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Long-Acting Reversible Contraception and Condom Use Among Female US High School Students Implications for Sexually Transmitted Infection Prevention

Riley J. Steiner, MPH,

Division of Adolescent and School Health, Centers for Disease Control and Prevention, Atlanta, Georgia

Nicole Liddon, PhD,

Division of Adolescent and School Health, Centers for Disease Control and Prevention, Atlanta, Georgia

Andrea L. Swartzendruber, PhD, MPH,

Department of Behavioral Sciences and Health Education, Rollins School of Public Health, Emory University, Atlanta, Georgia

Catherine N. Rasberry, PhD,

Division of Adolescent and School Health, Centers for Disease Control and Prevention, Atlanta, Georgia

Jessica M. Sales, PhD

Department of Behavioral Sciences and Health Education, Rollins School of Public Health, Emory University, Atlanta, Georgia

Abstract

IMPORTANCE—Long-acting reversible contraception (LARC), specifically intrauterine devices and implants, offers an unprecedented opportunity to reduce unintended pregnancies among adolescents because it is highly effective even with typical use. However, adolescent LARC users may be less likely to use condoms for preventing sexually transmitted infections compared with

Corresponding Author: Riley J. Steiner, MPH, Division of Adolescent and School Health, Centers for Disease Control and Prevention, 1600 Clifton Rd, MS E-75, Atlanta, GA 30329 (rsteiner@cdc.gov).

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Study concept and design: Steiner, Liddon.

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users of moderately effective contraceptive methods (ie, oral, Depo-Provera injection, patch, and ring contraceptives).

OBJECTIVE—To compare condom use between sexually active female LARC users and users of moderately effective contraceptive methods.

DESIGN, SETTING, AND PARTICIPANTS—Cross-sectional analysis using data from the 2013 national Youth Risk Behavior Survey, a nationally representative sample of US high school students in grades 9 through 12. Descriptive analyses were conducted among sexually active female students (n = 2288); logistic regression analyses were restricted to sexually active female users of LARC and moderately effective contraception (n = 619). The analyses were conducted in July and August 2015.

MAIN OUTCOMES AND MEASURES—Contraceptive method at last sexual intercourse was assessed by 1 item—respondents could select birth control pills; condoms; an intrauterine device or implant; injection, patch, or ring; withdrawal or other method; or not sure. A separate item asked whether respondents used a condom at last sexual intercourse. We created an indicator variable to distinguish those reporting use of (1) LARC (intrauterine device or implant), (2) oral contraceptives, and (3) Depo-Provera, patch, or ring.

RESULTS—Among the 2288 sexually active female participants (56.7% white; 33.6% in 12th grade), 1.8% used LARC; 5.7% used Depo-Provera, patch, or ring; 22.4% used oral contraceptives; 40.8% used condoms; 11.8% used withdrawal or other method; 15.7% used no contraceptive method; and 1.9% were not sure. In adjusted analyses, LARC users were about 60% less likely to use condoms compared with oral contraceptive users (adjusted prevalence ratio [aPR], 0.42; 95% CI, 0.21-0.84). No significant differences in condom use were observed between LARC users and Depo-Provera injection, patch, or ring users (aPR, 0.57; 95% CI, 0.26-1.25). The LARC users were more than twice as likely to have 2 or more recent sexual partners compared with oral contraceptive users (aPR, 2.61; 95% CI, 1.75-3.90) and Depo-Provera, patch, or ring users (aPR, 2.58; 95% CI, 1.17-5.67).

CONCLUSIONS AND RELEVANCE—Observed differences in condom use may reflect motivations to use condoms for backup pregnancy prevention. Users of highly effective LARC methods may no longer perceive a need for condoms even if they have multiple sexual partners, which places them at risk for sexually transmitted infections. As uptake of LARC increases among adolescents, a clear need exists to incorporate messages about condom use specifically for sexually transmitted infection prevention.

Long-acting reversible contraception (LARC) offers a promising strategy for reducing unintended pregnancy among adolescents aged 15 to 19 years in the United States, where teen birth rates remain much higher than many other Western, industrialized countries.¹ Long-acting methods, namely intrauterine devices and implants, are user independent and thus considerably more effective than contraceptive methods for which effectiveness depends on correct and consistent use. Perfect and typical use failure rates of LARC are less than 1%, whereas the typical use failure rates are about 9% for oral contraceptives, the patch, or the birth control ring and about 6% for injectable contraception.² Moreover, contraceptive continuation and satisfaction have been found to be greater for LARC than these shorter-acting methods that are only moderately effective with typical use.³

Accordingly, substantial reductions in teen pregnancies⁴⁻⁶ as well as declines in abortion rates⁴ have been attributed to LARC use. Although only 7.1% of female adolescents seeking contraceptive services from Title X service sites were using LARC in 2013, use of LARC among this population appears to be increasing due to concerted clinical and public health intervention.⁷ Both the American Academy of Pediatrics and the American Congress of Obstetricians and Gynecologists have affirmed the safety of adolescent LARC use and recommend LARC as a highly effective contraceptive option for this population.^{8,9}

As often is the case with the advent and scale-up of new public health technologies, concern exists that increasing LARC use among adolescents may have unintended consequences, namely the decreased use of condoms for preventing sexually transmitted infections (STIs), including human immunodeficiency virus (HIV).^{10,11} Nearly half of all new STIs occur among young people aged 15 to 24 years,¹² and neither moderately effective contraceptive methods nor LARC protect against STIs. Use of a highly or moderately effective form of contraception to avoid pregnancy *and* a condom to prevent STIs, including HIV, is thus recommended for sexually active, heterosexual couples in guidelines from the American Academy of Pediatrics, the American Congress of Obstetricians and Gynecologists, and the Centers for Disease Control and Prevention/Office of Population Affairs.^{8,9,13} However, dual use, as this behavior is often called,^{14,15} is uncommon among adolescents. According to the 2013 Youth Risk Behavior Survey (YRBS), only 8.8% of sexually active high school students reported using a highly or moderately effective contraceptive method and a condom at last sexual intercourse.¹⁶ Although some studies, including a randomized trial among women in Jamaica, have found that initiation of a contraceptive implant did not affect subsequent condom use,^{17,18} other analyses using prospective data from adolescents and reproductive-aged women have documented declines in condom use following LARC initiation.^{19,20}

Furthermore, several analyses suggest that LARC users may be less likely to use condoms compared with users of moderately effective methods.^{19,21-23} For example, one of the most recent analyses to consider differences in condom use by contraceptive type, using data from the 2006-2008 National Survey of Family Growth, found that use of LARC among reproductive-aged women was associated with lower dual-method use compared with use of oral contraceptives.²¹ Given the evolving context of contraceptive recommendations for and use among adolescents, these associations warrant reexamination among this population particularly at risk for STIs.

Using a nationally representative sample of US high school students, this study compares condom use between sexually active female LARC users and users of moderately effective contraceptive methods. Establishing the relationship between LARC and condom use among adolescent LARC users prior to widespread adolescent uptake will help provide a useful reference point for future monitoring and can ultimately inform STI prevention efforts as LARC is brought to scale.

Methods

Data Source

Data from the 2013 national YRBS were used for this study, and the analyses were conducted in July and August 2015. The sample design and surveillance procedures of the YRBS have been described in detail elsewhere.²⁴ Briefly, YRBS is administered biennially using a 3-stage cluster design and a self-administered paper and pencil questionnaire. The data are representative of ninth- through 12th-grade students attending public and private high schools in the 50 states and the District of Columbia. The Centers for Disease Control and Prevention Institutional Review Board reviewed and approved the national YRBS procedures. As a secondary analysis, this study did not require separate institutional review board approval. Student participation in the survey is voluntary, and local parental permission procedures are used.

Measures

Contraceptive method at last sexual intercourse was assessed by a single item that asked, “The last time you had sexual intercourse, what one method did you or your partner use to prevent pregnancy?” Participants could select only 1 response from a list of options that included no method; birth control pills; condoms; an intrauterine device (such as Mirena or ParaGard) or implant (such as Implanon or Nexplanon); an injection (referred to as “shot” in the survey; such as Depo-Provera), patch (such as Ortho Evra), or birth control ring (such as NuvaRing); withdrawal or some other method; or not sure. We created an indicator variable to distinguish use of (1) LARC (intrauterine device or implant), (2) oral contraceptives (ie, birth control pills), and (3) Depo-Provera, patch, or ring.

Condom use at last sexual intercourse, the primary outcome measure, was assessed via a separate item: “The last time you had sexual intercourse, did you or your partner use a condom?” Several sexual behavior items were examined as secondary outcomes, including number of lifetime partners, number of partners during the past 3 months, age at first sexual intercourse, and use of alcohol or drugs before last sexual intercourse. As is standard practice with YRBS analyses,¹⁶ we used dichotomous measures (yes or no) for 2 or more sexual partners during the past 3 months and 4 or more lifetime sexual partners. Age at first sexual intercourse was dichotomized to indicate participants who had sexual intercourse for the first time before age 13 years.

Statistical Analysis

Descriptive statistics were conducted among female students reporting at least 1 sexual partner during the past 3 months and therefore considered to be currently sexually active ($n = 2288$). Because our purpose was to compare condom use among adolescents using LARC or moderately effective contraception, we further restricted regression analyses to sexually active female students who reported using LARC, oral contraceptives, or Depo-Provera, patch, or ring ($n = 619$). Similar to previous studies, we limited our analyses to female students because self-report of contraceptive use by females is considered more accurate than self-report by males.^{25,26} Descriptive statistics were used to compare contraceptive method use by demographic characteristics. Logistic regression analyses

considered differences in condom use and other sexual behaviors between LARC and moderately effective methods, adjusting for self-reported grade and race/ethnicity (non-Hispanic black or African American [black], Hispanic or Latina [Hispanic], non-Hispanic white [white], and other). Separate regression models were used for each outcome. All models were run twice to compare LARC users vs 2 different reference groups: (1) oral contraceptives users and (2) Depo-Provera, patch, or ring users. For each comparison, the same model and analytic sample were used but the reference level was changed accordingly. All analyses used weighted data and were conducted with SAS-callable SUDAAN version 9.3 statistical software (RTI International) to account for the complex sampling design and to produce nationally representative estimates.

Results

The majority of the sample (56.7%) was white and about one-third of the participants (33.6%) were in 12th grade. Among these sexually active female students, 29.8% used LARC or a moderately effective contraceptive method. Overall, 1.8% used LARC and 5.7% used Depo-Provera injection, patch, or ring (Table 1). Oral contraceptives were the most common highly or moderately effective method, with nearly one-quarter of sexually active female students (22.4%) using this method. Condom use was the primary method of pregnancy prevention for 40.8% of the sample, 11.8% used withdrawal or other method, 15.7% used no contraceptive method, and 1.9% were not sure. Significant differences in the type of contraceptive method used by race/ethnicity were identified. For instance, 30.7% of white sexually active female students used oral contraceptives, whereas only 7.3% of both their black and Hispanic counterparts used this method. In addition, not using a contraceptive method was most common among Hispanic (23.7%) and black (21.2%) sexually active female students. Whereas 18.6% of sexually active ninth-grade female students used LARC or a moderately effective method (oral contraceptives, or Depo-Provera, patch, or ring), 36.4% of sexually active 12th-grade female students used LARC or a moderately effective method.

Bivariate comparisons of condom use by LARC or moderately effective contraceptive type showed that condom use was highest among oral contraceptive users (37.3%), followed by Depo-Provera, patch, or ring users (26.6%). Among LARC users, 16.4% reported using condoms, which was significantly less than condom use among oral contraceptive users ($P = .001$). In adjusted regression analyses (Table 2), LARC users were nearly 60% less likely to use condoms compared with oral contraceptive users (adjusted prevalence ratio [aPR], 0.42; 95% CI, 0.21-0.84). No significant differences in condom use were observed comparing LARC users with Depo-Provera, patch, or ring users (aPR, 0.57; 95% CI, 0.26-1.25).

Table 3 summarizes differences in prevalence of other sexual risk behaviors by contraceptive type. The LARC users were more than twice as likely to have 2 or more sexual partners in the past 3 months (aPR, 2.61; 95% CI, 1.75-3.90) and about twice as likely to have had 4 or more lifetime sexual partners (aPR, 1.87; 95% CI, 1.36-2.58) compared with oral contraceptive users. Similarly, when comparing LARC users with Depo-Provera, patch, or ring users, those using LARC were more likely to have 2 or more sexual partners in the past 3 months (aPR, 2.58; 95% CI, 1.17-5.67) and 4 or more lifetime sexual partners (aPR, 1.37;

95% CI, 1.01-1.85). There were no significant differences in age at sexual initiation or use of alcohol or drugs before last sexual intercourse between those using LARC and those using moderately effective methods.

Discussion

Similar to prior studies that have documented low prevalence of condom use with highly or moderately effective contraceptive methods,^{15,27-30} our findings point to a need to improve condom use among all users of highly and moderately effective methods considered, including LARC, oral contraceptive, and Depo-Provera, patch, or ring users. Moreover, our study highlights that condom use at last sexual intercourse was even lower among LARC users compared with oral contraceptive users. Similar findings have been reported previously for reproductive-aged samples^{19,21-23} and attributed to women's motivations to use condoms as a backup pregnancy prevention method as one potential explanation.^{21,22} Although few studies have assessed motivations for condom use with more effective methods, there is a conceptual basis to suggest that observed differences in condom use may be due to perceptions of contraceptive effectiveness. Given that the effectiveness of oral contraceptives depends on consistent, daily use and that missing pills is a common behavior,^{31,32} oral contraceptive users may choose condoms as a second contraceptive option.³³ In fact, it has been suggested that health care professionals could explicitly promote condoms as backup contraception for user-dependent hormonal methods as one strategy to increase rates of dual use.^{22,34} Adolescents using highly effective, user-independent LARC methods, however, may be less likely to use condoms because they do not perceive a need for additional protection against pregnancy.

The null findings when comparing condom use between LARC users and Depo-Provera, patch, or ring users may further support this conclusion. Although Depo-Provera, the patch, and the ring are also user-dependent methods, consistent use requires action only quarterly or monthly^{35,36} rather than daily, as is the case with oral contraceptives. Accordingly, adolescents may be less likely to perceive or have a need to use condoms as backup contraception with these methods, even though typical use failure rates are fairly similar to oral contraceptives.² Of course, it is possible that other explanations may account for the findings related to condom use. For instance, health care professionals may be more likely to offer LARC to adolescents who report not using condoms or using them infrequently, as LARC methods are particularly well suited for adolescents who have difficulty adhering to coitally dependent methods, including condoms. Additionally, we do not know whether the association varies by partnership type; it is possible that the observed differences occur largely among adolescents who consider themselves to be in committed partnerships and thus are less concerned about STIs.

Regardless of the reason for the discrepancy, this association between LARC use and condom use is particularly concerning given that STI risk is high during adolescence. Evidence suggests that some health care professionals may promote and consider LARC methods appropriate for women who are in stable, mutually monogamous relationships only.³⁷ However, as LARC is brought to scale as an effective strategy to decrease unintended pregnancy,⁴ adolescents in other kinds of relationships, including noncommitted or shorter

relationships, will be using this method. Therefore, there is a need to understand health care professionals' perceptions of LARC and how these may influence recommendations to adolescents in comparison with adults. In fact, we found that students using LARC were more likely to have multiple sexual partners, both recent and lifetime, compared with both oral contraceptive users and Depo-Provera, patch, or ring users. This finding may indicate that female adolescents who are more sexually experienced are being offered and accepting highly effective contraception. However, multiple partnerships increase risk of STI acquisition,^{38,39} making condom use among adolescent LARC users particularly important.

Several limitations should be considered when interpreting these findings. The YRBS data are based on participant self-report and behaviors may be inaccurately reported⁴⁰; however, YRBS items have been shown to have good test-retest reliability.⁴¹ Additionally, the survey asks only about the primary contraceptive method used at last sexual intercourse; it is possible that some students using condoms in conjunction with other methods only reported condoms as their pregnancy prevention method. However, because a separate item asks specifically about condom use, this is a minimal concern. More important, information about the duration of use, correct and consistent use, and partnership context is not available. Motivations for condom use or use of other strategies specifically for STI prevention (eg, testing, mutual monogamy, human papillomavirus vaccination) are also not assessed, and we do not have information on family income or health insurance status, which may influence adolescents' contraceptive choices. The data are cross sectional, which limits causal inference. Finally, the findings are not generalizable to out-of-school populations, students in grades other than ninth through 12th, or college students.

Despite these limitations, our analyses use nationally representative data to highlight the need to continue to address STI prevention for adolescents in the context of pregnancy prevention research and practice. The findings should not deter adolescent LARC scale-up but rather inform how scale-up occurs. Additional research is needed to explore motivations for condom use among adolescents, when used alone and in combination with more effective contraceptive methods. Evidence to date suggests that adolescents are motivated to use condoms with other contraception for STI prevention if they do not know a partner well or trust that a partner was monogamous³³ or if they have previously contracted an STI.⁴² Further research on partnership context may help inform the tailoring of messages for adolescents. Such research can be conceptualized within the framework of dual protection to further distinguish the use of condoms with a highly or moderately effective contraceptive method for 2 potential purposes—to protect against pregnancy and STIs.

As LARC use increases, counseling and education about LARC should incorporate messages about condom use, particularly given that recommendation by health care professionals to use condoms with oral contraception has been positively associated with consistent condom use.²⁹ Moreover, health care professionals should emphasize the importance of using condoms specifically for STI prevention and help adolescents develop strategies for implementing a coitally dependent method. To do so, health care professionals will need training and tools to effectively address both pregnancy and STI prevention and risk assessment within the same clinical visit. Such resources will help facilitate implementation of the recommendations for dual protection outlined by the American

Academy of Pediatrics, the American Congress of Obstetricians and Gynecologists, and the Centers for Disease Control and Prevention/Office of Population Affairs.^{8,9,13} Building health care professionals' skills and self-efficacy to discuss partnership dynamics and strategies for condom negotiation will be especially useful, as promoting the use of condoms for STI prevention may raise concerns about stigma, mistrust, and infidelity.^{14,34} Clinic-level strategies may also be needed to retain adolescent LARC users in routine preventive care where they can receive prevention counseling, condoms, and recommended STI screening, especially if future research indicates that LARC users are less likely to access sexual health-related clinical services. Also, sexual health education programs implemented in school or community settings can strengthen messages about the importance of condom use for STI prevention when using moderately or highly effective contraceptive methods.

Conclusions

There is a clear need for a concerted effort to improve condom use among adolescent LARC users to prevent STIs, particularly as adolescent LARC use increases. Our finding that LARC users are less likely to use condoms in comparison with oral contraceptive users suggests that it may be beneficial for clinicians to specifically promote condoms for STI prevention. Although this approach may be particularly important within the context of LARC scale-up, it also may serve to increase condom use with moderately effective contraceptive methods by motivating adolescents to avoid STIs. Regardless of the strategy or combination of strategies used, improving dual protection among adolescents will be key to maximizing both pregnancy and STI prevention goals.

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Key Points

Question:

Are adolescent users of long-acting reversible contraception (LARC) less likely to use condoms than adolescents using moderately effective contraceptive methods?

Findings:

Among a nationally representative sample of sexually active female US high school students, LARC users were about 60% less likely to use condoms compared with oral contraceptive users. There were no differences in condom use between those who used LARC and those who used injection, patch, or ring contraceptives.

Meaning:

As uptake of LARC increases among adolescents, a clear need exists to incorporate messages about condom use specifically for prevention of sexually transmitted infections.

Table 1. Contraceptive Use by Demographic Characteristics Among 2288 Sexually Active Female High School Students Using Data From the 2013 National Youth Risk Behavior Survey^a

Characteristic	Contraceptive Use, % (95% CI)						P Value ^c
	LARC ^b (n = 51)	Depo-Provera, Patch, or Ring (n = 142)	Oral Contraceptive (n = 426)	Condom (n = 926)	Withdrawal or Other Method (n = 240)	None (n = 382)	
Total	1.8 (1.2-2.7)	5.7 (4.5-7.0)	22.4 (19.3-25.9)	40.8 (37.5-44.1)	11.8 (9.5-14.7)	15.7 (13.5-18.2)	1.9 (1.2-2.9)
Race/ethnicity							
Non-Hispanic white	2.0 (1.2-3.3)	4.8 (3.7-6.2)	30.7 (26.9-34.7)	37.7 (32.9-42.7)	11.3 (8.4-15.2)	11.9 (9.7-14.4)	1.6 (0.7-3.5)
Non-Hispanic black	1.7 (0.7-4.1)	10.1 (5.9-16.8)	7.3 (4.6-11.5)	46.5 (40.0-53.0)	10.3 (7.0-14.9)	21.2 (16.2-27.3)	2.8 (1.4-5.8)
Hispanic	1.4 (0.7-2.8)	5.2 (2.9-9.4)	7.3 (4.8-10.8)	45.9 (40.6-51.3)	13.9 (9.8-19.2)	23.7 (20.0-27.9)	2.6 (1.5-4.5)
Other	1.4 (0.5-4.3)	4.6 (2.2-9.2)	28.3 (17.5-42.4)	39.1 (29.5-49.7)	13.5 (6.6-25.4)	12.6 (8.2-19.0)	0.5 (0.1-3.5)
Grade							
9	1.0 (0.3-3.2)	2.9 (1.4-6.1)	14.7 (10.0-21.1)	47.0 (37.9-56.3)	13.1 (8.8-18.9)	18.1 (13.0-24.7)	3.2 (1.5-6.8)
10	1.3 (0.5-3.1)	5.5 (3.5-8.6)	19.2 (14.2-25.4)	44.0 (38.3-49.8)	11.7 (7.8-17.3)	17.3 (13.7-21.6)	1.0 (0.3-3.1)
11	1.7 (0.9-3.1)	6.6 (4.3-10.0)	23.2 (17.4-30.2)	40.3 (34.0-46.9)	12.4 (9.1-16.7)	13.0 (9.9-16.8)	2.9 (1.1-7.3)
12	2.5 (1.4-4.5)	6.3 (4.4-9.1)	27.6 (22.2-33.8)	36.0 (32.2-40.0)	11.1 (8.2-14.9)	15.5 (11.6-20.5)	0.9 (0.5-2.0)

Abbreviation: LARC, long-acting reversible contraception.

^aData on primary method of pregnancy prevention are missing for 81 sexually active female students. The sample sizes are unweighted numbers; the percentages are weighted percentages.

^bIndicates intrauterine device or implant use.

^cOverall χ^2 .

Table 2.

Logistic Regression Models of Condom Use by Contraceptive Type Among Sexually Active Female High School Students Using LARC or Moderately Effective Methods Using Data From the 2013 National Youth Risk Behavior Survey^a

Contraceptive Type	Condom Use	
	PR (95% CI) (n = 617)	aPR (95% CI) ^b (n = 609)
LARC vs oral contraceptives		
LARC use	0.44 (0.23-0.85)	0.42 (0.21-0.84)
Oral contraceptive use	1 [Reference]	1 [Reference]
Depo-Provera, patch, or ring use	0.71 (0.48-1.05)	0.73 (0.48-1.11)
LARC vs Depo-Provera, patch, or ring		
LARC use	0.61 (0.29-1.30)	0.57 (0.26-1.25)
Oral contraceptive use	1.40 (0.95-2.07)	1.37 (0.90-2.08)
Depo-Provera, patch, or ring use	1 [Reference]	1 [Reference]

Abbreviations: aPR, adjusted prevalence ratio; LARC, long-acting reversible contraception; PR, prevalence ratio.

^aThe same models were run twice to make comparisons with 2 different reference groups: (1) oral contraceptive users, and (2) Depo-Provera, patch, or ring users. The analytic samples are unweighted numbers.

^bAdjusted models included self-reported grade and race/ethnicity.

Table 3. Adjusted Logistic Regression Models of Other Sexual Risk Behaviors by Contraceptive Type Among Sexually Active Female High School Students Using LARC or Moderately Effective Methods Using Data From the 2013 National Youth Risk Behavior Survey^a

Contraceptive Type	Sexual Risk Behavior; aPR (95% CI) ^b			
	Sexual Initiation Before Age 13 y (n = 610)	4 Lifetime Sexual Partners (n = 608)	2 Sexual Partners in Past 3 mo (n = 611)	Drank Alcohol or Used Drugs Before Last Sexual Intercourse (n = 605)
LARC vs oral contraceptives				
LARC use	2.01 (0.77-5.22)	1.87 (1.36-2.58)	2.61 (1.75-3.90)	1.28 (0.75-2.18)
Oral contraceptive use	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Depo-Provera, patch, or ring use	1.22 (0.55-2.70)	1.37 (0.99-1.90)	1.02 (0.52-1.97)	1.05 (0.70-1.57)
LARC vs Depo-Provera, patch, or ring				
LARC use	1.65 (0.67-4.06)	1.37 (1.01-1.85)	2.58 (1.17-5.67)	1.21 (0.59-2.51)
Oral contraceptive use	0.82 (0.37-1.82)	0.73 (0.53-1.01)	0.98 (0.51-1.91)	0.95 (0.64-1.43)
Depo-Provera, patch, or ring use	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]

Abbreviations: aPR, adjusted prevalence ratio; LARC, long-acting reversible contraception.

^aThe same models were run twice to make comparisons with 2 different reference groups: (1) oral contraceptive users, and (2) Depo-Provera, patch, or ring users. The analytic samples are unweighted numbers.

^bAdjusted models included self-reported grade and race/ethnicity.