

Centers for Disease Control and Prevention – August 11, 2006

## **Trends in HIV-Related Risk Behavior Among High School Students --- United States, 1991--2005**

Young persons who engage in unprotected sexual intercourse or use injection drugs are at increased risk for human immunodeficiency virus (HIV) infection. To examine changes in HIV-related risk behavior among high school students in the United States during 1991--2005, CDC analyzed data from eight national Youth Risk Behavior Surveys (YRBS) conducted during that period. This report summarizes the results of that analysis, which indicated that, during 1991--2005, the percentage of U.S. high school students engaging in HIV-related sexual risk behaviors decreased. During 1995--2005, the percentage of U.S. high school students who ever injected drugs remained less than 4%. However, many students still engage in HIV-related risk behaviors. Measures aimed at changing these behaviors should be strengthened to decrease the incidence and prevalence of HIV/AIDS among young persons and meet the national 2010 objective for adolescent sexual behavior (objective 25-11) (1).

The biennial national YRBS, a component of CDC's Youth Risk Behavior Surveillance System, used independent, three-stage cluster samples for the 1991--2005 surveys to obtain cross-sectional data representative of public and private school students in grades 9--12 in all 50 states and the District of Columbia. Sample sizes ranged from 10,904 to 16,296. School response rates ranged from 70% to 81%, and student response rates ranged from 83% to 90%; overall response rates for the surveys ranged from 60% to 70%.

For each cross-sectional national survey, students completed anonymous, self-administered questionnaires that included identically worded questions about sexual experience, number of sex partners, current sexual activity, condom use, and injection-drug use.\* Sexual experience was defined as ever having had sexual intercourse. Multiple sex partners was defined as having four or more sex

partners during the person's lifetime. Current sexual activity was defined as having sexual intercourse during the 3 months preceding the survey. Condom use was defined as use of a condom during last sexual intercourse among currently sexually active students. Beginning with the 1995 survey, injection-drug use was defined as ever having used a needle to inject any illegal drug into the body. Race/ethnicity data are presented only for non-Hispanic black, non-Hispanic white, and Hispanic students (who might be of any race); the numbers of students from other racial/ethnic groups were too small for meaningful analysis.

Data were weighted to provide national estimates, and the statistical software used for data analysis accounted for the complex sample design. Temporal changes were analyzed using logistic regression analyses, which controlled for sex, race/ethnicity, and grade and simultaneously assessed linear and quadratic time effects (2). Quadratic trends indicate a statistically significant but nonlinear trend in the data over time (e.g., a leveling off or significant change in direction). Trends that include significant linear and quadratic components demonstrate nonlinear variation in addition to an overall increase or decrease over time. During 1991--2005, the prevalence of sexual experience decreased 13% from 54.1% to 46.8% among high school students. Logistic regression analyses indicated a significant linear decrease overall and among female, male, 9th-grade, 10th-grade, 11th-grade, 12th-grade, black, and white students ([Table](#)). A significant quadratic trend also was detected among black students and 11th-grade students. Among black students, this trend indicated that the prevalence of sexual experience declined during 1991--2001 and then leveled off through 2005. Among 11th-grade students, the prevalence of sexual experience declined during 1991--1997 and then leveled off through 2005. Prevalence of sexual experience did not decrease significantly among Hispanic students.

During 1991--2005, the prevalence of multiple sex partners decreased 24% from 18.7% to 14.3%. A significant linear decrease was detected overall and among female, male, 9th-grade, 10th-grade, 11th-grade, 12th-grade, black, and white

students ([Table](#)). Prevalence of multiple sex partners did not decrease significantly among Hispanic students.

During 1991--2005, the prevalence of current sexual activity decreased 9% from 37.4% to 33.9%. A significant linear decrease was detected overall and among black students ([Table](#)), but the prevalence of current sexual activity did not decrease significantly among any other subgroups of students. Among currently sexually active students, the prevalence of condom use increased 36% from 46.2% to 62.8%. A significant linear increase in condom use was detected overall and among all subgroups of students. Among black students, a significant quadratic trend also was detected, indicating that the prevalence of condom use among currently sexually active black students increased during 1991--1999 and then leveled off through 2005.

During 1995--2005, the prevalence of injection-drug use remained below 4%. No significant change was observed overall or among any subgroups of students.

**Reported by:** *N Brener, PhD, L Kann, PhD, R Lowry, MD, H Wechsler, EdD, L Romero, DrPH, Div of Adolescent and School Health, National Center for Chronic Disease Prevention and Health Promotion, CDC.*

### **Editorial Note:**

The overall decrease in HIV-related sexual risk behaviors among high school students discussed in this report corresponds to a simultaneous decrease in gonorrhea ([3](#)), pregnancy ([4](#)), and birth rates ([5](#)) among adolescents. These improvements in health outcomes likely resulted from the combined contributions of parents and families, schools, youth-serving community organizations, health-care providers, the media, government agencies, and the youths themselves and improved availability of effective interventions that address HIV-related knowledge, skills, and behaviors and their determinants (e.g., peer norms and media influences). However, additional measures are needed to eliminate disparities among subgroups; for example, black students are more likely than white and Hispanic students to report HIV-related sexual risk behaviors ([6](#)), and

Hispanic students have not experienced decreases in the prevalence of sexual experience, having had multiple sex partners, or current sexual activity.

The findings in this report are subject to at least two limitations. First, these data apply only to youths who attend school and therefore are not representative of all persons in this age group. In 2001, among persons aged 16--17 years, approximately 5% were not enrolled in a high school program and had not completed high school (7). Second, the extent of underreporting or overreporting of behaviors cannot be determined, although the survey questions demonstrated good test-retest reliability (8).

A national health objective for 2010 (objective 25-11) is to increase the proportion of adolescents in grades 9--12 who abstain from sexual intercourse or use condoms if they are currently sexually active (1). Increased measures are needed to meet this 2010 objective and reduce the incidence and prevalence of HIV/AIDS among young persons.

\* The YRBS questions were as follows: "Have you ever had sexual intercourse?" "During your life, with how many people have you had sexual intercourse?" "During the past 3 months, with how many people have you had sexual intercourse?" "The last time you had sexual intercourse, did you or your partner use a condom?" and "During your life, how many times have you used a needle to inject any illegal drug into your body?" The wording of the question on injection-drug use changed substantially after the 1993 survey, so 1991 and 1993 data are not included in this report.

## References

1. US Department of Health and Human Services. Healthy people 2010, 2nd ed. With understanding and improving health and objectives for improving health. Washington, DC: US Department of Health and Human Services; 2000.
2. Hinkle DE, Wiersma W, Jurs SG. Applied statistics for the behavioral sciences. 5th ed. Boston, MA: Houghton Mifflin; 2003.
3. CDC. Sexually transmitted disease surveillance, 2003. Atlanta, GA: US Department of Health and Human Services; 2004.
4. Ventura SJ, Abma JC, Mosher WD, Henshaw S. Estimated pregnancy rates for the United States, 1990--2000: an update. Nat Vital Stat Rep 2004;52:1--12.
5. Martin JA, Hamilton BE, Sutton PD, Ventura SJ, Menacker F, Munson ML. Births: final data for 2003. Nat Vital Stat Rep 2005;54:1--25.

6. [Eaton DK, Kann L, Kinchen S, et al. Youth risk behavior surveillance---United States, 2005. In: Surveillance Summaries, June 9, 2006. MMWR 2006;55\(No. SS-5\).](#)
7. Kaufman P, Alt MN, Chapman C. Dropout rates in the United States: 2001. Washington, DC: US Department of Education, National Center for Education Statistics; 2004. Publication No. 2005-046.
8. Brener ND, Kann L, McManus T, Kinchen SA, Sundberg EC, Ross JG. Reliability of the 1999 Youth Risk Behavior Survey questionnaire. J Adolesc Health 2002;31:336--42.

## Table

TABLE. Percentage of high school students who reported HIV\*-related risk behaviors, by sex, grade, race/ethnicity, and survey year—United States, Youth Risk Behavior Survey, 1991, 1993, 1995, 1997, 1999, 2001, 2003, and 2005

Characteristic	Survey year	Ever had sexual intercourse		Had four or more sex partners during lifetime		Had sexual intercourse during preceding 3 months		Used condom during last sexual intercourse <sup>§</sup>		Ever used illegal injection drugs <sup>¶</sup>	
		%	(95% CI) <sup>†</sup>	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
Total	1991	54.1	(±3.5)	18.7	(±2.1)	37.4	(±3.1)	46.2	(±3.3)	—	—
	1993	53.0	(±2.7)	18.7	(±2.0)	37.5	(±2.1)	52.8	(±2.7)	—	—
	1995	53.1	(±4.5)	17.8	(±2.6)	37.9	(±3.4)	54.4	(±3.5)	2.1	(±0.4)
	1997	48.4	(±3.1)	16.0	(±1.4)	34.8	(±2.2)	56.8	(±1.6)	2.1	(±0.5)
	1999	49.9	(±3.7)	16.2	(±2.6)	36.3	(±3.5)	58.0	(±4.2)	1.8	(±0.4)
	2001	45.6	(±2.3)	14.2	(±1.2)	33.4	(±2.0)	57.9	(±2.2)	2.3	(±0.4)
	2003	46.7	(±2.6)	14.4	(±1.6)	34.3	(±2.1)	63.0	(±2.5)	3.2	(±1.2)
2005	46.8	(±3.3)**	14.3	(±1.5)**	33.9	(±2.5)**	62.8	(±2.1)**	2.1	(±0.3)	
Sex Female	1991	50.8	(±4.0)	13.8	(±1.8)	38.2	(±3.4)	38.0	(±4.3)	—	—
	1993	50.2	(±2.5)	15.0	(±1.9)	37.5	(±1.8)	46.0	(±2.8)	—	—
	1995	52.1	(±5.0)	14.4	(±3.5)	40.4	(±4.2)	48.6	(±5.2)	1.0	(±0.5)
	1997	47.7	(±3.7)	14.1	(±2.0)	36.5	(±2.7)	50.8	(±3.0)	1.5	(±0.8)
	1999	47.7	(±4.1)	13.1	(±2.2)	36.3	(±4.1)	50.7	(±5.8)	0.7	(±0.3)
	2001	42.9	(±2.8)	11.4	(±1.5)	33.4	(±2.5)	51.3	(±3.4)	1.6	(±0.4)
	2003	45.3	(±2.6)	11.2	(±1.4)	34.6	(±2.1)	57.4	(±3.1)	2.5	(±1.3)
2005	45.7	(±3.6)**	12.0	(±1.6)**	34.6	(±3.0)	55.9	(±2.8)**	1.1	(±0.4)	
Male	1991	57.4	(±4.1)	23.4	(±3.0)	36.8	(±3.4)	54.5	(±3.8)	—	—
	1993	55.6	(±3.5)	22.3	(±2.7)	37.5	(±3.0)	59.2	(±3.8)	—	—
	1995	54.0	(±4.7)	20.9	(±2.6)	35.5	(±3.5)	60.5	(±4.3)	3.0	(±0.6)
	1997	48.8	(±3.4)	17.6	(±1.5)	33.4	(±2.6)	62.5	(±2.8)	2.6	(±0.6)
	1999	52.2	(±4.0)	19.3	(±3.6)	36.2	(±3.9)	65.5	(±4.3)	2.8	(±0.8)
	2001	48.5	(±2.7)	17.2	(±1.6)	33.4	(±2.3)	65.1	(±2.7)	3.1	(±0.4)
	2003	48.0	(±3.3)	17.5	(±2.2)	33.8	(±2.5)	68.8	(±2.6)	3.8	(±1.3)
2005	47.9	(±3.4)**	16.5	(±1.8)**	33.3	(±2.6)	70.0	(±3.1)**	3.0	(±0.5)	
Grade 9	1991	39.0	(±5.0)	12.5	(±2.9)	22.4	(±3.9)	53.3	(±6.2)	—	—
	1993	37.7	(±4.2)	10.9	(±2.0)	24.8	(±3.2)	61.6	(±5.7)	—	—
	1995	36.9	(±5.9)	12.9	(±3.0)	23.6	(±4.0)	62.9	(±5.5)	2.8	(±1.1)
	1997	38.0	(±3.8)	12.2	(±2.5)	24.2	(±3.3)	58.8	(±5.6)	3.0	(±1.8)
	1999	38.6	(±6.1)	11.8	(±2.3)	26.6	(±5.7)	66.6	(±7.8)	1.6	(±0.6)
	2001	34.4	(±3.6)	9.6	(±1.6)	22.7	(±3.1)	67.5	(±3.3)	2.5	(±0.9)
	2003	32.8	(±3.8)	10.4	(±2.0)	21.2	(±2.5)	69.0	(±6.4)	3.2	(±1.8)
2005	34.3	(±3.5)**	9.4	(±1.5)**	21.9	(±2.4)	74.5	(±5.1)**	2.4	(±0.7)	

TABLE. (Continued) Percentage of high school students who reported HIV\*-related risk behaviors, by sex, grade, race/ethnicity, and survey year — United States, Youth Risk Behavior Survey, 1991, 1993, 1995, 1997, 1999, 2001, 2003, and 2005

Characteristic	Survey year	Ever had sexual intercourse		Had four or more sex partners during lifetime		Had sexual intercourse during preceding 3 months		Used condoms during last sexual intercourse <sup>§</sup>		Ever used illegal injection drugs <sup>¶</sup>	
		%	(95% CI) <sup>†</sup>	%	(95% CI)	%	(95% CI)	%	(95% CI)	%	(95% CI)
10	1991	48.2	(±5.7)	15.1	(±2.8)	33.2	(±4.6)	46.3	(±4.7)	—	—
	1993	46.1	(±3.6)	15.9	(±2.0)	30.1	(±3.0)	54.7	(±4.5)	—	—
	1995	48.0	(±5.1)	15.6	(±2.0)	33.7	(±3.1)	59.7	(±4.6)	2.2	(±1.4)
	1997	42.5	(±4.3)	13.8	(±2.7)	29.2	(±2.9)	58.9	(±3.6)	2.5	(±1.3)
	1999	46.8	(±5.6)	15.6	(±5.0)	33.0	(±5.2)	62.6	(±6.1)	1.2	(±0.5)
	2001	40.8	(±3.0)	12.6	(±1.8)	29.7	(±2.9)	60.1	(±4.5)	2.6	(±0.7)
	2003	44.1	(±2.8)	12.6	(±2.4)	30.6	(±2.5)	69.0	(±4.7)	3.2	(±1.6)
2005	42.8	(±3.9)**	11.5	(±2.0)**	29.2	(±2.9)	65.3	(±3.9)**	2.3	(±0.6)	
11	1991	62.4	(±3.2)	22.1	(±3.6)	43.3	(±3.6)	48.7	(±5.8)	—	—
	1993	57.5	(±3.5)	19.9	(±3.1)	40.0	(±3.6)	55.3	(±3.0)	—	—
	1995	58.6	(±5.0)	19.0	(±3.7)	42.4	(±4.4)	52.3	(±6.2)	1.7	(±0.6)
	1997	49.7	(±5.2)	16.7	(±2.9)	37.8	(±4.8)	60.1	(±5.2)	1.6	(±0.7)
	1999	52.5	(±3.8)	17.3	(±4.1)	37.5	(±3.4)	59.2	(±4.8)	2.0	(±1.2)
	2001	51.9	(±2.9)	15.2	(±1.5)	38.1	(±2.6)	58.9	(±4.0)	1.9	(±0.6)
	2003	53.2	(±4.3)	16.0	(±2.6)	41.1	(±3.9)	60.8	(±4.8)	2.8	(±1.3)
2005	51.4	(±5.2)**††	16.2	(±2.4)**	39.4	(±4.3)	61.7	(±3.8)**	1.7	(±0.5)	
12	1991	66.7	(±4.4)	25.0	(±4.0)	50.6	(±4.5)	41.4	(±3.6)	—	—
	1993	68.3	(±4.6)	27.0	(±3.6)	53.0	(±3.9)	46.5	(±4.0)	—	—
	1995	66.4	(±4.0)	22.9	(±3.5)	49.7	(±3.9)	49.5	(±4.4)	1.6	(±0.9)
	1997	60.9	(±6.5)	20.6	(±3.5)	46.0	(±5.0)	52.4	(±3.5)	1.5	(±0.8)
	1999	64.9	(±4.9)	20.6	(±2.8)	50.6	(±5.1)	47.9	(±5.7)	2.3	(±0.9)
	2001	60.5	(±4.0)	21.6	(±2.4)	47.9	(±4.0)	49.3	(±3.1)	2.1	(±0.6)
	2003	61.6	(±3.8)	20.3	(±2.0)	48.9	(±3.5)	57.4	(±3.7)	3.0	(±1.6)
2005	63.1	(±4.1)**	21.4	(±2.8)**	49.4	(±3.8)	55.4	(±3.5)**	1.7	(±0.5)	
<b>Race/Ethnicity<sup>§§</sup></b>											
Black, non-Hispanic	1991	81.4	(±3.2)	43.1	(±3.5)	59.3	(±3.8)	48.0	(±3.8)	—	—
	1993	79.7	(±3.2)	42.7	(±3.8)	59.1	(±4.4)	56.5	(±3.8)	—	—
	1995	73.4	(±4.5)	35.6	(±4.4)	54.2	(±4.7)	66.1	(±4.8)	1.1	(±0.6)
	1997	72.6	(±2.8)	38.5	(±3.6)	53.6	(±3.2)	64.0	(±2.8)	1.0	(±0.7)
	1999	71.2	(±8.2)	34.4	(±10.3)	53.0	(±8.9)	70.0	(±5.4)	0.9	(±0.5)
	2001	60.8	(±6.6)	26.6	(±3.7)	45.6	(±5.4)	67.1	(±3.5)	1.6	(±0.7)
	2003	67.3	(±3.3)	28.8	(±2.5)	49.0	(±2.9)	72.8	(±3.7)	2.4	(±1.1)
2005	67.6	(±3.1)**††	28.2	(±2.6)**	47.4	(±2.6)**	68.9	(±3.6)**††	1.7	(±0.9)	
Hispanic	1991	53.1	(±3.5)	16.8	(±2.6)	37.0	(±3.6)	37.4	(±6.2)	—	—
	1993	56.0	(±4.1)	18.6	(±3.1)	39.4	(±3.7)	46.1	(±4.4)	—	—
	1995	57.6	(±8.6)	17.6	(±3.7)	39.3	(±7.1)	44.4	(±11.1)	2.2	(±0.9)
	1997	52.2	(±3.6)	15.5	(±2.4)	35.4	(±3.9)	48.3	(±5.6)	2.2	(±0.6)
	1999	54.1	(±4.8)	16.6	(±3.6)	36.3	(±4.0)	55.2	(±6.8)	1.8	(±0.8)
	2001	48.4	(±4.5)	14.9	(±1.7)	35.9	(±3.2)	53.5	(±5.1)	2.5	(±0.7)
	2003	51.4	(±3.2)	15.7	(±2.2)	37.1	(±2.8)	57.4	(±5.3)	3.9	(±2.1)
2005	51.0	(±4.3)	15.9	(±2.4)	35.0	(±3.9)	57.7	(±4.1)**	3.0	(±1.0)	
White, non-Hispanic	1991	50.0	(±3.2)	14.7	(±1.8)	33.9	(±2.8)	46.5	(±4.6)	—	—
	1993	48.4	(±2.8)	14.3	(±2.1)	34.0	(±2.1)	52.3	(±3.9)	—	—
	1995	48.9	(±5.0)	14.2	(±2.4)	34.8	(±3.9)	52.5	(±4.0)	2.0	(±0.6)
	1997	43.6	(±4.2)	11.6	(±1.5)	32.0	(±3.1)	55.8	(±2.0)	1.8	(±0.5)
	1999	45.1	(±3.9)	12.4	(±2.1)	33.0	(±3.3)	55.0	(±5.1)	1.6	(±0.4)
	2001	43.2	(±2.5)	12.0	(±1.4)	31.3	(±2.2)	56.8	(±3.0)	2.4	(±0.5)
	2003	41.8	(±2.7)	10.8	(±1.5)	30.8	(±2.0)	62.5	(±3.1)	2.5	(±1.3)
2005	43.0	(±4.1)**	11.4	(±1.8)**	32.0	(±3.3)	62.6	(±2.5)**	1.9	(±0.4)	

\* Human immunodeficiency virus.

† Confidence interval.

§ Among students who had sexual intercourse during the 3 months preceding the survey.

¶ Ever used a needle to inject any illegal drug into the body. The wording of the question on injection-drug use changed substantially after the 1993 survey, so 1991 and 1993 data are not included in this report.

\*\* Significant linear effect ( $p < 0.05$ ).

†† Significant quadratic effect ( $p < 0.05$ ).

§§ Numbers of students in racial/ethnic groups other than non-Hispanic black, Hispanic, or non-Hispanic white were too small for meaningful analysis. Hispanic students might be of any race.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

---

References to non-CDC sites on the Internet are provided as a service to *MMWR* readers and do not constitute or imply endorsement of these organizations or their programs by CDC or the U.S. Department of Health and Human Services. CDC is not responsible for the content of pages found at these sites. URL addresses listed in *MMWR* were current as of the date of publication.

**Disclaimer** All *MMWR* HTML versions of articles are electronic conversions from ASCII text into HTML. This conversion may have resulted in character translation or format errors in the HTML version. Users should not rely on this HTML document, but are referred to the electronic PDF version and/or the original *MMWR* paper copy for the official text, figures, and tables. An original paper copy of this issue can be obtained from the Superintendent of Documents, U.S. Government Printing Office (GPO), Washington, DC 20402-9371; telephone: (202) 512-1800. Contact GPO for current prices.