MJ, Siegel DM, Enaharo M, et al. Keeping middle school students abstinent: outcomes of a primary prevention intervention. *J Adolesc Health*. 2002;31(1):70-78.
7. Paul C, Fitzjohn J, Herbison P, et al. The determinants of sexual intercourse before age 16. *J Adolesc Health*. 2000;27(2):136-147.
8. Harvey SM, Spigner C. Factors associated with sexual behavior among adolescents: a multivariate analysis. *Adolescence*. 1995;30(118):253-264.
9. Besharov DJ, Gardiner KN. Sex education and abstinence: programs and evaluation. *Children & Youth Services Review*. 1997;19(5/6):327-339.
10. Wight D, Henderson M, Raab G, et al. Extent of regretted sexual intercourse among young teenagers in Scotland: a cross sectional survey. *Br Med J*. 2000;320(7244):1243-1244.
11. Kirby D. Reflections on two decades of research on teen sexual behavior and pregnancy. *J Sch Health*. 1999;69(3):89-94.
12. Kirby D, Short L, Collins J, et al. School-based programs to reduce sexual risk behaviors: a review of effectiveness. *Public Health Rep (Washington DC)*:1974). 1994;109(3):339-360.
13. Kirby D. Emerging Answers: Research Findings on Programs to Reduce Teen Pregnancy: The National Campaign to Prevent Teen Pregnancy, 2001:1-186.
14. Thomas MH. Abstinence-based programs for prevention of adolescent pregnancies. A review. *J Adolesc Health*. 2000;26(1):5-17.
15. U.S. Social Security Act 510(b)(1). Available at: http://www.ssa.gov/OP_Home/ssact/title05/0510.htm. Accessed December 14, 2004.
16. Lamstein E, Haffner DW. Abstinence-only guidelines restrict postponing sexual involvement adaptation. *SIECUS Report*. 1998;26(3):23.
17. Howard M, McCabe JB. Helping teenagers

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- postpone sexual involvement. *Fam Plan Perspect.* 1990;22(1):21-26.
- 18.Christopher F, Roosa M. An evaluation of an adolescent pregnancy prevention program. Is "Just say no enough?" *Family Relations.* 1990;42:401-406.
- 19.Jorgensen S, Potts V, Camp B. Project Taking Charge: six months of follow up of a pregnancy prevention program for early adolescents. *Family Relations.* 1993;42:401-406.
- 20.Kim N, Stanton B, Li X, et al. Effectiveness of the 40 adolescent AIDS-risk reduction interventions: a quantitative review. *J Adolesc Health.* 1997;20(3):204-215.
- 21.Rotheram-Borus MJ, O'Keefe Z, Kracker R, et al. Prevention of HIV among adolescents. *Prev Sci.* 2000;1(1):15-30.
- 22.Ogletree RJ, Rienzo BA, Drolet JC, et al. An assessment of 23 selected school-based sexuality education curricula. *J Sch Health.* 1995;65(5):186-191.
- 23.Frost JJ, Forrest JD. Understanding the impact of effective teenage pregnancy prevention programs. *Family Plan Perspect.* 1995;27(5):188-195.
- 24.Bandura A. Self-efficacy: toward a unifying theory of behavioral change. *Psychol Rev.* 1977;84(2):191-215.
- 25.Bandura A, Adams NE, Beyer J. Cognitive processes mediating behavioral change. *J Pers Soc Psychol.* 1977;35(3):125-139.
- 26.SPSS Statistical Software [computer program]. Version 11.5. Chicago, IL: SPSS Inc., 2002.
- 27.Stata Statistical Software [computer program]. Version 8.0. College Station, TX: Stata Corporation, 2003.
- 28.Nelson C, Bloom F, Cameron J, et al. An integrative, multidisciplinary approach to the study of brain-behavior relations in the context of typical and a typical development. *Dev Psychopathol.* 2002;14:499-520.
- 29.Aarons SJ, Jenkins RR, Raine TR, et al. Postponing sexual intercourse among urban junior high school students-a randomized controlled evaluation. *J Adolesc Health.* 2000;27(4):236-247.
- 30.Card JJ. Teen pregnancy prevention: do any programs work? *Annu Rev Public Health.* 1999;20:257-285.
- 31.Kirby D, Korpi M, Barth RP, et al. The impact of the Postponing Sexual Involvement curriculum among youths in California. *Fam Plan Perspect.* 1997;29(3):100-108.
- 32.Jemmott JB, Jemmott LS, Fong GT. Abstinence and safer sex HIV risk-reduction interventions for African American adolescents: a randomized controlled trial. *JAMA.* 1998;279(19):1529-1536.
- 33.Kirby D. Do Abstinence-Only Programs Delay the Initiation of Sex Among Young People and Reduce Teen Pregnancy: The National Campaign to Prevent Teen Pregnancy, 2002: 1-9. Available at: http://www.teenpregnancy.org/resources/data/pdf/abstinence_eval.pdf.

Appendix

Section 510 off Title V of the Social Security Act specifies 8 specific characteristics that abstinence education programs must possess to receive federal funding:

- (a) has as its exclusive purpose, teaching the social, psychological, and health gains to be realized by abstaining from sexual activity;
- (b) teaches abstinence from sexual activity outside marriage as the expected standard for all school age children;
- (c) teaches that abstinence from sexual activity is the only certain way to avoid out-of-wedlock pregnancy, sexually transmitted diseases, and other associated health problems;
- (d) teaches that a mutually faithful monogamous relationship in context of marriage is the expected standard of human sexual activity;
- (e) teaches that sexual activity outside of the context of marriage is likely to have harmful psychological and physical effects;
- (f) teaches that bearing children out-of-wedlock is likely to have harmful consequences for the child, the child's parents, and society;
- (g) teaches young people how to reject sexual advances and how alcohol and drug use increases vulnerability to sexual advances; and
- (h) teaches the importance of attaining self-sufficiency before engaging in sexual activity.