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Evaluation of a randomized intervention to delay sexual initiation among fifth-graders followed through the sixth grade

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Abstract

US adolescents initiate sex at increasingly younger ages, yet few pregnancy prevention interventions for children as young as 10–12 years old have been evaluated. Sixteen Washington, DC schools were randomly assigned to intervention versus control conditions. Beginning in 2001/02 with fifth-grade students and continuing during the sixth grade, students completed pre-intervention and post-intervention surveys each school year. Each year, the intervention included 10–13 classroom sessions related to delaying sexual initiation. Linear hierarchical models compared outcome changes between intervention and control groups by gender over time. Results show the intervention significantly decreased a rise over time in the anticipation of having sex in the next 12 months among intervention boys versus control boys, but it had no other outcome effects. Among girls, the intervention had no significant outcome effects. One exception is that for both genders, compared with control students, intervention students increased their pubertal knowledge. In conclusion, a school-based curriculum to delay sexual involvement among fifth-grade and sixth-grade high-risk youths had limited impact. Additional research is necessary to outline effective interventions, and more intensive, comprehensive interventions may be required to counteract adverse circumstances in students' lives and pervasive influences toward early sex.

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Introduction

The US adolescent pregnancy rate decreased significantly from 111 pregnancies and 60 births per 1000 females aged 15–19 in 1992 to 84 pregnancies and 48 births in 2000 (Alan Guttmacher Institute 2006). Consistent across racial/ethnic groups and all states, including the District of Columbia, this decline may be attributed to decreases in teenage sexual activity rates and significant increases in the use of contraceptive methods, including

condoms (Centers for Disease Control and Prevention 2006; Flanigan 2001; Santelli et al. 2004, 2007). The teenage birthrate increased, however, from 40.5 per 1000 females aged 15–19 in 2005 to 41.9 in 2006 for all racial/ethnic groups except Asians or Pacific Islanders (Hamilton, Martin, and Ventura 2007).

Adolescents represent approximately one-quarter of sexually active US persons aged 15–44, but they experience nearly one-half of all annual sexually transmitted infection cases, including the human immunodeficiency virus (HIV) (Weinstock, Berman, and Cates 2004). Also, US adolescents are engaging in sexual intercourse at younger ages than ever (Albert, Brown, and Flanigan 2003; Aten et al. 2002; Raine et al. 1999; Terry and Manlove 2000). Nationally, 18–19% of adolescents engaged in sexual intercourse prior to age 15, with 4–5% initiating sex prior to age 12 (Albert, Brown, and Flanigan 2003).

Significant racial/ethnic disparities remain in US adolescent pregnancy rates. In 2000, the rate among African-American and Hispanic teenage girls (153 and 138 per 1000 aged 15–19, respectively) was nearly three times higher than among non-Hispanic whites in the same age group (55 per 1000) (Alan Guttmacher Institute 2006). Differences in sexual activity rates by race/ethnicity may largely explain these pregnancy rate disparities. The 2005 Youth Risk Behavior Survey revealed that African-American teenagers (68%) were significantly more likely to have initiated sexual intercourse compared with Hispanic (51%) and non-Hispanic white (43%) teenagers (Eaton et al. 2006). Although both African-American and Hispanic youths were one-half as likely (10%) as non-Hispanic white teenagers (22%) to use birth control before their last sexual intercourse, African Americans were more likely to report condom use during their last sexual encounter (68.9% vs. 62.6% and 57.7% of non-Hispanic whites and Hispanics, respectively). The relatively large percentage of sexually active youths not using condoms during their last sexual intercourse across all groups (>30%) is alarming. Even among those using condoms, it is likely that many may lack the knowledge and skills for applying consistent and correct techniques to prevent pregnancy, HIV, and sexually transmitted diseases (STDs) (Lindemann et al. 2005).

In Washington, DC, where most school-aged children are African American (85%) or Hispanic (10%) (DC Campaign to Prevent Teen Pregnancy 2007), youths are particularly vulnerable to the risks of adolescent pregnancy and early sexual activity. In 2000, DC's adolescent pregnancy rate was 128 per 1000 girls aged 15–19 compared with 84 per 1000 girls aged 15–19 nationwide (Alan Guttmacher Institute 2006). Although DC's high school students were only slightly more likely to have engaged in sexual intercourse (48.1% vs. 46.8% nationwide), they were almost twice as likely to initiate sexual intercourse prior to age 13 (11.1% vs. 6.2% nationwide); also, although they were more likely to use condoms during their last sexual intercourse (76.2% vs. 62.8% nationwide), they were significantly less likely to report birth control pill use before their last sexual intercourse (8.0% vs. 17.6% nationwide) (Eaton et al. 2006).

To effectively reduce DC's high adolescent pregnancy rate, prevention efforts must begin in elementary schools before children become sexually active. Among DC's junior high schoolers, more than one-half of the boys (56%) in a seventh-grade baseline sample and one-fifth of the girls (20%) reported having already had sexual intercourse (Raine et al. 1999). Efforts aimed at pre-teens or young teenagers should not only promote abstinence and the importance of delaying sexual intercourse debut, but also should encourage correct and consistent condom and contraceptive use among sexually active teenagers. Unfortunately, few interventions have been conducted among children as young as those in elementary schools, so very little research has evaluated the effectiveness of adolescent pregnancy prevention programs among early adolescents (Albert, Brown, and Flanigan 2003; Manlove et al. 2004).

To address this need, we developed and implemented Building Futures for Youth (BFY), an intervention with a classroom curriculum for DC's fifth-graders and sixth-graders and workshops for their parents. The study's purpose was to evaluate this two-year, school-based adolescent pregnancy prevention curriculum. Based on the intervention's objectives, we hypothesized that, when compared with control school students, intervention school students who participate in the intervention would, over time, show slower rates of increase in the proportions ever having sexual intercourse, anticipating having sexual intercourse in the next 12 months, and engaging in other risk behaviors (e.g. alcohol and marijuana use). We also hypothesized that, compared with control students, intervention students would, over time, experience greater increases in positive attitudes and knowledge on a number of other intermediate outcomes (e.g. attitudes toward sexual abstinence, perceptions of abstinence as a peer norm, parent-child communication, pubertal knowledge).

Methods

Intervention study design

We conducted a randomized controlled trial to select and randomly assign 16 DC elementary schools to either the intervention or the control condition. The study began in 2001/02 by recruiting fifth-graders and their parents/guardians from the selected schools, and it continued as students entered the sixth and seventh grades. Each school year, participating intervention students attended classroom educational sessions, and parents were invited to a series of workshops. At both intervention and control schools during each school year, participating students and parents completed pre-intervention and post-intervention surveys. In this paper, we examine longitudinally the effects of students' participation in the student intervention on student outcomes during the fifth-grade and sixth-grade school years only. We were not able to conduct longitudinal analyses involving the seventh-grade data because of difficulties in tracking and maintaining a sufficient cohort of students as they transitioned from elementary to middle or junior high schools. Furthermore, despite efforts to include parents in the workshop activities and cash payments for attending, overall attendance was extremely low; thus, we do not test for effects of parental participation on student outcomes in this paper. Consequently, this paper is based only on students' survey data and does not include parents' survey data. (For a description of the parents' data, see Rose et al. 2005.)

Sample

We selected an original sample of 16 schools from DC wards with the highest rates of teenage pregnancy – Wards 1, 5, 7, and 8 (O'Donnell et al. 1999). In 1998, DC's adolescent pregnancy rate of 122.7 per 1000 females was significantly higher than the national rate of 88.7 per 1000 (O'Donnell et al. 2002). When schools were selected for participation, we were aware that four of them (two intervention and two control) did not have a sixth-grade class and that we would need to drop them from the study's second year and recruit new schools to which the majority of students from the dropped schools were designated to attend, as determined by the school system's designated feeder pattern. However, after we identified and successfully recruited four new schools for the study, the DC school system adjusted its school feeder patterns because it was changing from having junior high schools (seventh–ninth grades) to middle schools (sixth–eighth grades). Consequently, we found that a number of our participant students were being sent to schools other than the four we had recruited. Thus, the change in school feeder patterns reduced our sample of youths who participated in both years of the intervention, and budgetary constraints did not allow us to increase the number of schools. In addition, many students moved from one school district to another during both years of the study, adding to the loss of student participants from the study schools. The four new study schools were randomly assigned to intervention and

control conditions. The original 12 schools maintained their original assignment of study condition.

All sixth-grade students and their parents in the new set of 16 schools were invited to participate whether or not they had participated in the fifth-grade year. Because of a lack of funds and the large number of students who changed schools and the large number of schools involved, we did not follow students if they attended the sixth grade at schools not among the 16 in the sixth-grade sample.

Analyses included all fifth-grade students who participated in the study during 2001/02 (regardless of sixth-grade participation status) and all sixth-graders who participated during 2002/03 (regardless of fifth-grade participation status). Thus, students contributed data for one to four time points, depending on how many pre-intervention and post-intervention surveys they took over the two years. Table 1 describes the percentage of students, by gender and experimental condition, who participated during the fifth grade only, sixth grade only, and both grades. Across gender and intervention/control conditions, 27% (247 students) had participated only in the fifth grade, 37% (342) only in the sixth grade, and 37% (339) in both grades. The majority of the students who participated during only one grade were not able to participate during the other grade because they did not attend a study school during that grade.

We included all 928 students in the analysis to make maximal use of available data and provide greater statistical power, under the assumption that data from students (and schools) were missing at random. Because students who had experienced the intervention in both years would be more likely to show an impact, we conducted a second analysis based only on the 339 students who had participated in both years. However, the results did not differ substantively from those based on all students. Thus, we present the results only from the larger sample.

During both school years and at all schools, students were required to obtain written parental consent to participate. The Institutional Review Boards of each participating research institution approved the procedures. In the fifth grade, of 793 eligible students, 87% returned consents and 78% returned them with parental consent. In the sixth grade, of 1004 eligible students, these figures were 77% and 72%, respectively. In the fifth grade, of the 793 eligible students, 71% completed the baseline survey and 64% the follow-up survey. In the sixth grade, of the 1004 eligible students, 62% and 57% completed the two surveys, respectively.

The sample is representative of all students at the 16 schools: 99% African American (vs. 97% total), 54% female (vs. 52% female total), and 75% in receipt of free/reduced-price school lunch (vs. 76% total). About 94% were aged ≤ 11 starting the fifth grade (the remainder were 12), and 98% were aged ≤ 13 ending the sixth grade. Further details are available in Rose et al. (2005).

Description of intervention

Development of the children's curriculum began with: a review of the literature on adolescent pregnancy and prevention interventions; data analysis from 12 focus groups with DC parents, teachers, and community leaders (Walker et al. 2008); and development of program logic models for each intervention (children's and parents') explicitly linking program objectives and theoretical assumptions to intervention activities and expected outcomes.

We initially adapted the content of the student curricula from two existing curricula: *Sex Can Wait* (Young and Young 1994) and *Brothers to Brother* (Wake County Health Department 1991). Although these served as starting points, we eventually developed, with a curriculum specialist, many original sessions to adequately address the program logic models' objectives and to tailor the curricula to central city, African-American youths. The student curricula underwent pretesting and piloting activities during the 2000/01 school year.

The fifth-grade and sixth grade curricula included 10 and 13 sessions, respectively (plus a graduation ceremony at the end of each school year). Both curricula focused on the importance and benefits of abstaining from sexual intercourse, provided age-appropriate information about developmental changes associated with puberty and adolescence, and encouraged values clarification and the development of effective decision-making and communication skills as strategies for avoiding early sexual involvement. The sixth-grade curriculum introduced additional information on media influences, stages of sexual intimacy, sexually transmitted and HIV infections, and use of contraceptive methods (DC school policy allowed discussion of contraceptives only from the sixth grade onward). Children's sessions are described in Table 2; sensitive topics (e.g. puberty) were covered separately by gender.

Full-time, trained health educators hired for the project administered the sessions during the spring of each school year; all were of an African-American or black racial/ethnic background, as were nearly all of the students. Typically, students attended weekly sessions lasting ~45–50 minutes and completed in one classroom period. During orientation, children created their own ground rules and the process for receiving good behavior and homework rewards. Also, the facilitator introduced students to: the 'Parking Lot', a blank flip chart on which the facilitator recorded students' questions to be answered at a later, more appropriate time; and the 'Anonymous Question Box', in which students could place anonymous sensitive questions for the facilitator to answer in the subsequent session. After orientation, sessions typically began with attendance taking, reviewing ground rules and the previous session (including homework collection), answering Anonymous Question Box questions, introducing a culturally relevant proverb or affirmation, and getting an overview of the day's session. The new lesson discussion and activity time ranged from 20 to 25 minutes, and all sessions concluded with an explanation of the homework assignment. The lessons included didactic lectures, interactive discussions, role-playing exercises, games, and prizes. Guest speakers, music, and video presentations further enhanced curriculum activities.

Both the fifth-grade and sixth-grade curricula emphasized including parents in children's session activities, specifically through homework assignments and parent workshops. The curricula also included sessions on 'How to Become a School Champion' and emphasized the importance of doing homework and succeeding in school. Facilitators provided children with homework binders and a calendar to track assignments.

Part-time, licensed social workers conducted six and eight workshops with parents/caregivers during the fifth-grade and sixth-grade school years, respectively. These workshops featured the BFY program, knowledge of puberty and adolescent development, and parenting practices. However, as noted earlier, because of poor attendance, this paper does not examine the impact of parents' workshop participation on the children's outcomes.

Students' survey instrument

The data analyzed come from the student questionnaires, which included items measuring background and risk factors related to early sexual debut and adolescent pregnancy and other knowledge, attitudinal, and behavioral outcomes targeted by the intervention. The

fifth-grade questionnaire included 70 items, and the sixth-grade questionnaire 74 items.¹ Students listened to questions and response options using an individual audiocassette player while marking their answers on a hard-copy questionnaire. We used this method because some students were not good readers; for example, in 2006 (the oldest year with publicly available data), 37% of third-graders to fifth-graders in DC achieved a level of ‘proficient’ or better for their grades in reading tests, and 32% of sixth-graders to eighth-graders and 10th graders did so (GreatSchools Inc. 2009). See Rose et al. (2005) for details on questionnaire development and administration.

Outcome measures

The three primary behavioral outcomes were: sexual intercourse experience (‘yes’ or ‘no’); anticipated sexual intercourse in the next 12 months (‘yes’ or ‘no’); and reporting of other risk behaviors, such as alcohol use, use of marijuana and inhalants, and affiliation with gangs (0, 1, or 2+ risk behaviors). We also analyzed 10 intermediate outcome variables. Further descriptions of all variables are included in Table 3.

Statistical methods

Because boys and girls differ markedly in their levels of sexual activity and sexual attitudes (Raine et al. 1999; Rose et al. 2005), we analyzed their data separately. To avoid bias and to evaluate the intervention’s benefits as they would occur in real-life (non-experimental) situations (i.e. in which students would change between intervention and control schools), we used an intent-to-treat approach. That is, we conducted the analyses based on the child’s original assignment to the intervention or control condition, even if the student subsequently changed conditions (e.g. by changing schools).² We included in the analysis all data observed through four survey time points.

To examine whether the intervention had impacts, we used linear hierarchical models to test the change over time between the intervention and control groups. In these models, we controlled for key sociodemographic factors previously linked to early sexual activity, including: whether the student had one versus two parents living at home; maternal employment; receipt of free/reduced-price school lunches; attendance at religious activities; perceptions of neighborhood safety; and child’s pubertal status (experienced no pubertal signs, some signs, or advanced signs).

We used a three-level model to measure individual change over time, variation among children within a school, and variation among schools/interventions.³ SAS Glimmix, Mixed, and Genmod procedures were used for computation. To test whether the intervention had an effect on each outcome, we tested whether the change in that outcome over time between the intervention and control groups was statistically significant.

Additional analyses tested for dosage effects of children’s attendance on the three behavioral outcomes. We conducted these analyses by adding to the linear hierarchical models a variable representing whether the students were control students, or, if intervention students, whether they had attended all of the first seven sessions in each grade.⁴

¹We slightly revised the sixth-grade questionnaire to measure the added curriculum activities; these changes did not affect any analysis variables.

²Altogether, 19 boys (7.6%) and nine girls (3.6%) changed from being in the intervention to the control condition; six boys (2.3%) and three girls (1.4%) made the opposite change. Nearly all of these changes occurred because of the creation of new middle schools and changes in the feeder patterns from elementary to middle schools.

³Details of the modeling formulations are available from the authors.

⁴We were constrained to use the attendance data only for the first seven sessions because attendance data were corrupted in the sixth grade after the seventh session, and it was necessary to create a uniform variable across the two years.

Results

Table 4 compares the unadjusted rates of the three primary behavioral outcomes for the male and female intervention and control students across the study period. The last column provides the adjusted *p* value for the test of significance of the interaction term (Time × Treatment Condition) in the linear hierarchical models. A significant result means that the intervention and control groups differed over time and thus the intervention can be concluded to have had an effect.

Overall, across the study period, males were significantly more likely than females to report being sexually experienced, expecting sexual intercourse in the next 12 months, and having higher numbers of other risk behaviors.

Experience of sexual intercourse

At baseline, there was no difference between intervention (18.0%) and control (17.2%) boys. Among both groups, sexual experience rates increased markedly in each subsequent time point, to 51.2% among controls and 47.0% among intervention boys by the end of the sixth grade. These differences between treatment groups over time were not statistically significant, indicating that the intervention had no effect on the rate of increase in sexual experience among boys.

At baseline, there was no difference in sexual experience rates between intervention girls (4.2%) and control girls (5.4%); the rates remained stable for both groups at the end of the fifth grade. At the beginning of the sixth grade, the rates increased more for control girls than intervention girls, but the reverse occurred by the end of sixth grade so that more intervention girls (14.7%) than control girls (8.5%) had had sexual intercourse. These differences over time were not statistically significant.

Anticipating sexual intercourse in next 12 months

At baseline, a somewhat higher percentage of intervention boys (57.9%) than control boys (51.3%) reported anticipating sexual intercourse. These rates decreased slightly for intervention males and increased slightly for control boys at the end of the fifth grade. The rates increased over the next two time points for both treatment groups. By the end of the sixth grade, a higher percentage of control boys (78.0%) than intervention boys (70.3%) reported anticipating sexual intercourse. The intervention effect in decreasing the rate of increase of intervention boys' anticipating sexual intercourse compared with the controls was statistically significant.

At baseline, intervention and control girls reported comparable rates of anticipating sexual intercourse (23.8% and 22.3%, respectively). Similar to the boys, by the end of the fifth grade, these rates decreased for intervention girls (19.4%) and increased for control girls (31.4%). At the beginning of the sixth grade, the rates decreased only for control girls to levels below the baseline fifth-grade level (17.3%); and by the end of the sixth grade, a higher percentage of intervention girls (28.6%) than control girls (23.9%) reported anticipating sexual intercourse. However, there was no statistically significant intervention effect.

Other risk behaviors

At baseline, a lower percentage of intervention boys (57.8%) than control boys (66.4%) reported no risk behaviors. By the end of the sixth grade, the percentage of boys reporting no risk behaviors decreased for both intervention (35.7%) and control (39.5%) students, and

the percentage reporting two or more risk behaviors increased to comparable levels (36.5% and 35.7%, respectively). There was no statistically significant intervention effect.

Similarly, at baseline, a lower percentage of intervention girls (66.9%) than control girls (75.5%) reported no risk behaviors. By the end of the sixth grade, the percentage reporting no risk behaviors decreased to the same level for both groups (53.3% and 53.1%, respectively); the percentage reporting two or more risk behaviors increased to comparable levels (24.0% and 25.2%, respectively). There was no statistically significant intervention effect.

Secondary outcomes: attitudes and knowledge

Tables 5 and 6 show the unadjusted results for each of the secondary outcomes for male and female students, respectively. Again, the adjusted *p*-value column displays the results of the test of significance of the intervention's effects over time in the models. Overall, across the study period, girls reported more favorable responses compared with boys for each of the 10 intermediate variables.

Among male students, there were no significant intervention effects on the attitudinal outcomes. However, the intervention effect over time on the boys' knowledge about puberty was significant. Among both treatment groups, boys' knowledge of puberty increased over time. At baseline, intervention boys averaged 3.6 out of nine possible points on male pubertal development and 3.1 on female pubertal development; the corresponding average scores for control boys were 3.9 and 3.7. At the end of the sixth grade, intervention boys scored significantly higher on male and female pubertal development (6.9 and 6.5, respectively) compared with control boys (6.2 and 5.6, respectively). The intervention effect was nearly significant for male pubertal development (adjusted *p* value = 0.068) and statistically significant for female pubertal development.

There was also a statistically significant program effect on the intervention girls' pubertal knowledge. For intervention girls, knowledge of female pubertal development increased from 5.3 at baseline to 8.0 at the end of the sixth grade, and knowledge of male pubertal development increased from 3.8 at baseline to 7.3 at the end of the sixth grade. Control girls also reported increases in knowledge of female and pubertal development from baseline to sixth grade (5.4 to 7.2 for female pubertal development and 3.2 to 6.0 for male pubertal development), but these were lower than the intervention girls' scores. The intervention effect was statistically significant for both female and male pubertal development.

Intervention girls (compared with control girls) showed nearly significant increases in their ability to identify benefits to postponing sex (adjusted *p* value = 0.062) and psychosocial influences to have sex (adjusted *p* value = 0.082).

Effects of attendance

As measured by whether or not intervention students attended all of the first seven sessions in each grade, attendance had no significant impact on the three behavioral outcomes among boys and girls, with one exception. The proportions of boys anticipating sexual intercourse in the next 12 months increased over the four time points among intervention students who had not attended all of the first seven sessions (from 52.9% to 82.3%) and among control students (from 51.3% to 78.0%) (data not shown). In contrast, among those who attended all seven sessions, the proportions anticipating sex decreased from 62.7% at the fifth-grade baseline to 58.9% at the end of the sixth grade. These differences over time were significant among the three groups (adjusted *p* value = 0.003) and between the two intervention groups (adjusted *p* value = 0.009).

Discussion and conclusion

This paper is one of a few to present data on the sexual activity and expectations of sexual activity among American children as young as 10 or 11 years old. In Washington, DC, where teenage pregnancy rates are considerably higher than across the United States, the proportions of youths who reported they have had sexual intercourse or are anticipating such activity in the next 12 months are both alarmingly high. By the end of the sixth grade, 47–51% of boys had experienced sex and 70–78% anticipated engaging in sexual intercourse in the next 12 months. Similar to other research efforts, the levels of both past and anticipated sexual intercourse are two to three times higher among boys than girls (Raine et al. 1999).

Within this context, it is perhaps not surprising that the only significant behavioral effect found was for boys: the slowing of the rise of proportions anticipating having sex among intervention versus control boys. The significant decrease in the anticipation of sex among intervention boys over the four time points was not accompanied, however, by a significant reduction in the rate of sexual experience among the intervention boys compared with the controls. Thus, it appears that the intervention was successful in getting male students to realize they should not have sex in the next year, to the point that they said that they would not do so in the survey. However, this intention was not supported by corresponding changes in attitudes toward abstinence and the use of refusal skills to resist sex or in the ability to identify benefits of postponing sex, consequences of having a baby while in school, peer pressure, and influences on youths to have sex. Thus, the intention to abstain from sex was not sufficiently grounded in attitudes and perceptions that would have facilitated actual delay in sexual initiation. Nevertheless, it should be noted that the biggest difference in anticipation of sex occurred at the end of the sixth grade, so that it is possible that after the end of the study, the lowered rates of anticipation of sex among intervention boys at the end of the sixth grade may yet result in reduced sexual experience among the intervention males.

The intervention also significantly increased boys' and girls' knowledge of pubertal changes, both in males and females, compared with control students. This result is not surprising given that two children's intervention sessions during each school year focused specifically on puberty and reproduction. Anecdotally, interventionists confirmed students' lack of prior knowledge and consequent interest in these sessions. In addition to pubertal knowledge, there was a slight positive effect among intervention versus control girls in their ability to identify the benefits of postponing sex and influences on children to have sex.

The study's findings are reinforced by the analyses investigating the effects of children's attendance on the behavioral outcomes. The only effect discerned was again upon the anticipation of sex among boys. Boys with complete attendance in the first seven sessions had a lower rate of increase in their anticipation of sex, and this was true compared with both the control boys and the intervention boys with lower attendance. This result may mean that greater exposure to the intervention increased its effect on not anticipating sex. However, it could also reflect the self-selection of boys who were less inclined to anticipate sex to attend all beginning sessions; it may be, for example, that boys who were more likely to think they would have sex were also more likely to have been absent from curricular sessions.

Because this sample represents a compelling test case for decreasing rates of early adolescent sexual activity among a very high-risk population, it is all the more disappointing that, even for youths as young as 10–13 years old, a carefully conceptualized and pretested classroom program failed to delay sexual initiation. Part of the lack of impact may potentially be due to inadequacies in the curriculum itself or in its implementation.

A review of 83 domestic and international HIV/STD and pregnancy prevention curricula suggested that written curricula implemented in school, clinic, and community settings ‘are a promising type of intervention to reduce adolescent sexual risk behaviors’, and they highlighted 17 key characteristics of effective programs (Kirby, Laris, and Roller 2006, 9). Our BFY intervention includes nearly all of these key elements in the: *development of the curriculum* (namely, multidisciplinary team of developers, assessment of population needs through focus groups, development and use of a program logic model, culturally relevant and appropriate for level of resources available, and pilot-tested); *curriculum content* (clear health goals, focus on specific behaviors leading to health goals, addresses multiple sexual psychosocial risk and protective factors, safe social environment for learning, instructionally sound teaching methods, age-appropriate and youth-oriented, and logical sequence of topics); and *curriculum implementation* (secured school and community support, utilized appropriate and well-trained educators, implemented strategies to enhance participation, and implemented activities as designed). Only one of the 83 studies in the review, however, included youths in the elementary school years; therefore, one may suggest that additional or different criteria are necessary when implementing a curriculum among very early adolescents. Kirby, Laris, and Roller (2006) also noted significant gaps in the effectiveness of such programs among very high-risk youths, such as our study’s population.

One may also suggest that our intervention lacked the intensity necessary for achieving significant behavioral change and that increasing children’s exposure to the curriculum content or strengthening the messages of the curriculum content would improve its impact. However, in a study of four abstinence-only education programs (including three among poor, African-American youths in the elementary and/or early middle school years), even 50 hours of curriculum contact were not sufficient to produce significant behavioral effects (Trenholm et al. 2007).

In a meta-analysis including only rigorous randomized controlled trials of programs designed to reduce sexual risk-taking among teens, Scher, Maynard, and Stagner (2006) used pooled effects to compare four types of programs: one-time consultations (mostly in clinical settings with high school-aged youths); sex education programs with an abstinence focus; sex education programs with a contraception component; and multicomponent youth development programs. Results highlight the lack of rigorously evaluated abstinence-only programs (only three studies were ‘rigorous randomized controlled trials’), the limited effects on sexual abstinence rates for all types of programs, and the potentially positive effect of youth development programs on pregnancy risk (unprotected intercourse vs. intercourse with contraceptives or abstinence). Similar to another review (Kirby 1997), none of the studies in this review included elementary school students.

Other research highlights the potential of community-based efforts and some service learning and youth development programs as particularly promising strategies for delaying and reducing sexual activity and pregnancy (Gallagher et al. 2005; Kirby 2002; O’Donnell et al. 1999, 2002; Philliber, Kaye, and Herrling 2001). Kirby’s (2002) review of 73 research studies examining the effectiveness of efforts to reduce unprotected sex, pregnancy, and childbearing among youths suggests that adding either an individualized clinician–patient approach or a more experiential, non-classroom component could enhance intervention effectiveness. By engaging children in activities that broaden their perspectives of life and community, such approaches may be more effective in convincing very high-risk pre-teens and young teenagers that delaying sexual initiation and avoiding pregnancy have tangible and attainable rewards.

There are several limitations to the present work. The sample is limited to schools located in areas with very high adolescent pregnancy rates in Washington, DC, and nearly all students

were African American. Thus, the sample has limited generalizability. On the other hand, this is precisely the sample in greatest need of intervention and is thus a compelling test case. Another limitation is the relatively small sample size, a particular problem in estimating rare events, such as sexual intercourse among young girls. This is compounded by the fact that sexual intercourse, and all other outcomes, was measured by self-reports in questionnaires. Furthermore, the data on attendance were not complete. This weakness in the data, however, is not important in view of the limited intervention effects overall. Finally, we based our analysis on all students, regardless of participation in only one or two years, under the assumption that the data missing from students who participated in only one grade were missing at random. However, results from a second analysis based only on students who participated in both grades did not differ substantively from the results based on all students.

Regardless of these limitations and the small number of significant effects, our study marks a significant advance in adolescent pregnancy prevention by targeting very high-risk youths in the elementary school years and conducting a randomized controlled trial. Despite concern about obtaining school, community, and parental support, we gained their cooperation and were able to successfully implement an abstinence-based curriculum that also included comprehensive information on contraceptive methods during the sixth-grade year (as well as implement a randomized design). It is possible that increasing the level of the curriculum exposure and even greater engagement of the broader community could have further strengthened the intervention program by improving its content and applicability to the target youths and their parents, engaging more parents in workshops, and addressing early sexual debut beyond the classroom setting (e.g. via youth development or service learning programs that would be conducted after school hours or during weekends) (Gallagher et al. 2005; Green and Documét 2005).

It is important to remember that the intervention failed to have greater effects on children's behaviors and attitudes in the face of overwhelming odds. Many of these children live in extremely adverse circumstances and are subjected to barrages of influences opposite those of the intervention, from public media to personal examples pushing them toward early sexual intercourse (Walker et al. 2008). In this sense, the lack of intervention impact is not surprising and calls for a redoubling of efforts and dedication to the cause of improving children's futures at the community level by helping them to avoid too-early sexual activity.

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Table 1

Students by gender and condition participating in fifth grade or sixth grade only or in both grades.

Grade	Boys (%)		Girls (%)		Total percentage (n)
	Intervention	Control	Intervention	Control	
Fifth grade only	25.7	32.0	19.8	30.1	26.6 (247)
Sixth grade only	40.1	37.3	38.7	30.6	36.9 (342)
Both fifth and sixth grades	34.1	30.7	41.5	39.3	36.5 (339)
Total percentage (n)	100.0 (249)	100.0 (212)	100.0 (248)	100.0 (219)	(928)

Table 2

Descriptions of fifth-grade and sixth-grade children's sessions.

Fifth-grade children's sessions	
1	<i>Orientation Session</i> : Introduce program purpose; create and identify ground rules; explain 'Parking Lot,' good behavior/ homework rewards, and Anonymous Question Box.
2	<i>Learning about Our Culture</i> : Promote positive racial/ethnic identity and increase knowledge of famous people, places, and things of African and Hispanic/Latino descent.
3	<i>How to Become a School Champion</i> : Highlight importance of academic success and completing homework assignments; provide tools for improving homework organization skills.
4	<i>Achieving a Dream</i> : Promote goal- setting and life-planning skills by including a 'successful' local guest speaker to share his/her life experiences.
5	<i>The Changes I Am Going Through: Puberty^a</i> : Highlight different aspects of pubertal development versus socioemotional changes of adolescence; explain normalcy of changes, including variations in timing.
6	<i>The Changes I Am Going Through: Adolescence^a</i> : Continue discussion of socioemotional changes in adolescence; highlight how adolescents may attain physical maturity before socioemotional maturity.
7	<i>Waiting to Have Sex – Abstinence^a</i> : Encourage positive attitudes about abstinence by identifying positive reasons to avoid sex and understanding abstinence as a peer norm.
8	<i>Making Good Decisions</i> : Increase awareness of peer pressure influences (positive and negative); learn about and demonstrate peer pressure reversal techniques.
9	<i>Communication</i> : Improve knowledge and demonstration of good listener and speaker skills (includes nonverbal cues); highlight importance of family talks.
10	<i>Values: What Is Important to Me</i> : Learn about personal values and understand how they are important determinants of our decisions, behaviors, and the future.
Sixth-grade children's sessions	
1	<i>Orientation Session</i> : See fifth-grade children Session 1 above.
2	<i>How to Become a School Champion</i> : See fifth-grade children Session 3 above.
3	<i>Family Relationships</i> : Explain role of parents and families in defining one's values; role-play parental 'perspective taking' on important issues (e.g. sexual behavior); highlight benefits of parental monitoring.
4	<i>Peer Communication</i> : Discuss how peers' values may differ from own values and how good communication skills can resolve conflicts with such peers; improve knowledge and demonstrate good listener and speaker skills.
5	<i>Media Influences</i> : Discuss important sources of values within and outside the family (highlighting negative media influences) and how personal values are important determinants of our decisions, behaviors, and future.
6	<i>Making Good Decisions</i> : See fifth-grade children Session 8 above.
7	<i>Taking Care of Your Body: Avoiding Threats to Your Body, Mind, and Spirit^a</i> : Define 'risky behaviors'; discuss reasons to avoid such behaviors; explain how various risk behaviors are threats to healthy teen development.
8	<i>The Changes I Am Going Through: Puberty^a</i> : See fifth-grade children Session 5 above.
9	<i>Taking Care of Yourself and Your Body: Sexuality^a</i> : Explain how sexuality consists of more than sexual intercourse; encourage healthy sense of respect and comfort with students' own sexuality.
10	<i>Building Healthy Relationships</i> : Define stages of physical affection; promote value and benefits of postponing sexual involvement; help students respond to peer pressure and avoid unwanted sexual involvement.
11	<i>Birth Control^a</i> : Encourage positive attitude toward abstinence; provide information on major methods of birth control, including effectiveness in preventing pregnancy and where to obtain effective contraception.
12	<i>Sexually Transmitted Diseases and HIV^a</i> : Discuss behaviors with high, low, and no risk for transmitting HIV/STDs; how to avoid such behaviors; abstinence and condoms as protection; and importance of family communication about these topics.
13	<i>Achieving a Dream</i> : See fifth-grade children Session 4 above.

Note:

^aGender-specific session.

Table 3

Primary and intermediate outcome variables.

Variable	Description	Sample item(s)	Response format
Behavioral outcomes			
Sexual intercourse experience	Binary: 0 =no; 1=yes	Have you ever had sex? ^a	Yes, no
Anticipate sexual intercourse in next 12 months	Binary: no =answered NO to having sex (regardless of kissing/ touching); yes = answered YES/ NOT SURE to having sex	(a) In the next 12 months, if you were going with someone you liked a lot, you would kiss each other; (b) In the next 12 months, if you were going with someone you liked a lot, you would touch each other under your clothing; (c) In the next 12 months, do you think that you will have sex?	(a and b) Agree, disagree, I am not sure; (c) Yes, no, I am not sure
Other risk behaviors	3-level ordinal variable: 0, 1, and 2+ risk behaviors	(a) Have you ever had more than one or two sips of alcohol, such as beer, wine, or liquor? (Also asked about smoking, marijuana, inhalants, and gang relations.)	Yes, no
Attitudinal outcomes			
Positive attitude toward abstinence	Factor analysis scale, seven items ($\alpha = 0.82$)	(a) I think kids my age should not have sex; (b) At what age is it okay for a person to have sex for the first time?	(a) Agree, disagree, I am not sure; (b) Range of age categories
Views abstinence as peer norm	Factor analysis scale, three items ($\alpha = 0.45$)	My friends think it is a good thing to wait to have sex until you are older.	Agree, disagree, I am not sure
Parent-child communication	Factor analysis scale, six items ($\alpha = 0.86$)	In the past 12 months, how often have you talked with your parent, or someone who is like a parent, about things like smoking, alcohol, drugs, or gangs?	Never, 1–2 times, 3–4 times, 5 times or more
Ability to identify peer pressure	Factor analysis scale, two items ($\alpha = 0.50$)	If you have friends who don't smoke or drink alcohol (such as beer, wine, or liquor), it is easier for you not to smoke or drink alcohol.	Agree, disagree, I am not sure
Positive attitude toward use of refusal skills to resist sexual intercourse	Factor analysis scale, four items ($\alpha = 0.60$)	(a) If your friends say NO to sex, would it be harder or easier for you to say NO to sex?; (b) If you were going with someone you really liked and did not want to have sex, would you talk to him about why you did not want to have sex with him?	(a) Harder, easier, I am not sure; (b) Yes, no, I am not sure
Benefits of postponing sex	Summary variable, seven items, range = 1–7 ($\alpha = 0.86$)	If you wait until you're older to start having sex, which of the following would happen?	<i>Sample item response from list of seven responses to mark:</i> Help me to focus on my goals and future plans.
Consequences of having a baby while in school	Summary variable, six items, range = –3 through +2 ($\alpha = 0.42$)	What would happen if you had a baby while you are in junior high or high school?	<i>Sample item response from list of six responses to mark:</i> I would have someone to love me.
Influences on kids to have sex	Summary variable, six items, range = 0–5 ($\alpha = 0.76$)	Why do some kids have sex even though they may not want to have sex?	<i>Sample item response from list of six responses to mark:</i> Because their friends think it makes them more grown up.
Knowledge outcomes			
Knowledge of pubertal changes in own/ other ^b gender	Summary variable, seven items, range = 0–9 ($\alpha = 0.72$ for own gender; $\alpha = 0.76$ for other gender)	What changes happen to boys/girls during puberty?	<i>Sample item response from list of seven responses to mark:</i> Grow body hair.

Notes:

^a Defined in the questionnaire as "The male's penis is inside the female's vagina. Also called "going all the way" or "doing it."

^b Asked as two separate questions and included as two separate variables.

Behavioral outcomes for male and female fifth-grade and sixth-grade students, unadjusted number (percentage) of cases; adjusted *p*-values from models.

Table 4

	Intervention males						Control males						Adjusted <i>p</i> value
	5th BL	5th FU	6th BL	6th FU	5th BL	5th FU	6th BL	6th FU	5th BL	5th FU	6th BL	6th FU	
	<i>n</i> = 140	<i>n</i> = 126	<i>n</i> = 162	<i>n</i> = 121	<i>n</i> = 117	<i>n</i> = 108	<i>n</i> = 129	<i>n</i> = 132	<i>n</i> = 117	<i>n</i> = 108	<i>n</i> = 129	<i>n</i> = 132	
Ever had sex	Yes	25 (18.0)	37 (29.6)	60 (37.0)	54 (47.0)	20 (17.2)	33 (30.6)	56 (44.8)	66 (51.2)				0.912
Anticipate sex	Yes	81 (57.9)	69 (54.8)	106 (65.4)	85 (70.3)	60 (51.3)	61 (57.0)	79 (61.2)	103 (78.0)				0.032*
Other risk behaviors	2+	20 (14.6)	35 (27.8)	48 (30.0)	42 (36.5)	21 (17.2)	28 (26.9)	41 (30.6)	46 (35.7)				0.582
	1	38 (27.7)	26 (20.6)	33 (20.6)	32 (27.8)	20 (16.4)	25 (24.0)	35 (26.1)	32 (24.8)				
	0	79 (57.8)	65 (51.6)	79 (49.4)	41 (35.7)	81 (66.4)	51 (49.0)	58 (43.3)	51 (39.5)				
Intervention females													
Control females													
	5th BL	5th FU	6th BL	6th FU	5th BL	5th FU	6th BL	6th FU	5th BL	5th FU	6th BL	6th FU	Adjusted <i>p</i> value
	<i>n</i> = 144	<i>n</i> = 135	<i>n</i> = 184	<i>n</i> = 157	<i>n</i> = 148	<i>n</i> = 122	<i>n</i> = 130	<i>n</i> = 142	<i>n</i> = 148	<i>n</i> = 122	<i>n</i> = 130	<i>n</i> = 142	
Ever had sex	Yes	6 (4.2)	6 (4.4)	12 (6.5)	23 (14.7)	8 (5.4)	7 (5.7)	12 (8.5)	12 (8.5)				0.112
Anticipate sex	Yes	34 (23.8)	26 (19.4)	37 (20.4)	44 (28.6)	33 (22.3)	37 (31.4)	22 (17.3)	34 (23.9)				0.576
Other risk behaviors	2+	12 (8.3)	16 (11.6)	26 (14.3)	37 (24.0)	15 (10.2)	10 (8.1)	22 (16.9)	37 (25.2)				0.194
	1	36 (24.8)	31 (22.5)	37 (20.3)	35 (22.7)	21 (14.3)	34 (27.4)	26 (20.0)	32 (21.8)				
	0	97 (66.9)	91 (65.9)	119 (65.4)	82 (53.3)	111 (75.5)	80 (64.5)	82 (63.1)	78 (53.1)				

Notes: The number and percentages are the unadjusted values; the adjusted *p* value is the result of the test of significance for the variable, time × membership in the intervention or control group, in the linear hierarchical model. BL = baseline; FU = follow-up.

* *p* < 0.05.

Table 5

Secondary outcome results for male fifth-grade and sixth-grade students, unadjusted mean scores (and standard deviations); adjusted *p* values from models.

	Intervention males						Control males						Adjusted <i>p</i> value				
	5th BL		5th FU		6th BL		6th FU		5th BL		5th FU			6th BL		6th FU	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)		<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
Favors abstinence	141	64.3 (29.7)	129	57.4 (30.7)	168	53.8 (28.2)	122	50.1 (28.6)	121	67.3 (26.3)	110	60.4 (27.4)	137	54.0 (25.8)	133	48.4 (27.0)	0.404
Perceives abstinence as peer norm		69.0 (24.6)		63.6 (30.0)		61.3 (25.7)		57.8 (24.8)		69.7 (25.6)		66.0 (26.1)		63.3 (24.8)		57.0 (24.0)	0.163
Communicates with parents		46.8 (31.0)		52.2 (30.0)		46.8 (30.1)		46.0 (27.5)		44.7 (28.2)		47.8 (29.0)		48.8 (30.7)		45.9 (28.5)	0.861
Identifies peer pressure to have sex		77.2 (28.5)		75.0 (31.4)		77.7 (27.8)		69.5 (33.1)		71.7 (31.0)		68.8 (32.6)		75.4 (31.0)		69.9 (30.0)	0.299
Favors use of refusal skills		67.9 (26.7)		64.4 (27.3)		61.4 (26.0)		55.5 (25.9)		66.7 (27.8)		67.2 (28.3)		61.3 (26.4)		55.0 (27.1)	0.758
Benefits of postponing sex		3.0 (2.2)		3.9 (2.5)		3.2 (2.2)		3.9 (2.2)		3.1 (2.4)		3.8 (2.4)		3.2 (2.2)		3.3 (2.3)	0.293
Consequences of having baby in school		0.1 (1.1)		0.5 (1.2)		0.2 (1.1)		0.4 (1.1)		0.2 (1.2)		0.4 (1.2)		0.3 (0.9)		0.5 (1.0)	0.387
Influences on kids to have sex		2.1 (1.7)		2.2 (1.8)		2.2 (1.6)		2.4 (1.7)		1.9 (1.7)		2.3 (1.8)		2.1 (1.5)		2.2 (1.8)	0.635
Knowledge of self/boys' puberty		3.6 (2.6)		6.4 (2.2)		5.3 (2.7)		6.9 (2.0)		3.9 (2.8)		5.6 (2.5)		5.4 (2.5)		6.2 (2.5)	0.068**
Knowledge of girls' puberty		3.1 (2.8)		5.8 (2.8)		5.0 (3.0)		6.5 (2.6)		3.7 (3.1)		5.1 (3.0)		4.9 (2.7)		5.6 (2.9)	0.045*

Notes: The means and standard deviations are the unadjusted values; the *p*-value is the result of the test of significance for the variable, time × membership in intervention or control group, in the linear hierarchical model. BL =baseline; FU =follow-up.

** *p* < 0.10.

* *p* < 0.05.

Table 6

Secondary outcome results for female fifth-grade and sixth-grade students, mean scores (and standard deviations); adjusted *p* values from models.

	Intervention females						Control females						Adjusted <i>p</i> value				
	5th BL		5th FU		6th BL		6th FU		5th BL		5th FU			6th BL		6th FU	
	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)		<i>n</i>	Mean (SD)	<i>n</i>	Mean (SD)
Favors abstinence	146	73.6 (21.1)	138	76.5 (18.0)	185	72.8 (22.1)	159	66.3 (25.3)	148	73.2 (22.9)	125	73.2 (23.0)	131	69.9 (23.3)	147	65.3 (22.1)	0.427
Perceives abstinence as peer norm		83.2 (17.1)		85.8 (15.9)		86.1 (15.8)		82.6 (16.1)		84.7 (16.3)		84.8 (17.8)		86.8 (15.5)		83.4 (19.3)	0.242
Communicates with parents		59.4 (30.4)		68.7 (27.4)		63.5 (28.3)		61.1 (29.0)		63.5 (32.1)		62.8 (31.2)		64.7 (30.0)		63.8 (30.1)	0.523
Identifies peer pressure to have sex		80.2 (29.9)		76.3 (32.4)		77.2 (30.9)		74.5 (30.6)		78.6 (30.5)		75.2 (32.3)		69.6 (35.4)		72.5 (35.0)	0.452
Favors use of refusal skills		87.6 (19.2)		88.8 (16.0)		88.0 (15.4)		87.68 (14.9)		86.1 (17.3)		87.4 (18.0)		88.9 (14.2)		85.2 (17.7)	0.785
Benefits of postponing sex		4.0 (2.5)		5.0 (2.1)		4.9 (2.1)		5.2 (1.9)		4.0 (2.6)		4.9 (2.2)		4.5 (2.4)		4.7 (2.2)	0.062*
Consequences of having baby in school		0.7 (0.9)		1.2 (0.9)		0.9 (1.0)		1.1 (1.0)		0.5 (1.0)		0.9 (0.9)		0.9 (1.0)		1.0 (1.0)	0.381
Influences on kids to have sex		2.4 (1.7)		2.9 (1.7)		2.9 (1.7)		3.2 (1.7)		2.6 (1.8)		2.8 (1.8)		2.9 (1.7)		3.0 (1.7)	0.082*
Knowledge of self/girls' puberty		5.3 (2.8)		7.5 (2.0)		7.2 (2.0)		8.0 (1.5)		5.4 (2.9)		6.9 (2.2)		7.0 (1.9)		7.2 (2.1)	0.021**
Knowledge of boys' puberty		3.8 (2.8)		6.4 (2.9)		6.0 (2.9)		7.3 (2.1)		3.2 (3.0)		5.0 (3.0)		5.5 (2.7)		6.0 (2.8)	0.011**

Notes: The means and standard deviations are the unadjusted values; the *p*-value is the result of the test of significance for the variable, time × membership in intervention or control group, in the linear hierarchical model. BL =baseline; FU =follow-up.

* *p* < 0.10.

** *p* < 0.05.