



ELSEVIER

Impact of an adolescent sex education program that was implemented by an academic medical center

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Objective: The purpose of this study was to assess changes in knowledge and attitudes before and after a large-scale sex education curriculum that was implemented by an academic medical center.

Study design: Middle school students were surveyed regarding demographics, knowledge, attitudes, and behaviors. All grade levels at each campus completed a presurvey on the same day before any of the 2-week curricula were received. Postsurveys were taken on the day after the last lesson.

Results: Surveys were completed by 26,125 students before and 24,550 students after a sex education curriculum. Knowledge improved ($P < .001$) for all grades, based on paired comparisons for each group. Although most students chose the option to wait until after high school graduation to have sex, significantly more students held this opinion after the program ($P < .0001$). Variables that were associated with the attitude of delaying sex included making a pledge (odds ratio, 7.4; 95% CI, 6.7-8.2), original parents still married (odds ratio, 1.6; 95% CI, 1.1-2.1), attending weekly religious/church services (odds ratio, 1.5; 95% CI, 1.3-1.6), and watching 0 to 2 hours of television on school nights (odds ratio, 1.4; 95% CI, 1.2-1.5). Self-reported "less than C" students showed the least knowledge improvement and the belief that teens should "have sex whenever they want" at a greater percentage than other academic levels.

Conclusion: Implementation of a sex education curriculum by an academic medical center to adolescents resulted in increased knowledge and a shift in attitude toward delaying sexual activity.

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Adolescent sexual activity is an enormous health care issue in the United States. Of the 4,091,063 births in 2003, 10.3% (421,626) were to teenagers.¹ Of the

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estimated 18,900,000 new cases of sexually transmitted diseases (STDs), approximately one-half occur in teens and young adults.² An estimated \$29 billion is spent annually taking care of families that are started by teens who are ≤ 17 years old, and additional billions are spent in the evaluation and treatment of STDs.^{3,4}

Realizing the ramifications of adolescent sexual activity and lacking a sex education program in the area school system, school administrators in Temple, Texas, approached health care professionals to assist with choosing a curriculum. Dissatisfied with content and

Table I Self-reported household characteristics of middle school students after the sex education program

Characteristic	Percent of respondents								
	Grade			Racial/ethnic group				Gender	
	6th	7th	8th	Black	White	Hispanic	Other	Male	Female
Living arrangements*									
With both original parents	56.7	56.4	56.2	39.8	61.9	58.0	57.7	57.6	55.4
With only 1 original parent	39.4	39.1	39.6	53.2	35.2	37.7	37.5	38.4	40.2
With someone other than original parents	3.9	4.5	4.2	7.0	2.9	4.3	4.8	4.0	4.4
Marital status of parents†									
Still married	57.2	56.8	56.2	43.1	60.6	58.0	59.5	58.2	55.4
Divorced or separated	31.8	31.3	32.3	32.5	32.8	30.0	29.7	31.3	32.2
Never married	8.3	8.6	8.0	20.9	3.8	8.9	7.1	7.5	9.2
Adopted me	0.7	1.2	1.0	1.0	0.9	0.6	1.5	0.8	1.1
Are no longer living	0.3	0.4	0.5	0.7	0.3	0.4	0.5	0.5	0.3
Are widowed	1.7	1.7	2.0	1.8	1.6	2.1	1.7	1.7	1.9

Probability calculated with multivariate analysis of subset of surveys with complete data of all surveyed results.

* N = 22,731, choices vary for racial/ethnic group ($P < .0001$) and gender ($P = .002$), but not grade ($P = .54$).

† N = 22,676, choices vary for racial/ethnic group ($P < .0001$) and gender ($P < .0001$), but not grade ($P = .05$).

medical inaccuracies of available curricula, health care professionals in the department of Obstetrics and Gynecology at Scott & White Hospital and Texas A&M College of Medicine developed and implemented a sex education program for middle school students and adults. Results of the adult components were published recently.⁵ Although other surveys of adolescents have accessed risky behaviors,^{6,7} this report details the first large-scale observation of demographics, attitudes, and knowledge of approximately 25,000 students before and after a sex education program.

Methods

The population consisted of 6th, 7th, and 8th grade students who were surveyed anonymously before and immediately after a 2-week sex education curriculum that was implemented during the 2002-2003 school year. The survey consisted of demographic, behavioral, attitude, and knowledge questions. The 33 school districts comprised of 62 campuses were located in 11 counties in central Texas. The study was approved by the hospital Institutional Review Board, and parental permission was obtained.

The curriculum was written by health care professionals and included an obstetrician gynecologist/contraceptive researcher (P.J.S.), an adolescent gynecologist, and child psychologists, with assistance from educators, to assure an age-appropriate format. Data on teen pregnancy, STDs, and other medical topics were derived from government statistics and peer-reviewed articles. Legal sections were written by attorneys.

The curriculum was implemented by science teachers in their classes, because all students are required to take

science at these grade levels and the content most closely meshed with this subject. Teachers who were assigned to present the 2-week curriculum were required to attend a 2-day training session. Eighth-grade students received 1 additional lesson that was presented by health care professionals. Lessons introduced topics at the 6th grade level and progressively expanded into more detail and complexity in the 7th and 8th grades. The curriculum content and focus were determined after numerous hospital-sponsored community forums. The overwhelming viewpoint of parents and school officials was to focus on postponing sexual activity. Thus, the curriculum centered on documented ramifications of adolescent sexual activity, the importance of delaying sexual debut, skill building, character development, and refusal skills. Adolescents who were contemplating sexual activity were encouraged to see a health care professional. Schools received the program through a Department of Health and Human Services grant.

Students completed the presurvey before any components of the curriculum were taught and an identical postsurvey immediately on the conclusion of the curriculum. Comparisons were made of knowledge scores and attitude questions before and after the program. Data sets were also subdivided for comparisons that were based on demographics, self-rated academic average, and attitude toward delaying sexual activity. Data were analyzed with Statistica software (StatSoft, Tulsa, OK). Comparisons were made by taking into account the repeated measures aspects of testing and surveying in each grade. Knowledge scores and proportions were calculated for choices of individual attitude questions. Multivariate logistic regression was used to examine the association of characteristics to attitudes about sexual

Table II Self-reported household characteristics of middle school students after the sex education program

Characteristic	Percent of respondents								
	Grade			Racial/ethnic group				Gender	
	6th	7th	8th	Black	White	Hispanic	Other	Male	Female
Academic grade*									
A	37.9	35.7	32.7	23.8	45.2	23.0	38.0	31.4	39.7
B	47.2	48.0	49.8	56.3	42.8	55.1	46.3	49.5	47.1
C	12.8	14.0	14.8	17.4	10.3	18.4	13.4	16.1	11.5
Below C	2.1	2.3	2.7	2.5	1.7	3.5	2.3	3.0	1.7
Television viewed†									
None on school nights	7.0	6.0	5.4	3.6	7.0	3.9	9.0	6.0	6.3
1-2 h	41.7	38.0	38.3	21.1	47.2	36.1	40.8	38.4	40.1
3-4 h	33.3	35.0	35.4	37.2	33.0	38.9	31.4	33.9	35.4
≥ 5 h	18.0	21.0	20.9	38.1	12.8	21.1	18.8	21.7	18.2
Activities‡									
Band/orchestra/choir (N = 19,238) ^{§ ¶}	64.6	52.9	43.9	51.2	56.6	49.4	55.5	47.5	60.4
Private music/drama/art lessons (N = 18,121) ^{§ ¶}	21.3	26.2	24.5	18.4	26.9	17.3	28.5	20.8	26.6
School clubs (N = 18,187) ^{§ ¶}	25.4	30.4	37.3	30.8	33.5	24.7	30.3	25.9	35.4
Weekly attendance at church/ religious activities (N = 19,261) ^{§ ¶}	57.9	60.7	60.7	62.7	62.4	55.2	54.9	57.7	61.6
Member of service organization and/or volunteer in community (N = 17,122) ^{§ ¶}	30.6	31.1	36.6	27.8	39.0	22.6	31.4	30.1	35.0
None of the above (N = 13,645) [§]	17.5	15.9	18.2	21.2	12.4	23.9	18.4	17.7	16.5

* I am usually a/an ___ student: N = 22,144, choices vary by grade ($P < .0001$), racial/ethnic group ($P < .0001$), and gender ($P = .004$).

† Hours of television watched on school nights: N = 22,631, choices vary by grade, racial/ethnic group, and gender ($P < .0001$).

‡ I participate in the following activities (percentage who answered yes).

§ Choice varies by grade ($P < .05$).

|| Choice varies by racial ethnic group ($P < .05$).

¶ Choice varies by gender ($P < .05$), with multivariate analysis.

activity. Results were calculated as odds ratios (ORs), with 95% CI. Multivariate discriminate analysis was used to examine the effects of grade, race/ethnicity, and gender on attitude questions.

Results

Demographics

There were 150 groups on 62 campuses with 96% of eligible students who provided 26,125 surveys before and 147 groups on 62 campuses with 92.5% of students who provided 24,550 surveys after the program. Approximately 2% of the students who could have participated in the program were not present on the day of the survey. Although parents could have their child opt out of the curriculum, according to Texas Education Agency mandates, 98% of students in the participating school districts received the curriculum. Most of the students (96%) were 11 to 14 years old. Male and female students made up equal proportions, which did not differ ($P = .09$) before (50.2% vs 49.8%, respectively) and after (49.4% vs

50.6%). Only 3 of 150 groups did not complete the postsurvey. Although the proportion of different racial/ethnic groups varied ($P < .0001$), these contributions did not differ ($P = .12$) before (white, 44.8%; Hispanic, 21.9%; black, 17.2%; other, 16.1%) and after (white, 46.0%; Hispanic, 21.5%; black, 16.9%; other, 15.7%).

Table I shows student household arrangements. About one half of the students reported living with both original parents and that their parents were still married. Percentages varied among races/ethnicities and between genders. Black students were more likely to be living with 1 parent or someone other than their original parents and more likely to have parents who never married ($P < .05$).

Self-reported student characteristics and activities are given in Table II. Most students in all grade levels self-reported being an "A" or "B" student. There was a greater tendency to report being an "A" student among the female gender and white students ($P < .05$). Black and Hispanic students were more likely to report being "C" or "below C" students. Television viewing varied greatly, especially by race, with ≥ 3 hours of television watched each school night by 75.3% of black

Table III Odds ratio from multivariate logistic regression of characteristics that were associated with the attitude to delay sex

Characteristic	Before program		After program	
	OR	95% CI	OR	95% CI
Perform community service and/or participating in service organizations	1.2*	1.1-1.3*	1.1	0.96-1.20
Attend weekly church/religious service	1.7*	1.5-1.8*	1.5*	1.3-1.6*
Living with both original parents	1.4*	1.3-1.6*	1.0	0.7-1.3
Parents still married	1.5*	1.3-1.6*	1.6*	1.1-2.1*
Watch ≤ 2 hours of TV on school nights	1.5*	1.4-1.6*	1.4*	1.2-1.5*
Made a pledge-not to have sex	4.3*	4.0-4.7*	7.4*	6.7-8.2*
Involved in ≥ 1 extracurricular activities	1.0	0.9-1.1	1.0	0.90-1.20
Currently use alcohol, tobacco, and/or illegal drugs	0.37*	0.32-0.44*	0.38*	0.32-0.45*
Female gender	1.5*	1.3-1.6*	1.2*	1.1-1.4*
Knowledge score of ≥ 70	1.1*	1.04-1.2*	1.3*	1.2-1.5*
Being white	1.2*	1.1-1.3*	1.1*	1.01-1.20*
Will avoid future use of alcohol and drugs	3.0*	2.7-3.2*	2.6*	2.3-2.8*

* Values are significantly ($P < .05$) different from 1.0.

students, 60.0% of Hispanic students, and 45.8% of white students ($P < .05$). When students were provided a list of extracurricular activities, only 17.5% of 6th grade students, 15.9% of 7th grade students, and 18.2% of 8th grade students indicated that they did not participate in any activity. The nonparticipating students were more likely to be black and Hispanic ($P < .05$).

Knowledge

The questions tested knowledge of reproductive anatomy and physiology, STDs, teen pregnancy, sexual abuse, and legal issues. Knowledge scores improved ($P < .001$) significantly from 59.8 ± 0.9 (mean \pm SE) to 79.2 ± 0.9 for 6th grade classes ($n = 51$), 67.6 ± 0.9 to 77.2 ± 0.9 for 7th grade classes ($n = 48$), and 61.4 ± 1.0 to 73.0 ± 0.9 for 8th grade classes ($n = 48$), based on paired comparisons for each group. The Cronbach alpha of 0.72, 0.61, and 0.62 with low inter-item average correlations of 0.21, 0.30, and 0.17 for 6th grade, 7th grade, and 8th grade tests, respectively, demonstrate that these portions of the survey are reliable. The question with the lowest presurvey score dealt with the legal age of consent to sex in Texas. Only 10% of 8th grade students correctly knew the legal age to consent to sex was 17 years, which increased to 84% after the curriculum.⁸

Attitudes

The survey included standardized opinion questions that pertained to the onset of sexual activity. When asked: "I think people should: a) have sex at whatever age they want; b) wait until after high school to have sex; c) wait until after college/trade school to have sex; or d) wait until marriage to have sex," most students (84.0%) in all grades chose waiting until at least after high school (options b +

c + d) before the program with an increase ($P < .0001$) to 86.9%. The primary shift was toward delaying sexual activity until marriage, with 60.1% before and 70.9% after choosing this response ($P < .0001$). This shift occurred at all grade levels, with an increase of 13% among 6th grade students (95% CI, 11%-15%), 11% with 7th grade students (95% CI, 9%-13%), and 8% of 8th grade students (95% CI, 6%-10%).

Table III presents multivariate OR calculations for activities and family characteristics that are associated with the attitude of teens who are waiting to have sex. In general, results of logistic regression of 12 dichotomous variables before and after the program were similar. Postsurvey characteristics that were associated most closely with the attitude that people should delay sex until marriage included having made a pledge to not have sex (OR, 7.4), planning to avoid future substance use (OR, 2.6), attending weekly religious services (OR, 1.5), watching 0 to 2 hours of TV on school nights (OR, 1.4), being a female (OR, 1.2), having a pre- and posttest knowledge score of ≥ 70 (OR, 1.3), parents still married (OR, 1.6), and being white (OR, 1.1). Further analysis of race/ethnicity comparing white students to the other racial groups demonstrated that racial/ethnic descriptors do not have a large association with the attitude to delay sex (black: OR, 0.83; 95% CI, 0.69-1.01; Hispanic: OR, 0.93; 95% CI, 0.78-1.11) but perhaps act primarily through other factors such as making a pledge; use of tobacco, alcohol, and/or illegal drugs; parents still married; and/or attending church regularly. A minority of students had the opinion that teens should have sex whenever they want. This group was more likely to be current substance users (OR, 3.7; 95% CI, 3.2-4.2) and less likely to be involved in extracurricular activities (OR, 0.7; 95% CI, 0.6-0.9).

Table IV Student attitude responses after the sex education program

Characteristic	Percent of respondents								
	Grade			Racial/ethnic group				Gender	
	6th	7th	8th	Black	White	Hispanic	Other	Male	Female
Sex is a safe activity for teens*									
Yes	2.9	3.5	4.5	4.0	2.7	4.4	4.2	5.3	2.0
No	91.6	91.1	89.8	89.4	93.4	88.2	89.7	87.5	94.3
Unsure	5.5	5.4	5.7	6.6	3.9	7.4	6.1	7.3	3.7
Having sex is a good way to show a boyfriend or girlfriend you love them†									
Yes	7.5	5.0	6.9	6.9	5.5	7.1	7.1	10.0	2.9
No	82.5	90.1	86.8	84.8	88.6	84.6	85.6	80.3	92.8
Unsure	10.0	4.9	6.3	8.2	5.9	8.3	7.3	9.7	4.3
It is okay for unmarried teens to get pregnant‡									
Yes	4.7	4.8	5.7	6.3	3.8	5.8	6.0	6.2	3.7
No	86.8	87.0	87.0	83.7	89.9	84.5	85.6	84.2	89.7
Unsure	8.5	8.2	7.3	10.0	6.3	9.7	8.4	9.5	6.6
I have felt pressured to have sex§									
Yes	12.0	18.1	21.6	24.8	13.8	18.8	15.9	17.1	17.3
No	81.2	76.4	73.1	68.6	81.4	74.5	77.5	76.1	77.8
Unsure	6.8	5.5	5.3	6.6	4.8	6.7	6.6	6.8	4.9
Whether or not I have had sex, from now on I will wait to have sex									
Yes	68.8	63.3	54.4	51.6	68.4	57.8	63.5	54.3	70.0
No	10.1	12.4	17.4	17.6	10.3	14.9	13.8	18.1	8.6
Unsure	21.1	24.3	28.2	30.8	21.3	27.3	22.7	27.6	21.4

Large-scale implementation of an adolescent sex education curriculum by an academic medical center resulted in wide acceptance of the program and a shift in attitude towards delaying sex.

* N = 21,980, choices vary for grade, racial/ethnic group, and gender ($P < .0001$).

† N = 21,945, choices vary for grade, racial/ethnic group, and gender ($P < .0001$).

‡ N = 21,916, choices vary for grade, racial/ethnic group, and gender ($P < .0001$).

§ N = 21,891, choices vary for grade, racial/ethnic group, and gender ($P < .0001$).

|| N = 21,968, choices vary for grade, racial/ethnic group, and gender ($P < .0001$).

Table IV details student attitude responses after the program. Compared with responses before the program, 8.8% more students ($P < .0001$) agreed that sex was not a safe activity for teens, which was an increase from 81.4% to 90.2%. The percentages did vary among grades, racial/ethnic groups, and genders. When asked whether “Having sex is a good way to show a boyfriend or girlfriend you love them,” male students were 3 times more likely to say “yes” ($P < .0001$). Students were also asked whether it was okay for unmarried teens to get pregnant. The percent that responded “no” increased ($P < .0001$) by 6.8%. Feeling pressured to have sex increased with increasing grade level and was highest among black students. Those students who responded that they will wait to have sex until marriage increased by 8.7% ($P < .0001$).

There were variations in attitudes regarding sexual activity among subgroups. For example, students were asked to rate their academic level as “I am usually... an ‘A’, ‘B’, ‘C’, or ‘less than C’ student.” Self-reported academic achievement levels correlated with the actual scores on the knowledge test. The higher the self-reported academic level, the less likely teens thought that people

should have sex “whenever they want.” Students reporting themselves as usually “A” students were also least likely to respond that teens should “have sex whenever they want,” with a further decrease after the program. Self-reporting “less than C” students had minimal change in knowledge scores and were the only group that did not have a decrease in the opinion that teens should “have sex whenever they want.” The “less than C” students had a lower knowledge score, were more likely to come from a household with parents not having a high school degree (OR, 6.0; 95% CI, 2.2-16.4), and were more likely to be current substance users (OR 3.1; 95% CI, 1.5-6.3). They were less likely to have pledged to not have sex (OR, 0.2; 95% CI, 0.1-0.5) and to plan to avoid alcohol and tobacco in the future (OR, 0.2; 95% CI, 0.1-0.4).

The validity of student responses was assessed. Answers to demographic questions such as age, race, and parental status did not change between presurvey and postsurvey results. In addition, students were honest about their self-reported academic grade, because there was a direct correlation between self-reported academic grade and actual performance on the knowledge section of the survey. Also, although a significant change in

attitude toward waiting to have sex was noted, other self-reported behaviors that included substance use changed only slightly. When asked whether, regardless of their history, students would avoid alcohol and tobacco in the future, the increase was only 1.6% ($P = .02$). This contrasts to an increase of 8.7% ($P < .0001$) who agreed that, regardless of their history, they will wait to have sex (Table IV). The observation that students did not change their use of alcohol and tobacco, which are issues that were not addressed in the curriculum, further supports the reliability of responses and validity of the survey instrument.

Comment

This report details the results of a sex education program that was implemented by the department of Obstetrics and Gynecology at an academic medical center to a large population of students in a concentrated geographic area. This is the first large-scale study that involved approximately 25,000 students to examine the effects of a curriculum on knowledge and attitudes regarding adolescent sexual activity. Of students enrolled in the participating schools, there was a 98% acceptance rate, which was most likely consequent to the program being based in an academic medical center, the community-wide saturation of the program's message that included a website (www.worththewait.org), and parent presentations that were conducted by trained health care professionals.

Our results confirmed that adolescents increased their knowledge and shifted their attitude toward favoring delaying sexual activity. Most students (86.9%) responded that people should at least wait until after high school to have sex ($P < .0001$). Characteristics associated with the attitude to delay sex until marriage included having made a pledge, planning to avoid future use of alcohol and drugs, attending weekly church/religious services, watching 0 to 2 hours of television on school nights, female gender, knowledge score of ≥ 70 , and being white. A subset of students who performed poorly in school was identified as being at high risk for sexual activity. Curriculum components were implemented to reinforce the curriculum content among these students. An alternative-setting curriculum and programs are being implemented for alternative schools, youth prisons, teen pregnancy education programs, and other programs that are dedicated to at-risk youth. When multivariate analysis is used to adjust for these factors, race did not have a large association with student attitude to delay sex. However, race was a factor in academic performance, the number of hours of television viewing, participation in extracurricular activities, and parental status and living arrangements. Our findings confirm the importance of school involvement and of parents as major factors in adolescent attitude. These findings are similar to those in other large

surveys.⁹⁻¹² In an article entitled "Protecting Adolescents From Harm,"⁹ 12,000 adolescents were interviewed regarding risky behaviors. Factors that were statistically significant in delaying the onset of sex included a pledge of virginity (relative risk, 0.25), religious identity (relative risk, 0.93), parental disapproval of adolescents using birth control (relative risk, 0.75), parental disapproval of adolescents having sex (relative risk, 0.79), parent-family connectedness (relative risk, 0.85), and school connectedness (relative risk, 0.77).

Realizing the importance of adults in influencing sexual decisions of adolescents, the program included components for adult audiences that include health care professionals, teachers, parents, and community leaders.⁵ To assess knowledge and opinions, >3600 adults who attended our adolescent sexual health conferences and presentations were surveyed. All groups demonstrated significant ($P = .0005$) improvements in knowledge and a shift in attitude, with 98% favoring the delay of sexual activity until at least after high school on the postsurvey ($P < .0001$). Such results document how an educational intervention that is implemented by health care professionals can influence changes in knowledge and attitudes of the adults who interact with this age group.

There is evidence of a national trend in the delay of sexual activity among teens. Data from the 2002 National Survey of Family Growth documented a decrease in ever having sexual intercourse by never married teens (15-19 years old) from approximately 56% in 1988 to 46% in 2002.¹³ Parallel trends are seen in the Youth Risk Behavior Surveillance that shows that the percentage of high school students who had ever had sexual intercourse decreased from 54.1% in 1991 to 46.7% in 2003.⁶

With the decreasing trend in teenage sexual intercourse, there is also a decrease in the teen pregnancy rate (births and abortions) throughout the United States.^{1,14} The birth rate for teens declined 33% from its most recent high in 1991 to the lowest rate in 60 years.¹ A recent publication that examined the cause of the declining teen birth rate concludes that "the higher proportion of teen females abstaining from sex accounted for most of the reduction in single teen births and 67% of the decrease in single teen pregnancies from 1991 to 1995."¹⁵ Data analyzed and published by the Centers for Disease Control indicates that 53% of the decline in teen pregnancy rates can be attributed to decreased sexual experience.¹⁶ Importantly, while refraining from sexual activity can decrease both teen pregnancy and STDs, commonly used hormonal methods of contraception provide no reduction in STD acquisition. The initiation of sexual activity during adolescence and multiple sexual partners are well-documented risk factors for acquiring STDs. As stated in an article by Genuis et al,¹⁷ "...the promotion of optimal lifelong health can be achieved through

delayed sexual debut, partner reduction, and the avoidance of risky sexual behaviors.”

Despite a strong study design with a large sample size, some limitations exist. Our study does not include a control group because of state education mandates and strong demand to have our curriculum. Translation of the increase in knowledge and changes in attitude regarding the initiation of sexual activity to long-term behavioral indicators requires additional interventions and time. Although middle school students receive the curriculum, significant numbers of teen pregnancies usually do not occur until high school.¹⁸ This program has established research tools to allow yearly data collection and review of health statistics to assess whether interventions at this young age influence teen pregnancy and STD statistics later.

In summary, the development and implementation of a sex education curriculum within the department of Obstetrics and Gynecology at an academic medical center resulted in wide acceptance of the program, an increase in knowledge, and a shift in attitude toward delaying adolescent sexual debut. Involvement by the medical profession can assure medically correct content, appropriate research outcomes, and enhanced quality of medical information in this important area of adolescent health. By placing medical emphasis on risk avoidance and primary prevention of disease, encouraging adolescents to delay sexual onset can lead to significant health benefits.

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Implementation of a sex education curriculum by an academic medical center to adolescents resulted in increased knowledge and a shift in attitude toward delaying sexual activity.