JOURNAL OF ADOLESCENT HEALTH 2004;35:442–452

ORIGINAL ARTICLE

The "Safer Choices" Intervention: Its Impact on the Sexual Behaviors of Different Subgroups of High School Students

DOUGLAS B. KIRBY, Ph.D., ELIZABETH BAUMLER, Ph.D., KARIN K. COYLE, Ph.D., KAREN BASEN-ENGQUIST, Ph.D., GUY S. PARCEL, Ph.D., RON HARRIST, Ph.D., AND STEPHEN W. BANSPACH, Ph.D.

Purpose: **To measure the relative impact of a school-based human immunodeficiency virus (HIV)-, sexually transmitted disease (STD)-, and pregnancy-prevention intervention on sexual risk-taking behaviors of different subgroups of students.**

Methods: **Twenty schools were randomly assigned to receive *Safer Choices* or a standard knowledge-based HIV-education program. *Safer Choices* was designed to reduce unprotected sex by delaying initiation of sex, reducing its frequency, or increasing condom use. Its five components included: school organization, an intensive curriculum with staff development, peer resources and school environment, parent education, and school-community linkages. A total of 3869 9th-grade students were tracked for 31 months. Results are presented for initiation of sex, frequency of unprotected sex, number of unprotected sexual partners, condom use, and contraceptive use. These results are presented separately by gender, race/ethnicity, prior sexual experience, and prior sexual risk-taking. Statistical analyses included multilevel, repeated measures logistic and Poisson regression models.**

Results: **Safer *Choices* had one or more positive behavioral effects on all subgroups. On four outcomes that could be affected by condom use, it had a greater impact on males than on females. It had greater effects on Hispanics, including a delay in sexual activity, than on other racial/ethnic groups. Its greatest overall effect was an increase in condom use among students who had engaged in unprotected sex before the intervention.**

Conclusions: *Safer Choices* reduced one or more measures of sexual risk taking over 31 months among all groups of youth, and was especially effective with males, Hispanics, and youth who engaged in unprotected sex and thus were at higher risk for HIV, other STD infections and pregnancy. © *Society for Adolescent Medicine, 2004*

KEY WORDS:
Sex and HIV education
Teen HIV/STD and pregnancy prevention
Sexual behavior
Gender differences
Racial/ethnic differences

Both randomized trials and meta-analyses have demonstrated that some sex- and HIV-education programs can either delay initiation of sex, reduce the frequency of sex, reduce the number of sexual partners, increase condom use, or increase contraceptive use among young people. These effects have been demonstrated in different settings for as long as 1 year [1–5] and even for 31 months [6]. Furthermore, researchers have identified the common characteristics of these effective programs that may contribute to their success [7,8].

However, it is also important to know the relative impact of effective programs on different groups of

From the Department of Research, ETR Associates, Scotts Valley, California (D.B.K., K.K.C.); Center for Health Promotion Research and Development, University of Texas, Houston, Texas (E.B., K.B.-E., G.S.P., R.H.); and Centers for Disease Control and Prevention, Atlanta, Georgia (S.W.B.).

Address correspondence to: Dr. Douglas Kirby, ETR Associates, 4 Carbonero Way, Scotts Valley, CA 95066-4200. E-mail: dougk@etr.org

Manuscript accepted February 4, 2004.

1054-139X/04/$–see front matter
doi:10.1016/j.jadohealth.2004.02.006

Published by Elsevier Inc., 360 Park Avenue South, New York, NY 10010

youth. For example, practitioners need to know whether an intervention that is effective with one population of youth also will be effective with youth in their own communities.

Plausible rationales have been suggested for contradictory hypotheses about the relative impact of programs on different groups of youth. For example, because some programs teach refusal skills, and because females more commonly must refuse male sexual advances than vice versa, it is plausible that effective programs will have a greater impact on females. In addition, programs that emphasize the consequences of pregnancy might have a greater impact on female sexual and contraceptive behavior. Alternatively, programs, especially HIV- and other STD-prevention programs that emphasize condom use, especially male condom use, may have a greater impact on males. Similarly, plausible rival explanations have been proffered for why programs may be more effective for minority or nonminority youth, lower risk or higher risk youth, and sexually experienced or sexually inexperienced youth.

Some evidence for the relative impact of effective programs has been published. Measuring and especially demonstrating differential behavioral effects of interventions on different groups of youth, however, is more challenging than measuring behavioral effects on all participants. Demonstrating differential impact may require especially strong evaluation designs (e.g., those with random assignment), large sample sizes, and behavioral impact among at least some groups of youth.

Only four studies have included a randomized experimental design, had a sample size of at least 200, measured impact on behavior, found a behavioral impact for at least 12 months, and examined relative effects among some subgroups. One program, *Becoming a Responsible Teen*, had several positive behavioral effects on all youth, but was more effective at reducing the frequency of unprotected vaginal sex among males than among females [3]. This gender effect may have been caused in part by much higher rates of unprotected sex at baseline among males than among females, thereby creating greater potential for reduction.

Two programs, *Making a Difference* and *Making Proud Choices*, were evaluated in a single study [1]. According to the study, *Making a Difference* delayed the initiation of sex for 3 months, whereas *Making Proud Choices* reduced the frequency of sex, increased condom use, and reduced the frequency of unprotected sex for 6 to 12 months, depending on the outcome. Analyses revealed that *Making a Difference* did not have a differential effect on subsequent abstinence among those who had or had not engaged in sex before the intervention. In contrast, *Making Proud Choices* did have a differential effect on frequency of sex and frequency of unprotected sex in these two subgroups. It did not significantly reduce the frequency of sex or unprotected sex among those who were sexually inexperienced at baseline, but it did significantly reduce sex and unprotected sex among those who were sexually experienced at baseline. This may reflect the fact that relatively few sexually inexperienced youth initiated sex and thus a ceiling effect may have occurred.

Finally, the last program, *Draw the Line/Respect the Line*, delayed the initiation of sex and reduced the proportion of youth that had sex during the previous year, but only among males and not among females [9].

In sum, these four studies suggest that programs might be more effective for males than for females, and one of the studies suggests that some programs may be more effective for youth who have already had sex than for those who have not yet initiated sex. However, these results are far from definitive.

The purpose of this article is to examine more thoroughly the differential impact of *Safer Choices* on several subgroups of youth. *Safer Choices* increased condom use and reduced unprotected sex among youth during a 31-month period [6]. Its effects on different subgroups, however, have not been reported.

These study results have the potential to shed light on the relative impact of that intervention on subgroups of youth for several reasons: the *Safer Choices* study was a randomized trial, and treatment and control groups were matched on characteristics such as gender, ethnicity, and poverty; the sample size was large and included substantial numbers of youth in various subgroups; the study measured impact on behavior for 31 months; and *Safer Choices* had significant positive behavior effects that could potentially vary by subgroup.

Overview of Safer Choices

Safer Choices is a 2-year, school-based HIV/STD- and pregnancy-prevention program for high school youth. Its primary aim is to reduce the number of students engaging in unprotected sex by reducing the number who begin or have sex during their high school years, and by increasing condom use among students who have sex. To achieve these behavioral

results, the program seeks to modify several factors related to sexual risk-taking behavior: knowledge about HIV and other STDs; students' self-efficacy to refuse sex or unprotected sex, use condoms, and communicate about safer sexual practices; attitudes about sexual behavior and condom use; perceived barriers to condom use; perceived peer norms regarding sexual behavior and condom use; perceived risk of becoming infected with HIV or other STDs; and communication with parents and partners about abstinence and methods of protection against STDs, HIV, and pregnancy.

The *Safer Choices* intervention was based on social cognitive theory [10], social influence theory [11–13], and models of school change [14]. An unusual quality of this multiple-component intervention was its focus on school-wide change and the influence of the total school environment on student behavior.

The program included five primary components:

1) School Organization: To support and coordinate project activities, schools formed a School Health Promotion Council (SHPC). It included teachers, students, parents, administrators, and community members.
2) Curriculum and Staff Development: The curriculum included 10 lessons in the 9th grade and 10 lessons in the 10th grade. Using many interactive activities, the curriculum provided functional knowledge related to HIV, STDs, and pregnancy; taught skills about refusing sex and communicating about and using condoms and other contraception; and reinforced social norms supportive of responsible behavior. In-class peer leaders facilitated selected curriculum activities. To teach the curriculum, teachers received initial training and ongoing technical support.
3) Peer Resources and School Environment: The major purpose of this component was to saturate the school environment with activities, information, events, and services to reinforce key messages of the classroom-based instruction and create an environment supportive of HIV/STD prevention. To do this, a student peer resource team at each school implemented activities such as publishing articles in the school newspaper, conducting school opinion polls, organizing public speakers and special assemblies, distributing small media materials (e.g., posters, buttons, and t-shirts), conducting small-group discussion sessions, and organizing dramatic productions.
4) Parent Education: To increase parent-child communication about sexuality, HIV, and other STDs, schools sent newsletters to parents three times each year; the 9th and 10th grade classes asked students to discuss sexuality topics with their parents twice each year as part of homework assignments; and schools conducted additional parent education activities.
5) School-Community Linkages: To enhance student familiarity with community HIV, STD, and pregnancy prevention resources and support, homework assignments required students to gather information about local resources, schools distributed a resource guide that listed these services for youth, and HIV-positive speakers from the community gave presentations in schools.

A more detailed discussion of the program has been published elsewhere [15].

Methods

Overview

The *Safer Choices* intervention was implemented during the 1993–94 and 1994–95 school years. The evaluation used a randomized trial involving 20 schools, 10 in southeast Texas and 10 in northern California. Within each site, 10 schools were randomly assigned to the *Safer Choices* condition or to the comparison condition. The schools in the comparison group implemented a standard 5-session knowledge-based curriculum plus a small number of other school activities that varied from school to school.

To assess *Safer Choices'* effectiveness, cohort data were collected at all 20 schools by trained data collectors using student self-report surveys. The baseline survey was administered in the fall and winter of 1993/94, and follow-up surveys in the spring of 1995, 1996, and 1997, an average of 7, 19, and 31 months after the baseline survey. These procedures were approved by the University of Texas Committee on Human Subjects.

Study Schools and Student Cohort

Study schools. The schools ranged in size from 961 to 2733 students (mean = 1767). After randomization, several school-level indicators (e.g., dropout rate, ethnicity, test scores) were used to compare the intervention and comparison schools. No significant differences (as measured by Student's *t*-tests) were detected between intervention and comparison schools among any variables used in randomization.

Student cohort. The cohort included all ninth grade students who completed the baseline survey in

Fall 1993 and who were officially enrolled at first follow-up (Spring 1994). Students who left school during the 1993–94 school year were excluded from the cohort (at both intervention and control schools), unless they returned during the following year, in which case they were included. These criteria were adopted because of the multiyear school-wide nature of the intervention.

Active parental consent was required for study participation. Eighty percent of students (5184 of 6488) returned parental consent forms; of these students, 4733 (91%) received permission to complete the questionnaire. Completed questionnaires were collected from 4310 of these students, yielding a 91% response rate. A total of 441 students were dropped from the cohort based on cohort eligibility criteria (346 because they officially left school during the first year and 95 because they were in 11th or 12th grade), yielding a final cohort sample of 3869 students. Of these, 95% completed the 7-month survey, 83% completed the 19-month survey, and 79% completed the 31-month survey. Analyses of attrition revealed that there were demographic characteristics and psychosocial differences between eligible cohort students who completed the follow-up surveys and those who did not, but there were no significant differences between these two groups in any sexual behaviors reported.

Measures

The evaluation questionnaire included items that assessed program exposure, demographic characteristics, sexuality-related psychosocial factors, and sexual behaviors. This article reports on five important sexual behaviors: initiation of sex, the number of times sexually experienced students had sex without a condom (hereafter referred to as "unprotected sex"), the number of partners with whom sexually experienced students had unprotected sex, condom use during the last act of intercourse, and use of effective contraception during the last act of intercourse (i.e., used a condom or birth control pills or both).

We considered many student characteristics for creating student subgroups and used the following criteria: they would be conceptually meaningful; a theoretical potential would exist for *Safer Choices* to have a differential impact on the groups; they would include a small number of groups, each with a sufficiently large sample size; and they would be based on student characteristics with relatively few missing survey data.

These criteria produced four characteristics measured at baseline that formed the basis for subgroups: demographic characteristics including gender and ethnicity (Whites, Blacks, Hispanics, and Asians), behavioral characteristics including timing of initiation of sex (before versus after baseline data collection) and behavioral risk (had engaged versus had not engaged in unprotected sex during the 3 months before baseline).

The two behavioral characteristics were not conceptually and statistically independent, i.e., all students who had sex without condoms in the last 3 months had also, by definition, ever had sex. Despite this interdependence, both measures were used because youth who had engaged in unprotected sex during the last 3 months were a higher-risk group than those who had ever had sex, for two reasons. They had engaged in unprotected sex versus simply having had sex, and they had engaged in unprotected sex during a relatively short time period (the 3 months before the questionnaire) versus "ever."

Data Analysis

The analysis was designed to measure the relative impact of the intervention on subsequent behavior among different subgroups. Because schools were the unit of randomization while data were collected from individual students, multilevel statistical analyses were used to account for the intra-class correlation that resulted from the clustering of students within schools. In addition, because data were collected at four points in time (T1-T4), the data provided repeated measures of the same behaviors. Repeated measures were treated as an additional level in the multilevel analysis. This has at least two important implications for the analysis. First, student data could be included in the analyses even when data were not available for all four time-points. Second, whereas sample sizes reported in Table 1 represent the number of students in each analysis, in Table 2–5 sample sizes represent the number of student observations. Thus, students that provided data for all four points in time each contributed four observations to the sample size count.

Poisson multilevel regression models were used to analyze count data (the number of partners with whom sexually experienced students had unprotected intercourse). Owing to a problem with overdispersion, the number of times sexually experienced students had unprotected intercourse was analyzed using a negative binomial regression model. This model is a generalization of the Poisson regression

Table 1. Sample Characteristics at Baseline ($N = 3869$)

Characteristic	Percent of All Youth	
	Intervention	Control
Gender		
Male	49.8	46.4
Female	50.2	53.6
Ethnicity		
Asian	13.5	22.2
Black	19.6	14.3
Hispanic	28.4	26.4
White	30.2	30.7
Other	8.0	6.4
Age (years)		
13	4.4	4.6
14	57.2	57.4
15	28.1	27.7
16	8.6	7.9
≥17	1.7	2.4
Sexually experienced (at baseline)		
Yes	31.2	25.5
No	68.8	74.5
	Percent of Sexually Experienced Youth	
	Intervention	Control
Had sex without a condom (last 3 months)		
Yes	26.8	31.4
No	73.2	68.6
Condom use (last time)		
Yes	60.5	56.3
No	39.5	43.7
Contraceptive use (last time)		
Yes	64.5	59.0
No	35.5	41.0

model commonly used to model over-dispersed count data. Logistic regression models were used to analyze dichotomous data (initiation of sex, condom use during last act of intercourse, or contraceptive use during last act of intercourse). Computations for the multilevel models were carried out using Mln Software for Multilevel Analysis, Version 1.0a [16].

To statistically control for differences between the intervention and comparison groups at baseline, each analytic model included the baseline measurement of the outcome variable and a set of outcome-specific covariates (e.g., gender, parents' education, ethnicity). The outcome-specific covariates were included if they were significantly related to intervention condition and remained significant in the final stage of multilevel modeling. This covariate screening was conducted in both the overall model and each subgroup. In addition, because the intervention was conducted in two locations (Texas and California), all analyses also included a group-by-location interaction term to test for differential intervention effects by location.

Two types of significance tests are provided in the results: tests indicating whether the impact of *Safer Choices* on each outcome variable was statistically significant for the overall sample and for each subgroup, and tests indicating whether the differential impact of *Safer Choices* on each outcome variable for each subgroup was statistically significant, i.e., did a significant interaction effect exist between the measure of effect and subgroup? In all analyses, two-tailed tests were used and no adjustments were made for multiple tests of significance.

Results

Sample Characteristics

At baseline, the sample contained a few more females (52%) than males, included a diversity of ethnic groups ranging from 30% white to 18% Asian, and was mostly aged 14 (57%) and 15 (28%) years (Table 1). Twenty-eight percent had initiated sex.

Overall Effects of *Safer Choices*

Overall, *Safer Choices* did not significantly delay the onset of sexual intercourse ($p = .99$), but it did appear to improve condom use. In particular, it reduced the frequency of sex without a condom ($p = .02$), reduced the number of sexual partners in the last 3 months with whom a condom was not used ($p = .04$), increased condom use during last sex among those who had sex in the last 3 months ($p = .02$), and marginally increased contraceptive use (including condoms and pills) among those who had sex in the last 3 months ($p = .07$), (Table 2). These positive results warrant an examination of effects for various subgroups.

Interaction Effects with Gender

No significant gender interaction effect on the initiation of sex was detected (Table 2). That is, the odds ratio measuring the impact of *Safer Choices* on initiation of sex for males did not significantly differ from that for females ($p = .70$).

In contrast, on all four measures involving condom use (number of times of unprotected sex, number of partners unprotected, condom use at last sex, and contraceptive use at last sex), interaction effects were detected, suggesting that *Safer Choices* had a greater impact on males than on females. The abso-

Table 2. Gender Subgroup: 31-Month Follow-Up[a]

Variable	Number of Follow-Up Observations	Group Estimate (Std. Error)		Ratio Est./SE or 95% C. I.	Tests For Subgroup Differences	
		Estimate	*p* value		Contrast	*p* value
Initiation of sex						
Overall	2029	OR = 1.00	.99	(0.78, 1.29)	χ^2 (2 df) = 0.72	.70
Male	809	OR = 1.08	.63	(0.80, 1.46)		
Female	1220	OR = 0.88	.54	(0.59, 1.31)		
Frequency of unprotected sex						
Overall	3103	−0.41 (0.17)	.02	−2.41	χ^2 (2 df) = 6.16	.05
Male	1498	−0.44 (0.20)	.03	−2.15		
Female	1605	−0.39 (0.19)	.04	−2.09		
Number of partners unprotected						
Overall	3231	−0.26 (0.13)	.04	−2.01	χ^2 (2 df) = 5.12	.08
Male	1552	−0.34 (0.15)	.02	−2.27		
Female	1679	−0.18 (0.15)	.25	−1.16		
Condom use at last sex						
Overall	2145	OR = 1.38	.02	(1.06, 1.79)	χ^2 (2 df) = 7.22	.03
Male	956	OR = 1.66	.01	(1.12, 2.47)		
Female	1189	OR = 1.20	.31	(0.84, 1.70)		
Contraceptive use at last sex						
Overall	2145	OR = 1.34	.07	(0.98, 1.84)	χ^2 (2 df) = 4.67	.10
Male	956	OR = 1.64	.04	(1.03, 2.59)		
Female	1189	OR = 1.15	.50	(0.77, 1.73)		

[a] Results for condom or contraceptive use at last sex were restricted to youth who had engaged in sex during the 3 months prior to each survey. Sample size for initiation of sex reflects number of students not number of observations.

lute value of group estimates was always larger for males than for females, and *p* values for tests of subgroup differences in group estimates were either significant or close to significant ($p = .05, .08, .03$, and .10, respectively).

This does not mean *Safer Choices* did not have an impact on females; group estimates for all four outcome variables for females were in the desired direction, and one was significant (number of times of unprotected sex, $p = .04$). Nevertheless, *Safer Choices* appeared to have a larger impact on males.

Interaction Effects with Race/Ethnicity

Safer Choices had a significant interaction effect involving impact on initiation of sex and race/ethnicity ($p = .05$) (Table 3). *Safer Choices* did not delay the initiation of sex among Blacks, Asians, or Whites, but did significantly delay the initiation of sex among Hispanic students (OR = 0.57, $p = .02$).

Safer Choices also had a significant interaction effect on one of four condom-related measures and race/ethnicity ($p = .04$). Whereas odds ratios were in the desired direction for all subgroups, *Safer Choices* increased condom use at last sex more among Hispanics and Whites than among Blacks (OR = 1.65 and 1.57 vs. 1.07, respectively).

Other outcome measures involving condoms suggest that *Safer Choices* had positive effects for each major racial/ethnic group. First, for three of four condom-related measures (number of times of unprotected sex, number of partners unprotected, and use of contraception), no significant or near-significant subgroup differences (no interaction effects) were detected. Furthermore, among Blacks, Hispanics, and Whites, one or more condom-related measures were significant or close to significance, and always in the desired direction. More specifically, among Blacks, effects were close to significance for number of partners unprotected ($p = .07$); among Hispanics effects were significant or close to significance for number of times of unprotected sex ($p = .03$), condom use at last sex ($p = .04$), and use of contraception ($p = .06$); and among Whites effects were significant for number of times of unprotected sex ($p = .04$) and condom use at last sex ($p = .04$).

In combination, these results suggest that Blacks decreased risk by reducing the number of unprotected partners; Hispanics reduced risk by delaying sex, increasing condom use, increasing contraceptive use, and thereby decreasing frequency of unprotected sex; and Whites decreased risk by increasing condom use and thereby decreasing frequency of unprotected sex.

Table 3. Ethnic Subgroup: 31-Month Follow-Up[a]

Variable	Number of Follow-Up Observations	Group Estimate (Std. Error)		Ratio Est./SE or 95% C. I.	Tests For Subgroup Differences	
		Estimate	*p* value		Contrast	*p* value
Initiation of sex						
Overall	2015	OR = 1.03	.83	(0.81, 1.29)	χ^2 (4 df) = 9.63	.05
Black	185	OR = 1.38	.32	(0.73, 2.59)		
California Asian[b]	468	OR = 0.96	.90	(0.53, 1.74)		
Hispanic	448	OR = 0.57	.02	(0.36, 0.90)		
White	914	OR = 1.32	.10	(0.95, 1.84)		
Frequency of unprotected sex						
Overall	2887	−0.39 (0.17)	.02	−2.29	χ^2 (4 df) = 6.35	.17
Black	837	−0.19 (0.27)	.47	−0.72		
California Asian[b]	274	−0.38 (0.39)	.32	−0.99		
Hispanic	911	−0.46 (0.21)	.03	−2.16		
White	865	−0.54 (0.26)	.04	−2.08		
Number of partners unprotected						
Overall	3003	−0.24 (0.13)	.06	−1.85	χ^2 (4 df) = 3.83	.43
Black	847	−0.32 (0.17)	.07	−1.81		
California Asian[b]	288	−0.08 (0.32)	.79	−0.26		
Hispanic	967	−0.18 (0.18)	.33	−0.97		
White	901	−0.18 (0.21)	.40	−0.85		
Condom use at last sex						
Overall[c]	2111	OR = 1.41	.01	(1.08, 1.84)	χ^2 (3 df) = 8.36	.04
Black	548	OR = 1.07	.86	(0.62, 1.87)		
Hispanic	619	OR = 1.65	.04	(1.02, 2.68)		
White	605	OR = 1.57	.04	(1.02, 2.42)		
Contraceptive use at last sex						
Overall[c]	2111	OR = 1.36	.06	(0.99, 1.86)	χ^2 (3 df) = 4.35	.23
Black	548	OR = 1.16	.32	(0.61, 2.23)		
Hispanic	619	OR = 1.69	.06	(0.97, 2.93)		
White	605	OR = 1.28	.34	(0.77, 2.14)		

[a] Results for condom or contraceptive use at last sex were restricted to youth who had engaged in sex during the 3 months prior to each survey. Sample size for initiation of sex reflects number of students not number of observations.
[b] In the Texas sample, there were too few Asian students to include as a separate category.
[c] Too few Asians had engaged in sex in the last 3 months to provide separate analyses for them.

Interaction Effects with Subgroups Based on Timing of Initiation of Sex

When observing differential effects of *Safer Choices* on those who had and had not initiated sex at baseline, the differential effects can only be examined for the remaining four outcomes and the analyses are restricted to youth who had ever had sex at follow-up (and for outcomes measuring condom and contraceptive use at last sex, the analyses were restricted to those who had sex during the 3 months before the survey).

Two interaction effects were examined that involved subgroups based on timing of initiation of sex. First, in terms of frequency of unprotected sex, *Safer Choices* had a significantly greater impact on youth who initiated sex after baseline than on youth who were sexually experienced at baseline ($p = .02$). Second, in terms of condom use at last sex, *Safer Choices* had a greater impact on youth who were sexually experienced at baseline than on youth who initiated sex afterward.

However, this does not mean that *Safer Choices* had a behavioral impact on only one or the other of these two groups; it had significant positive effects on students regardless of whether they had initiated sex before program participation. This is true in three respects. First, all group estimates are in the positive direction. Second, where significant subgroup differences exist, they favor the sexually inexperienced at baseline on one measure and the sexually experienced at baseline on the other. Third, no significant subgroup differences were detected on the other two outcome measures.

In combination, these results suggest that *Safer Choices* had positive effects on youth regardless of their sexual experience at baseline. It had a greater impact on frequency of unprotected sex among those who initiated sex during or after participating in *Safer Choices*, but it had a greater impact on condom use among those who initiated sex before participating in *Safer Choices*.

Table 4. Timing of Initiation of Sexual Intercourse Subgroup: 31-Month Follow-Up[a]

Variable	Number of Follow-Up Observations	Group Estimate (Std. Error)		Ratio Est./SE or 95% C. I.	Test For Subgroup Differences	
		Estimate	*p* value		Contrast	*p* value
Frequency of unprotected sex						
Overall	3018	−0.40 (0.16)	.01	−2.47	χ^2 (2 df) = 7.82	.02
Before Baseline	1584	−0.33 (0.18)	.06	−1.84		
After Baseline	1434	−0.57 (0.21)	.007	−2.71		
Number of partners unprotected						
Overall	3150	−0.22 (0.13)	.09	−1.66	χ^2 (2 df) = 3.24	.20
Before Baseline	1677	−0.15 (0.14)	.29	−1.07		
After Baseline	1473	−0.30 (0.17)	.07	−1.79		
Condom use at last sex						
Overall	2134	OR = 1.41	.02	(1.06, 1.89)	χ^2 (2 df) = 5.85	.05
Before Baseline	1129	OR = 1.59	.03	(1.05, 2.41)		
After Baseline	1005	OR = 1.23	.30	(0.82, 1.86)		
Contraceptive use at last sex						
Overall	2134	OR = 1.38	.06	(0.99, 1.93)	χ^2 (2 df) = 3.53	.17
Before Baseline	1129	OR = 1.50	.10	(0.92, 2.43)		
After Baseline	1005	OR = 1.25	.36	(0.77, 2.02)		

[a] This sample was restricted to youth who had ever engaged in sexual intercourse. Results for condom or contraceptive use at last sex were restricted to youth who had engaged in sex during the 3 months prior to each survey.

Interaction Effects with Subgroups Based on Unprotected Sex in the Previous Three Months at Baseline

As above, these analyses were restricted to students who had ever had sex, and the analyses involving condom and contraceptive use were restricted to students who engaged in sex during the 3 months before each questionnaire.

Significant (or close to significant) interaction effects were detected with three of the four outcomes (i.e., frequency of unprotected sex, condom use at last sex, and contraceptive use at last sex). For all three outcomes, *Safer Choices* had a greater impact on youth who had engaged in unprotected sex before baseline than on youth who had not done so ($p = .07$, .01, and .02, respectively).

Table 5. Behavioral Risk Subgroup: 31-Month Follow-Up[a]

Variable	Number of Follow-Up Observations	Group Estimate (Std. Error)		Ratio Est./SE or 95% C. I.	Tests For Subgroup Differences	
		Estimate	*p* value		Contrast	*p* value
Frequency of unprotected Sex						
Overall	3103	−0.41 (0.17)	.02	−2.41	χ^2 (2 df) = 5.33	.07
Had unprotected sex before baseline	488	−0.48 (0.25)	.05	−1.94		
No unprotected sex before baseline	2615	−0.34 (0.18)	.06	−1.85		
Number of partners unprotected						
Overall	3167	−0.23 (0.14)	.10	−1.64	χ^2 (2 df) = 2.94	.23
Had unprotected sex before baseline	493	−0.29 (0.19)	.13	−1.51		
No unprotected sex before baseline	2674	−0.11 (0.10)	.27	−1.10		
Condom use at last sex						
Overall	2093	OR = 1.42	.009	(1.09, 1.85)	χ^2 (2 df) = 9.28	.01
Had unprotected sex before baseline	393	OR = 2.38	.009	(1.24, 4.55)		
No unprotected sex before baseline	1700	OR = 1.26	.12	(0.94, 1.69)		
Contraceptive Use at Last Sex						
Overall	2101	OR = 1.36	.03	(1.17, 1.80)	χ^2 (2 df) = 8.04	.02
Had unprotected sex before baseline	393	OR = 2.04	.006	(1.23, 3.40)		
No unprotected sex before baseline	1708	OR = 1.20	.24	(0.88, 1.63)		

[a] This sample was restricted to those youth who had ever engaged in sexual intercourse. Results for condom or contraceptive use at last sex were restricted to those youth who had engaged in sex during the 3 months prior to each survey.

Once again, *Safer Choices* had a positive effect on both groups; it simply had a greater effect on higher-risk youth who had unprotected sex before their baseline survey. All subgroup coefficients were in the positive direction across both groups and across all four outcome measures. Moreover, each group of students had one or more results that were significant or close to significant.

Discussion

These results support four primary conclusions. First, *Safer Choices* had positive impacts across a variety of groups, regardless of their gender, ethnicity, or sexual experience before taking *Safer Choices*. Most regression coefficients were in the desired direction across groups, and every group had at least one positive result that was significant or close to significant. Second, regarding all four outcome measures affected by condom use, *Safer Choices* appeared to have a greater impact among males than females. This is consistent with the fact that males typically have more direct control over condom use than do females. Third, *Safer Choices* appeared to have a greater number of positive behavioral effects on Hispanics than on any other ethnic group. Fourth, *Safer Choices* appeared to have a greater impact on condom-related measures among higher-risk youth who engaged in unprotected sex before the intervention than among youth who initiated sex after the intervention.

In terms of reducing frequency of unprotected sex, *Safer Choices* apparently had its greatest impact on students who initiated sex after baseline and on students who initiated sex before baseline and engaged in unprotected sex during the previous 3 months, and it had less impact on students who engaged in sex before baseline but did not engage in unprotected sex during the previous 3 months. Thus, when this last group is part of the "initiated sex before baseline" group as reflected in Table 4, *Safer Choices* had less of an impact on that entire group. And when this last group of students became part of the "no unprotected sex before baseline" group as reflected in Table 5, *Safer Choices* had less of an impact on that entire group. It makes intuitive sense that *Safer Choices* would have a smaller impact on students who had initiated sex before baseline but either never had sex during the previous 3 months or always used condoms than on students who later initiated sex for the first time or who had sex without condoms.

The overall patterns of results are encouraging and important for several reasons. First, they demonstrate that the impact of *Safer Choices* is not limited to any single group defined by any of the student characteristics examined. Second, few studies currently exist that demonstrate positive effects of programs on Hispanic youth [17]. Thus, multiple positive effects (including apparent delay in the initiation of sex) are particularly important for this group. Third, the results demonstrate that programs can be effective with youth both before and after they have initiated sex. This conclusion differs from the belief held by many that sex and HIV education programs are most effective when taught before youth initiate sex [18]. In addition, if higher-risk youth are defined as those who engage in unprotected sex (versus not engaging in sex or always using condoms), then these results suggest that *Safer Choices* was most effective with higher-risk youth. This is particularly encouraging because higher-risk youth are most likely to spread or contract STDs and to get pregnant (or get someone pregnant) and thus they are most in need of prevention programs.

These results also are consistent with results from previous studies noted above. For example, both *Becoming a Responsible Teen* and *Draw the Line/Respect the Line* were more effective with males than females, and *Making Proud Choices* was more effective with higher-risk youth who initiated sex before baseline [1,4].

When only a small percentage of youths has sex without condoms, it is still possible to achieve a large proportional (as opposed to an absolute) reduction, but when percentages for comparison groups are small, these proportional reductions are very difficult to measure statistically. For example, it is much easier to measure the impact of a program that reduces the percentage of youth who initiate sex from 30% to 20% (a 33% proportional reduction) than it is to measure the impact of a program that reduces initiation of sex from 10% to 5% (a 50% reduction). Thus, without further research designed to measure very small absolute changes in behavior, it is difficult to know whether *Safer Choices* and other effective programs have similar proportional effects on lower-risk youth.

The fact that *Safer Choices* and possibly other curricula may have a larger absolute impact on higher-risk youth has at least two important implications. The first is methodological, i.e., some programs that are actually effective with higher-risk youth may be found to be ineffective because they were implemented and evaluated with lower-risk youth, whereas programs that are actually less effective in general may be found to be effective because

they were implemented and evaluated with higher-risk youth. Thus, in the future, researchers who review the effectiveness of programs should take sample characteristics into consideration.

The second implication is programmatic, i.e., given that higher-risk youth are disproportionately likely to contract an STD, including HIV, or to become pregnant, if *Safer Choices* (and possibly other programs) are more effective with higher-risk youth, then schools and communities should target higher-risk youth with these programs.

Limitations

Even though this study had a very rigorous evaluation design and analytic procedures, it nevertheless had several limitations. First, the study randomly assigned entire schools, not individual youth. Randomly assigning individual youth may have divided the subgroups more evenly and made the statistical analyses more powerful. However, as described above, to correct for the assignment of entire schools, multilevel statistical models were used that control for clustering in schools. Second, attrition, caused both by lack of parental consent and by loss to follow up, slightly reduced the generalizability of these findings. Third, like most studies of sex- and HIV-education programs, this study relied on self-reports of behavior. To increase the validity of self-reported data, numerous procedures were implemented to assure confidentiality and make the students feel comfortable answering honestly. Fourth, the analyses were exploratory and not confirmatory. That is, because hypotheses did not specify the direction of findings before the analyses were conducted, these results need to be confirmed by other studies. Fifth, because tests of significance were not corrected for multiple testing, one or more statistically significant findings reported could have been caused by chance. To reduce the chance of Type I errors, these analyses were limited to five outcome variables and four subgroup analyses. And finally, this study measured the impact of *Safer Choices* on in-school youth, not on out-of-school youth. Although many young people, including young people who engage in sexual risk-taking behavior, remain in school through the 10th grade, youth who drop out of school typically engage in even greater sexual risk behavior.

Conclusions

These results have demonstrated that *Safer Choices*, a theory-driven multicomponent, curriculum-based intervention can have a long-term impact up to 31 months; can have positive effects on males and females, all major ethnic groups, sexually inexperienced and experienced youth, and lower-risk and higher-risk youth; and may be especially effective with Hispanic and higher-risk youth. Given that *Safer Choices* was effective with multiple groups, it can be used effectively in a wide variety of schools and communities. Because *Safer Choices* was especially effective with higher-risk youth who had already engaged in unprotected sex at relatively early ages (ninth grade), it also should be implemented in schools and communities with youth at higher risk of unintended pregnancy, HIV, and other STDs.

References

1. Jemmott JB, Jemmott LS, Fong GT. Abstinence and safer sex: A randomized trial of HIV sexual risk-reduction interventions for young African-American adolescents. JAMA 1998;279: 1529–36.
2. Kirby D, Barth R, Leland N, Fetro JV. Reducing the risk: Impact of a new curriculum on sexual risk-taking. Fam Plann Perspect 1991;23:253–63.
3. St. Lawrence JS, Brasfield TL, Jefferson KW, et al. Cognitive-behavioral intervention to reduce African American adolescents' risk for HIV infection. J Consult Clin Psychol 1995;63: 221–37.
4. St. Lawrence JS, Crosby RA, Brasfield TL, O'Bannon RE 3rd. Reducing STD and HIV risk behavior of substance-dependent adolescents: A randomized controlled trial. J Consult Clin Psychol 2002;70:1010–21.
5. Stanton BF, Li X, Ricardo I, et al. A randomized, controlled effectiveness trial of an AIDS prevention program for low-income African-American youths. Arch Pediatr Adolesc Med 1996;150:363–72.
6. Coyle KK, Basen-Engquist KM, Kirby DB, et al. Safer Choices: reducing teen pregnancy, HIV and STDs. Public Health Rep 2001;116(Suppl 1):82–93.
7. Jemmott JB, Jemmott LS. HIV risk reduction behavioral interventions with heterosexual adolescents. AIDS 2000;14(Suppl 2):s40–s52.
8. Kirby D. Emerging Answers: Research Findings on Programs to Reduce Sexual Risk-Taking and Teen Pregnancy. Washington, DC: National Campaign to Prevent Teen Pregnancy, 2001.
9. Coyle K, Kirby D, Marin B, et al. Draw the Line/Respect the Line: A randomized trial of a middle school intervention to reduce sexual risk behaviors. Am J Public Health 2004;94:843–51.
10. Bandura A. Social Foundations of Thought and Action. Englewood Cliffs, NJ: Prentice Hall, 1986.
11. Fisher JD. Possible effects of reference group-based social infuence on AIDS-risk behaviors and AIDS. Am Psychol 1988;43:914–20.
12. McGuire WJ. Social psychology. In: Dodwell PC (ed.) New Horizons in Psychology. Hammondsworth, UK: Penguin Books, 1972.
13. McGuire WJ, Papageorgis D. The relative efficacy of various types of prior belief-defense in producing immunity against persuasion. J Abnorm Soc Psychol 1961;62:327–37.

14. Marsh D, Brown E, Crocker P, et al. Building Effective Middle Schools: A Study of Middle School Implementation in California Schools. Los Angeles, CA: School of Education, University of Southern California, 1988.
15. Coyle K, Kirby D, Parcel G, et al. Safer Choices: A multicomponent school-based HIV/STD and pregnancy prevention program for adolescents. J Sch Health 1996;66:89–94.
16. Rashbash J, Woodhouse G. MLn Command Reference. London, UK: University of London Institute of Education, 1995.
17. Kirby D. Effective teen pregnancy prevention programs: Do they work for all? In: Kirby D, Troccoli K (eds). Progress Pending: How to Sustain and Extend Recent Reductions in Teen Pregnancy Rates. Washington, DC: National Campaign to Prevent Teen Pregnancy, 2003;16–21.
18. Levy SR, Perhats C, Weeks K, et al. Impact of a school-based AIDS prevention program on risk and protective behavior for newly sexually active students. J Sch Health 1995;65: 145–51.