TRENDS IN CONTRACEPTIVE USE AMONG U.S. HIGH SCHOOL STUDENTS IN THE 1990s. *John S Santelli, M.D. M.P.H., Brian Morrow M.A., Marion Carter, Ph.D. Centers for Disease Control and Prevention, Atlanta, Georgia.*

Abstract

Background: Teen pregnancy in the United States declined steadily during the 1990s, as a result of delay in initiation of intercourse and improved contraceptive use. We used national data to examine changes in contraceptive use patterns among high school students during this period.

Methods: We used national Youth Risk Behavior Surveys to estimate trends in contraceptive use at last sexual intercourse among high school students between 1991 and 2001. We used published, method-specific, race/ethnicity-specific contraceptive failure rates developed from the National Survey of Family Growth to calculate weighted-average contraceptive failure rates (WACFR), indicators that summarize the effectiveness of overall contraceptive use for populations with different patterns of method use. We then examined trends in these indicators by sex, grade, and race/ethnicity and used weighted least-squares regression to test change in these trends.

Results: Between 1991 and 2001, contraceptive use improved for young women but not young men, with annual rates of change in the WACFR of -1.5% (95% CI -2.5, -0.6, p=.0032) and -1.0% (95% CI –2.1, 0.2, p=.1122), respectively. The largest improvements occurred among 9th grade women, non-Hispanic black women, and Hispanic women. Reasons for the improvement among women between 1991 and 2001 included declines in use of withdrawal (from 19.1% to 12.8%) and no method (17.6% to 14.1%) and an increase in condom use (38.1% to 51.5%). Overall use of hormonal methods among women changed little during this time, because a decline in oral contraceptive use (from 24.9% to 20.9%) was offset by new use of injectable contraception (5.7% in 2001). Dual use (condoms plus a hormonal method) among women was 7.4% in 2001. Based on the WACFR index, in 2001 almost one quarter of sexually active teens would have been expected to become pregnant within a year.

Conclusions: Although contraceptive failure among teens is common, these data demonstrate significant improvement in contraceptive practice among high school-aged teens during the

1990s. **Introduction**

Use of contraception is a critical factor influencing the risk of adolescent pregnancy among sexually active teens.[1,2] Through *Healthy People 2010*, the U.S. has set specific goals for increasing the use of contraception, combined-method contraception, and condoms.[3]

Contraceptive use among U.S. teens has also changed remarkably over time. In the 1970s, the birth control pill was the most common contraceptive method, followed by condoms and withdrawal.[4] Condom use among adolescents increased dramatically in the 1980s, as the use of birth control pills declined.[5] Increases in condom use resulted in an increased use of contraception at first intercourse.[6] From 1988 into the mid-1990s, condom use continued to increase, as pill use decreased and new long-acting hormonal methods were introduced.[7, 8] Data on high school students indicate that condom use increased as pill use and use of withdrawal declined.[9, 10]

The objectives for this study were to explore changes in contraceptive use among high school students between 1991 and 2001 and to examine changing contraceptive use by grade, gender, and race/ethnicity. We created a weighted-average contraceptive failure rate (WACFR) index to summarize contraceptive use efficacy. We used contraceptive use data from the biennial national Youth Risk Behavior Survey (YRBS) and published contraceptive failure rates from the National Survey of Family Growth (NSFG).

METHODS

For these analyses we worked with public use datasets available from the Centers for Disease Control and Prevention (CDC); the collection and availability of data from each system has been reviewed for human subjects protection at CDC.

Contraceptive Use Data

The YRBS is a national probability sample of adolescents in public and private schools grades 9 to 12, conducted every 2 years since 1991. The YRBS uses self-administered paper and pencil interviews in classroom settings and employs a combination of active and passive parental permission, depending on the usual practices of the sampled school. The YRBS uses multistage, stratified, clustered sampling, and oversamples minority youths to produce national estimates for

high school students. The YRBS includes only youth who are enrolled in school and present on the day that the survey is initially administered or on one of several make-up days.[11]

For our study, data from the YRBS provided estimates for method of contraceptive use at last sexual intercourse for the years 1991 to 2001. The YRBS asks about method used at last sexual intercourse to prevent pregnancy and a separate question asks about condom use at last sexual intercourse. By combining the data from the two questions on method used to prevent pregnancy and condom use, the rates of dual use were calculated. The YRBS questions on condom and contraceptive use have been consistently worded during this period, although Depo-Provera was first added as a response category in 1999. Norplant is not listed as a response category; NSFG data from 1995 suggest that Norplant use among younger teens is relatively low.[7]

Contraceptive Failure Rates

The NSFG provided information to calculate contraceptive failure rates (CFRs), which are used to describe the efficacy of specific methods of contraception in preventing pregnancy. Typical-use CFRs are the number of pregnancies occurring among 100 women using a specific contraceptive method over a 12-month period, as the method is commonly used. Published failure rates for the first-year of typical use of specific contraceptive methods were used.[12] These failure rates were calculated by combining samples from the 1988 and 1995 NSFG and were adjusted for underreporting of abortion. (Failure rates were not statistically significantly different between the 2 years.) CFRs for specific contraceptive methods varied widely (Table 1). Remarkably, method-specific rates for teens aged 15 to 17 years were similar to women overall, whereas rates did vary considerably by race and ethnicity. Method-specific CFRs stratified by both age and race and ethnicity were not available; instead, we used race and ethnic-specific rates for all women. Recent data for the failure rate for nonuse of contraception were not available; this failure rate was based on historical data from Trussell.[13] A small percentage (3% to 5%) of the women reported Asome other method@ or Anot sure@ as their method at last intercourse. Women who were not sure were assigned the failure rate for no method use. For women reporting some other method, we assigned the overall CFR[12] (Table 4, in reference 12). Failure rates for the combined method at last intercourse (i.e., condom and pill or injection and condom)

were estimated by multiplying the method-specific failure rates for the 2 methods. So this index summarize the overall effectiveness of an individuals' and sub-group's contraceptive use and is based on assumptions about contraceptive user- effectiveness drawn from previous research.

Analysis Method

The weighted-average contraceptive failure rates (WACFR) were calculated by summing the product of each method-specific failure rate and the proportion of women using that method in each year. For each year from 1991 to 2001: WACFR = ∑ (% of females using methodx * CFR for methodx), where *x* = each specific method.

We calculated decline over time in the WACFR using weighted least-squares regression in SUDAAN, which corrects for the clustering inherent in complex survey designs.[14] We calculated the confidence intervals (CIs) of the annual rates of change using a first-order Taylor series.

RESULTS

The Tables shows changes over time in contraceptive method use at last sexual intercourse among sexually active high school students. Consistent with published data from the YRBS,[15] these data show a decrease in pill use, an increase in condom use, and a decrease in use of withdrawal among both men and women. Among women between 1991 and 2001 improvements in contraceptive use included declines in use of withdrawal (from 19.1% to 12.8%) and no method (17.6% to 14.1%) and an increase in condom use (38.1% to 51.5%). Use of the pill declined from 24.9% in 1991 to 20.9% in 2001. Overall use of hormonal methods among women changed little during this time, because a decline in oral contraceptive use (from 24.9% to 20.9%) was offset by new use of injectable contraception (5.7% in 2001). (Data on injectable use were first collected in the YRBS in 1999.) Dual use (condoms plus a hormonal method) among women was 7.4% in 2001 and 6.9% among men.

Between 1991 and 2001, contraceptive use improved for women but not men, with annual rates of change in the WACFR of -1.5% (95% CI -2.5, -0.6, p=0032) and -1.0% (95% CI –2.1, 0.2, p=.1122), respectively. The largest improvements occurred among 9th grade women, non-Hispanic black women, and Hispanic women with annual rates of change of -3.3% (95% CI

-5.5, -1.0, p=0172), -1.7% (95% CI –2.6, -0.8, p=.0004), and -2.0 (95% CI -3.9, 0.0, p=.0632) respectively. Based on the WACFR index, in 2001 almost one quarter (23.9%) of sexually active teens would have been expected to become pregnant with a year.

DISCUSSION

Although contraceptive failure among teens is common, these data demonstrate significant improvement in contraceptive practice among high school-aged women during the 1990s. Between 1991 and 2001, WACFR for women declined primarily as a result of decreasing use of withdrawal, decreasing nonuse, and increased use of condoms. The overall use of hormonal methods changed little as declining pill use was offset by the increasing use of Depo-Provera. Dual use (use of condoms with a hormonal method) also increased, but was low overall. Teen men did not demonstrate significant overall improvement in WACFR, but showed similar patterns of change in contraceptive method use.

Limitations of the Study

Potential limitations in these analyses include a lack of data for non students, use of contraceptive at last intercourse as a marker for overall contraceptive use, lack of data in the YRBS for the correctness and consistency of contraceptive use, potential changes in reporting bias, and unavailability of CFRs stratified by age, race, and ethnicity.

YRBS data are limited to adolescents attending high school. Pregnancy, sexual activity and failure to use contraceptives are significantly more common among out-of-school youth.[16] Teens may drop out of school and then become pregnant or may become pregnant and then drop out. Data from the National Center for Education Statistics (NCES) suggest that approximately 3.9% of teens aged 16 years and 7.6% of teens aged 17 years have dropped out.[17]

Temporal changes in contraceptive efficacy for specific methods may influence changes in pregnancy rates. Previous studies using the NSFG did not find evidence for changes in method-specific effectiveness between 1988 and 1995.[12]

YRBS provides limited information about contraceptive behaviors. Data on the use of Norplant or other less common methods are not collected. Data on injectable contraception were

first collected in 1999. Data on postcoital contraception are not collected in YRBS. One recent study of women receiving abortions[19] suggested that postcoital contraception may explain as much as 43% of the decline in abortions between 1994 and 2000.

Potential changes over time in reporting bias of sexual behaviors are possible and virtually impossible to detect in national reporting systems.

Another limitation for these analyses was the use of method specific CFRs by race and ethnicity for women of all ages, because CFRs were not available by age and race and ethnicity. Whereas failure rates for adolescents are similar to older women, our methodology cannot account for potential interaction effects between age and race and ethnicity. We also assumed that method specific CFR for men were the same as for women.

Implications

Improved contraceptive use cannot be explained by improvement in any single method. Rather this is the result of a complex set of changes in method use, including the greater use of any method of contraception. In these data, condoms are now used by more than one half of teen women who are sexually active, and many using contraceptive hormonal methods (more than one fourth in 2001) also used a condom at last intercourse. These changes suggest that increased motivation to avoid an unplanned pregnancy and continued concern about human immunodeficiency virus and sexually transmitted diseases may be contributing to improvement in contraceptive use. Future years of the YRBS and the NSFG 2002 will refine our understanding of changing adolescent behaviors.

These data find that the nation has made progress toward the goals of improving contraceptive practice among teens[3] but also suggest that there is considerable room for improvement. Overall, in 2001, 14% of high school females and 11% of high school males were using no method of contraception at last sexual intercourse. This means that a substantial number of sexually active young teens will continue to become pregnant each year. Pregnancy-prevention programs for teens should continue to focus on ways to improve contraception use for sexually active teens.

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Contraceptive Method Use at Last Sexual Intercourse, Sexually Active, High School-Attending Women, United States, 1991-2001, Youth Risk Behavior Survey

Method	% of adolescents using method						%	%	
	1991	1993	1995	1997	1999	2001	Change 1991-2001	Change** 1991-2001	p value***
Total									
Pill only	21.9	18.1	16.6	14.4	15.2	15.7			
Condoms only	35.0	42.0	44.7	44.4	44.6	44.0			
Pill and condom	3.1	4.1	3.5	6.1	4.9	5.2			
Withdrawal	19.1	16.5	15.1	15.5	11.7	12.8			
Injection	na	na	na	na	3.9	3.5			
Injection and condom	na	na	na	na	1.1	2.2			
Some other method	2.4	2.3	1.9	4.2	1.5	1.7			
No method	17.6	16.0	17.0	14.7	16.0	14.1			
Not sure	0.9	0.9	0.6	0.3	0.9	0.8			
Other and condom	0.1	0.1	0.5	0.5	0.2	0.1			
Weighted Average Contraceptive Fail Rate	27.9	26.5	27.2	25.1	26.0	23.9	-14.3%	-1.5%	0.0032
N	2306	3133	2271	3008	2745	2319			

Contraceptive Method Use at Last Sexual Intercourse, Sexually Active, High School-Attending Men, United States, 1991-2001, Youth Risk Behavior Survey

Method	% of adolescents using method						%	%	
	1991	1993	1995	1997	1999	2001	Change 1991-2001	Change** 1991-2001	p value***
Total									
Pill only	13.2	11.5	9.0	8.3	8.6	9.0			
Condoms only	51.0	55.9	55.2	57.8	62.2	58.0			
Pill and condom	3.3	3.2	5.0	4.6	2.8	5.7			
Withdrawal	15.4	11.6	12.4	9.6	8.3	9.5			
Injection	na	na	na	na	1.1	1.7			
Injection and condom	na	na	na	na	0.5	1.2			
Some other method	1.5	2.4	2.7	2.8	2.1	1.5			
No method	13.8	13.6	13.2	14.3	11.9	10.7			
Not sure	1.6	1.6	2.1	2.3	2.2	2.4			
Other and condom	0.3	0.3	0.5	0.3	0.4	0.4			
Weighted Average Contraceptive Fail Rate	25.9	25.9	25.8	26.4	24.9	23.5	-9.3%	-1.0%	0.1122
N	2333	3204	2129	2960	2745	2234			