Published in final edited form as:

Womens Health Issues. 2014 ; 24(5): 543–550. doi:10.1016/j.whi.2014.05.003.

Effective Dual Method Contraceptive Use and HPV Vaccination Among U.S. Adolescent and Young Adult Females

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Abstract

Background—Problem Behavior Theory posits that risky behaviors cluster in individuals, implying that protective behaviors may follow a similar pattern. The purpose of this study was to determine whether the protective behavior of effective dual method contraception use at first and most recent sexual intercourse is associated with HPV vaccination among adolescent and young adult females.

Methods—National Survey of Family Growth (2006–2010) data were used to examine the association between women's contraception use during first and most recent sexual intercourse and HPV vaccination. Women aged 15 to 24 years ($n = 1,820$) served as the study sample.

Findings—At first and last sexual intercourse, effective dual method contraception use was reported by 15.3% and 16.8% women, respectively; 27.8% reported receiving at least one dose of the human papillomavirus (HPV) vaccine. Higher HPV vaccination rates were observed among dual method users at first and last sexual intercourse (36.4% and 48.2%, respectively). This trend was also observed across age groups (15–19 year olds vs. 20–24 year olds). In adjusted models, among all respondents, dual users at last sexual intercourse were significantly more likely to be vaccinated, whereas at first sexual intercourse only younger dual users were more likely to report HPV vaccination.

Conclusions—Findings suggest that the protective behavior of dual method contraceptive use at first and most recent sexual intercourse may serve as a predictor of another complementary health behavior, HPV vaccination, particularly among adolescent females. More research is needed to understand behavioral clustering to design related multi-focused women's health interventions.

Human papillomavirus (HPV) is the most common sexually transmitted infection among women and men in the United States (Dunne et al., 2007). An estimated 70 to 80% of all women will acquire a genital HPV infection by the time they reach 50 years of age (National Network for Immunization Information, 2012). There are multiple strains of HPV that can

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be transmitted sexually. HPV low-risk types 6 and 11 are causal factors for genital warts, and high-risk types 16 and 18 are known to cause 70% of all cervical cancers (Centers for Disease Control and Prevention [CDC], 2013a; Dunne et al., 2007; National Cancer Institute, 2011). In the past decade, two vaccines—Gardasil (quadrivalent; Merck, Whitehouse Station, NJ) and Cervarix (bivalent; GlaxoSmithKline, Brentford, UK)—have been approved for women and men ages 9 to 26 years to prevent HPV infection, specifically infection with high-risk strains that may lead to cancer (CDC, 2013a; Scarinci et al., 2010). However, national HPV vaccine uptake rates are low among female adolescents and young adult women. According to 2012 national estimates, only 34.5% of adult women ages 19 to 26 reported receiving one or more doses of the HPV vaccine, and only 53.8% of adolescent girls ages 13 to 17 had initiated the three-dose series (Stokley et al., 2013; Williams et al., 2014).

To date, there has been ample research focusing on the perception, attitudes, knowledge, and intent of HPV vaccination among parents, adolescent females, and young women (Allen et al., 2010; Brewer & Fazekas, 2007; Bynum, Brandt, Sharpe, Williams, & Kerr, 2011; Friedman & Shepard, 2007; Reiter, Brewer, Gottlieb, McRee, & Smith, 2009). Additionally, several studies have examined clinical predictors of actual HPV vaccination (Chao, Velicer, Slezak, & Jacobsen, 2009a, 2010; Conroy et al., 2009). However, few studies have focused on behavioral predictors of HPV vaccination including the practice of other complementary health protective behaviors, or alternatively, the conduct of related risky behaviors. For example, Mills, Vanderpool, and Crosby (2011) found that young Appalachian women who reported participating in protective sexual behaviors (e.g., condom use, Pap testing, hormonal contraceptive use) were more likely to initiate the HPV vaccine series, whereas women engaging in risky sexual health behaviors as related to HPV infection (e.g., mutual masturbation, not receiving a Pap test) were more likely to refuse the vaccine. Similarly, Liddon, Leichliter, and Markowitz (2012) found that adolescent females who always use a condom (in the past month) were three times more likely to receive the HPV vaccine compared with those never using a condom.

These results support Problem Behavior Theory, which suggests risk behaviors cluster in individuals, implying that health-protective behaviors may follow a similar pattern (Donovan, Jessor, & Costa, 1993; Fortenberry, Costa, Jessor, & Donovan, 1997; Jessor, Donovan, & Costa, 1991). Indeed, there is a body of research that supports the clustering of negatively perceived health behaviors, such as problem drinking, drug use, tobacco use, poor diet and physical inactivity, and non-seat belt use among both adolescents (Brener & Collins, 1998; Fortenberry et al., 1997; Mistry, McCarthy, Yancey, Lu, & Patel, 2009; Pronk et al., 2004; Wiefferink et al., 2006) and adults (Berrigan, Dodd, Troiano, Krebs-Smith, & Barbash, 2003; Fine, Philogene, Gramling, Coups, & Sinha, 2004; Pronk et al., 2004; Rosal et al., 2001). Related specifically to sexual health, Costa, Jessor, Fortenberry, and Donovan (1996) and Fortenberry and colleagues (1997) found that contraception use was correlated with less involvement in problem behaviors (e.g., deviant behavior, problem drinking, marijuana use) and more participation in health-enhancing behaviors, such as exercise, eating a well-balanced diet, seatbelt use, and practicing good oral hygiene. As an extension of this line of behavioral inquiry, an examination of contraception use during first and most

recent sexual intercourse as a predictor of HPV vaccination among adolescent females and young adult women is warranted.

Specifically, effective dual method contraceptive use is defined as the use of both a highly effective pregnancy prevention method and a barrier method during sexual intercourse (Eisenberg, Allsworth, Zhao, & Peipert, 2012; Pazol, Kramer, & Hogue, 2010). Highly effective methods are those with a pregnancy rate of fewer than 20 per 100 women and include oral contraceptives, implant, hormonal patch, hormonal ring, intrauterine device, Lunelle, and Depo-Provera (Pazol et al., 2010; CDC, 2013b; Trussell, 2011; Williams, Larsen, & McCloskey, 2008). Barrier methods include both male and female condoms. Research suggests that, when these two contraceptive methods are used in combination, it is more effective in preventing unplanned pregnancies and sexually transmitted infections than either method alone (Pazol et al., 2010; Trussell, 2011).

Further exploring this health behavior clustering concept, it may be reasonable to hypothesize that women who use effective dual contraceptive methods at first and most recent sexual intercourse are more likely to receive the HPV vaccine compared with women who use a single or ineffective contraceptive method. By focusing on contraception use at first sex, we are able to examine early adoption of health-protective behaviors, especially among young adolescents (Fortenberry et al., 1997). Comparatively, contraception use at most recent sexual intercourse provides a more recent snapshot of this important health behavior and allows us to ascertain whether there are differences in HPV vaccination rates at these two distinct time points. Therefore, the purpose of this study was to determine whether use of effective dual method contraception during a woman's first and most recent sexual intercourse is associated with HPV vaccine receipt among women aged 15 to 24 in the United States.

Methods

Participants and Survey Procedure

Data were analyzed from the National Survey of Family Growth (NSFG; 2006–2010), a continuously administered national probability sample of the U.S. household population aged 15 to 44 (Groves, Mosher, Lepkowski, & Kirgis, 2009). All adult respondents provided informed consent and minors provided assent after parental consent. Interviews were conducted with computer-assisted personal interviewing software and an audio computer-assisted self-interview (Lepkowski, Mosher, Davis, Groves, & Van Hoewyk, 2010). Between 2006 and 2010, 12,279 women aged 15 to 44 participated in the NSFG (Groves et al., 2009). The overall response rate for females was 78% (National Center for Health Statistics, 2011). We included in this study only those participants who responded to HPV vaccination questions, which were added to the survey for interviews conducted between June 2007 and June 2010. The study sample was further restricted to only include sexually experienced women ages 15 to 24, resulting in a final sample size of 1,820. The University of Kentucky Office of Research Integrity determined the study exempt from review by the institutional review board owing to the de-identified nature of the existing dataset.

Measures

Contraceptive use—Use of contraception during first sexual intercourse was assessed via the following question: “Which method did you use the first time you had intercourse?”

Women were given a list of multiple birth control methods (Figure 1), and then prompted to choose her first, second, third, and fourth used method. Based on evidence of contraceptive efficacy (CDC, 2013b; Pazol et al., 2010; Trussell, 2011; Williams et al., 2008), this variable was grouped into three categories for analysis: Effective dual method users (effective contraceptive methods plus condom), single method users (effective contraceptive method or condom), and ineffective method users (an ineffective method or no contraceptive method used; Figure 1). Emergency contraception, which is considered a backup method of contraception whereby the effectiveness is dependent on when in a woman’s cycle it is taken, was classified as an ineffective method (Noe et al., 2011). Male partner’s vasectomy, female sterilization, diaphragm use, female condom, foam, and respondent sterility were not reported in this sample. We also analyzed contraceptive use at last sexual intercourse in the past 12 months, using the same response categories as first sexual intercourse with an additional category of no sexual intercourse in the past 12 months.

HPV vaccination—Only those respondents who were younger than 25 at the time of the interview were asked if she had ever heard of the HPV vaccine (Gardasil). Women who responded “yes” to this awareness question were then asked if they had received the HPV vaccine (“Have you received the cervical cancer vaccine, also known as the HPV shot or Gardasil?”). This variable was dichotomized into “yes” (representing receipt of one or more doses) or “no” (representing nonreceipt of the vaccine). The small number ($n = 6$) of “don’t know” responses were recategorized as “No” to err toward a more conservative estimate of HPV vaccination uptake.

Covariates—Potential influences on effective dual method contraception use and HPV vaccine receipt included age, education, race/ethnicity, poverty level, early sexual debut, parental communication about sex, and health insurance status (past 12 months). The overall sample was stratified into two primary age groups: 15 to 19 and 20 to 24 years. Education was recoded into three groups: Less than high school, high school diploma, and some college or more. Race/ethnicity was categorized into non-Hispanic White, non-Hispanic Black, non-Hispanic Other, and Hispanic. Poverty level was stratified as 200% or below, 200% to 399%, and 400% or greater of the poverty level. Early sexual debut was dichotomized into “yes” or “no” to having first sexual intercourse at younger than age 15. This categorization was informed by previous research suggesting an increase in sexual risk behaviors for women who first engage in sexual intercourse earlier than 15 years of age (Baumgartner, Waszak Geary, Tucker, & Wedderburn, 2009; Greenberg, Magder, & Aral, 1992; Sandfort, Orr, Hirsch, & Santelli, 2008), as well as previous NSFG HPV vaccination studies using this same variable (Liddon et al., 2012). Parental communication about sex was coded as “yes” or “no”; “yes” included ever talking with a parent or guardian about any of the following topics: How to say no to sex, methods of birth control, where to get birth control, sexually transmitted diseases, how to prevent HIV/AIDS, or how to use a condom. Health insurance coverage was assessed with the following question, “Was there any time [in the last 12 months] that you did not have any health insurance or coverage?” (yes or no).

Analyses

We used χ^2 tests to evaluate bivariate associations between 1) contraceptive method used during first sexual intercourse and all covariates to test for potential confounders, 2) contraceptive method used during first and most recent sexual intercourse and HPV vaccine receipt, and 3) receiving the HPV vaccine and all covariates. Multiple logistic regression was used to estimate adjusted odds ratios (OR) and 95% CI for the relationship between use of contraception during first and most recent sexual intercourse and receiving the HPV vaccine, controlling for education, race/ethnicity, parental communication about sex, health insurance status (past 12 months), and early sexual debut (<15 years). We compared dual method users with each of the following groups as the reference category: 1) Dual users versus single method users, 2) dual users versus ineffective method users (including no method used), and 3) dual users versus no recent sexual activity for the analysis of contraceptive use at last sex in both overall and age-stratified models. SAS 9.3 (SAS Institute Inc, Cary, NC) SURVEY commands were used for all analyses to adjust for the complex NSFG design and create nationally representative estimates of women aged 15 to 24 in the United States.

Results

The majority of women were between the ages of 20 and 24 (65.8%) and non-Hispanic White (64.8%; Table 1). Nearly 30% of the sample (28.4%) reported having less than a high school diploma. Just over half of the women (53.1%) reported living at or below 200% of the poverty level. Most of the women reported first sexual intercourse post age 15 (80.5%) and almost three quarters reported ever receiving sex education from their parents (73.4%). The majority reported having some type of health insurance within the previous 12 months (67.3%).

Only 15.3% of the women reported using dual contraceptive methods during their first sexual intercourse (Table 1). Three of every five women (61.2%) reported using a single contraceptive method and approximately one quarter of the women (23.5%) reported no/ineffective contraceptive use. Significant differences were observed across the three contraception methods for race/ethnicity, education, early sexual debut, and parental communication about sex. Seventeen percent of the women reported using dual contraceptive methods during their most recent sexual intercourse in the past 12 months. All of the most recent sexual intercourse bivariate results were identical to first sexual intercourse findings in terms of significance, except for health insurance in the past 12 months (data not shown).

A little more than one quarter of the women (27.8%) reported receiving the HPV vaccine at some point in their life (Table 2). Significantly higher rates of HPV vaccination were observed among adolescent females aged 15 to 19 (43.2%) compared with young women aged 20 to 24 (19.7%). Among all women, contraceptive use during first sexual intercourse was not significantly associated with HPV vaccination, but contraceptive use during last sexual intercourse was significant. Specifically, 48.2% of those indicating dual method contraceptive use during last sexual intercourse reported receipt of the HPV vaccine compared with 25.8% of single method users, 19.7% of ineffective method users, and 19.7%

of those without recent sexual intercourse. For all respondents, age, race/ethnicity, education, parental communication about sex, and health insurance coverage were significant predictors of HPV vaccination. Within the 15- to 19-year-old age group, both contraception method used at first intercourse and at last intercourse were significant predictors of HPV vaccine receipt; notably, at each of these two time points, approximately 60% of these young dual method users were vaccinated. Race/ethnicity and health insurance status were also significant predictors of HPV vaccination in the younger age group. Among 20- to 24-year-old women, contraception use at last sex was significantly associated with vaccine receipt: 37.9% of those reporting dual method contraceptive use had received the HPV vaccine compared with 19.3% of single method users, 8.7% of ineffective method users, and 12.6% of those without recent sexual intercourse. Education, parental communication about sex, and health insurance coverage were also significant predictors of HPV vaccine receipt in this age group.

When examining contraceptive method at first sexual intercourse, the unadjusted odds of receiving the HPV vaccine among females ages 15 to 19 were more than twice as high for dual method users compared with those using a single contraceptive method (OR, 2.04; 95% CI, 1.23–3.39) and those using ineffective methods (OR, 2.04; 95% CI, 1.06–3.91; Table 3). When adjusting for education, race/ethnicity, parental communication about sex, health insurance status, and early sexual debut, females ages 15 to 19 reporting dual contraceptive method use had significantly higher odds of HPV vaccination compared with single method users (adjusted OR, 1.74; 95% CI, 1.09–2.80); there was no difference compared with ineffective method users. For all respondents, although the unadjusted odds of HPV vaccine receipt were 1.6 times higher for dual methods users compared with single method users (OR, 1.60; 95% CI, 1.06–2.43; Table 3), this difference was no longer significant after adjusting for covariates. Among women aged 20 to 24, there were no differences between groups.

Contraceptive use at last sexual intercourse was more systematically associated with HPV vaccine receipt. For all respondents, the unadjusted odds of receiving the HPV vaccine were more than twice as high for dual method users compared with those using a single contraceptive method (OR, 2.68; 95% CI, 1.69–4.25), those using ineffective methods (OR, 3.79; 95% CI, 1.81–7.93), and those without recent sexual activity (OR, 3.78; 95% CI, 2.21–6.48; Table 3). Although attenuated, these differences remained after adjusting for education, race/ethnicity, parental communication about sex, health insurance status, and early sexual debut: Females reporting dual contraceptive method use had significantly higher odds of HPV vaccination compared with single method users (OR, 1.98; 95% CI, 1.22–3.19), ineffective method users (OR, 2.53; 95% CI, 1.19–5.39), and those without recent sexual activity (OR, 2.37; 95% CI, 1.35–4.15). Among 15 to 19 year olds, significant differences between dual method users and single method users, as well as dual method users and sexually inactive females, were observed for both unadjusted and adjusted models. Finally, among women aged 20 to 24, there were significant HPV vaccination differences between dual method users and no/ineffective method users and women reporting no sexual intercourse in the past 12 months, respectively.

Discussion

To our knowledge, this is the first study to explore the behavioral clustering of HPV vaccination and contraception use among adolescent and young adult females. In this sample, women reporting effective dual method contraceptive use at first sexual intercourse were more likely to receive the HPV vaccine compared with women reporting single method contraceptive use, or ineffective method use (including no contraception). This association was even stronger when assessing contraception use and HPV vaccination at most recent sexual intercourse. Interestingly, after adjusting for important confounding variables, at both intercourse time points, dual method users in the 15- to 19-year-old age group were significantly more likely to report HPV vaccination compared with single method users.

Importantly, these results provide preliminary support for the inverse tenet of Problem Behavior Theory (Costa et al., 1996; Donovan et al., 1993; Fortenberry et al., 1997; Jessor et al., 1991) and our hypothesis that practicing safer sex during a woman's first and most recent sexual intercourse, vis-à-vis effective dual method contraceptive use, is associated with another protective health behavior, namely, HPV vaccination. We also found that women using only a single method of contraception or an ineffective method (including no contraception) at first sexual intercourse are less likely to be vaccinated against HPV. These women may be putting themselves at risk for unintended pregnancies, infection with various sexually transmitted diseases, and HPV-related cancers and genital warts.

Because the observed dual contraceptive use and HPV vaccination trends were especially pronounced in the adolescent group (ages 15–19), it is interesting to consider the influence of parents, particularly mothers, on adolescents' HPV vaccination behaviors as well as adolescents' involvement in vaccine decision making. Several authors have suggested that maternal protective health behaviors (e.g., well-woman visits, routine Pap testing, annual physical examinations) are predictive of HPV vaccination among their adolescent daughters (Chao, Slezak, Coleman, & Jacobsen, 2009b; Monnat & Wallington, 2013; Rahman, Elam, Balat, & Berenson, 2013). Simultaneously, there is evidence suggesting adolescents are actively involved in the HPV vaccination decision-making process (Griffioen et al., 2012; Mathur, Mathur, & Reichling, 2010; McRee, Reiter, & Brewer, 2010). Although we tried to account for parental communication about sex (which could possibly include discussions about HPV and HPV vaccination) by including it as a covariate in the adjusted models, we were unable to account for the fact that parents must provide vaccination consent for minors, which is obviously an important influence on adolescent HPV vaccination behavior. Similarly, there was no direct measure of adolescents' involvement in vaccine decision making.

The results for the young adult women (ages 20–24) are intriguing because there were no significant findings at first sexual intercourse between the contraceptive user groups; however, at last sexual intercourse, dual method users were significantly more likely to be vaccinated than no/ineffective method users and women reporting sexually inactivity over the past 12 months. One explanation may be that, for the 20 to 24 year olds, first sexual intercourse may have occurred before they were vaccinated against HPV, given that these women could have come of age sexually before the HPV vaccine was widely introduced

(this data was collected from 2006 to 2010; the HPV vaccine was recommended by the U.S. Advisory Committee on Immunization Practices in 2006). Thus, dual method contraceptive use at last sexual intercourse is more indicative of a protective clustering behavior with HPV vaccination for this particular age group. The 15 to 19 year olds may have been vaccinated at a younger age, even previous to their sexual debut, so that dual method contraception use at first sexual intercourse is more reflective of their tendency to engage in protective behaviors. Future studies would benefit from including a variable measuring age at HPV vaccination to determine whether being vaccinated earlier is related to more protective behaviors at first sexual intercourse rather than being vaccinated later, as a young adult.

Another theory is that, for women ages 20 to 24, their contraceptive use at first and last sexual intercourse represent two distinct time points developmentally, where they may have begun to engage in more protective behaviors over time, whereas younger girls' first sexual intercourse and most recent sexual intercourse may be more proximate to one another. In particular, we noted that among 15 to 19 year olds, 50.3% of those using dual methods at first sex also reported using dual methods at last sex; this compares with only 36.8% among 20 to 24 year olds (data not shown).

Overall, only 27.8% of women ages 15 to 24 in this national study sample reported receiving the HPV vaccine which is slightly higher than previous estimates (23.1%) published by Liddon and associates (2012). Related, the HPV vaccination rate among 15 to 19 year olds was double the rate of the 20 to 24 year olds. In assessing contraception use during first and most recent sexual intercourse, we found that 15.3% and 16.8% of women, respectively, reported effective dual method contraceptive use. The overall rate of dual method use in this sample is somewhat consistent with published research (Eisenberg et al., 2012; Pazol et al., 2010; Sieving, Bearinger, Resnick, Pettingell, & Skay, 2007).

Strengths and Limitations

A strength of this study is that these data are nationally representative of reproductive-aged women in the United States. The sample size is sufficiently large to evaluate differences among dual method contraceptive users compared with single contraceptive method users, those using ineffective methods, and women reporting no sexual activity in the past 12 months. However, there are several limitations that should be acknowledged. This is a cross-sectional analysis, which does not allow for determining causality. Furthermore, there is no way to determine temporality of whether HPV vaccination occurred before or after first or most recent sexual intercourse. Given the nature of self-report data, there is potential for recall bias regarding past health behaviors and social desirability because of the sensitivity of the questions regarding sexual behavior. Additionally, the survey question, "Have you received the cervical cancer vaccine, also known as the HPV shot or Gardasil?" does not distinguish how many doses of the three-dose vaccine series a woman has completed. Although initiation is important, it is preferable for women to complete all three doses of the HPV vaccine for full protection (Markowitz et al., 2007).

Implications for Practice and/or Policy

Despite these limitations, these results help us to further understand behavioral predictors of HPV vaccination among adolescent and young adult females in the United States. Moreover, study findings provide evidence supporting the need for interventions to increase both effective dual method contraceptive use and HPV vaccination among adolescent and young adult women. Although more empirical work is necessary, particularly examination of the temporal sequence between effective dual contraceptive use and HPV vaccination, the discovery of an association between contraceptive use and immunization receipt may help to direct public health messages about complementary protective health behaviors. Indeed, engaging in protective sexual health behaviors in adolescence and early womanhood may influence the adoption and continuation of other wellness-oriented behaviors throughout a woman's life. More research is needed to understand behavioral clustering to design related multi-focused women's health interventions.

Acknowledgments

This publication was supported in part by a Building Independent Research Careers in Women's Health (BIRCWH) grant (No. K12 DA035150) from the Office of Women's Health Research and National Institute on Drug Abuse at the National Institutes of Health.

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Effective Dual Method Contraceptive Use
Condom use PLUS any of these methods: Oral contraceptive, Hormonal ring, Hormonal patch, Intrauterine device, Lunelle, Implant, Depo-Provera, Diaphragm*, Male Partner's Vasectomy*, Female Sterilization*
Single Method Contraceptive Use
Condom Use OR any of these methods: Oral contraceptive, Hormonal ring, Hormonal patch, Intrauterine device, Lunelle, Implant, Depo-Provera, Diaphragm*, Male Partner's Vasectomy*, Female Sterilization*
Ineffective Contraceptive Methods
Withdrawal, Rhythm, Emergency Contraception, Foam*, Jelly, Cervical Cap, Suppository, Temperature or Cervical Mucus Test, No Contraception Used
*Not reported in the sample.

Figure 1.
Contraceptive method categories.

Table 1

Overall Sample Characteristics, National Survey of Family Growth, 2006 Through 2010

	% Sample (<i>N</i> = 1,820 [*])	Contraceptive Method Used at First Sexual Intercourse		
		Dual Method Users (%) (<i>n</i> = 278 [*] ; 15.3%)	Single Method Users (%) (<i>n</i> = 1,125 [*] ; 61.2%)	No/Ineffective Method (%) (<i>n</i> = 417 [*] ; 23.5%)
Age (y)				
15–19	34.2 (673)	15.5	60.9	23.5
20–24	65.8 (1,147)	15.2	61.4	23.5
Race/ethnicity [†]				
Non-Hispanic White	64.8 (995)	18.3	62.0	19.8
Non-Hispanic Black	15.3 (423)	10.9	60.3	28.8
Non-Hispanic Other	5.3 (71)	10.1	59.1	30.8
Hispanic	14.5 (331)	8.6	59.7	31.7
Education [‡]				
Less than high school	28.4 (601)	13.5	53.0	33.5
High school diploma	26.7 (481)	10.6	64.5	24.9
Some college or higher	44.9 (738)	19.2	64.5	16.3
Poverty level				
200%	53.1 (1,063)	13.6	60.5	25.8
200–399%	38.8 (551)	17.0	62.2	20.8
400%	13.1 (206)	17.7	61.6	20.7
Early sexual debut [‡]				
No	80.5 (1,420)	17.0	63.1	19.9
Yes	19.5 (400)	8.4	53.4	38.2
Parental sex communication [§]				
No	26.6 (467)	9.5	65.9	24.6
Yes	73.4 (1,352)	17.4	59.5	23.1
Health insurance in past 12 months				
No	32.7 (578)	13.7	61.1	25.2
Yes	67.3 (1,236)	16.1	61.3	22.6

* Unweighted frequencies.

[†] $p < .01$ (χ^2 analyses).[‡] $p < .0001$ (χ^2 analyses).[§] $p < .05$ (χ^2 analyses).

Table 2

Association between Selected Characteristics and HPV Vaccination, National Survey of Family Growth, 2006 Through 2010

Characteristic	All Respondents (<i>N</i> = 1,820)	Ages 15–19 (<i>n</i> = 673)	Ages 20–24 (<i>n</i> = 1,147)
	% HPV Vaccine Receipt	% HPV Vaccine Receipt	% HPV Vaccine Receipt
Overall	27.8	43.2	19.7
Contraceptive method used at 3 rd sexual intercourse		*	
Dual method users	36.4	58.1	24.9
Single method users	26.3	40.5	19.0
Ineffective method used	25.9	40.5	18.3
Contraceptive method used at last sexual intercourse	†	‡	†
Dual method users	48.2	62.0	37.9
Single method users	25.8	38.8	19.3
Ineffective method used	19.7	40.9	8.7
No sexual intercourse in past 12 months	19.7	35.9	12.6
Age (y)	†		
15–19	43.2		
20–24	19.7		
Race/ethnicity	*	‡	
Non-Hispanic White	29.8	48.1	20.8
Non-Hispanic Black	17.1	27.9	11.6
Non-Hispanic other	38.8	58.4	26.0
Hispanic	25.8	32.8	21.6
Education	*		‡
Less than high school	31.7	40.9	14.8
High school diploma	21.5	40.1	10.4
Some college or higher	29.0	56.3	25.0
Poverty level			
200%	27.7	41.1	20.3
200–399%	27.5	50.0	15.5
400%	28.8	32.4	27.6
Early sexual debut			
No	28.3	45.6	20.5
Yes	25.8	37.0	14.4
Parental sex communication	‡		‡
No	18.8	33.4	13.9
Yes	31.0	45.6	22.3
Health insurance in past 12 months	†	‡	†
No	14.0	28.9	10.1
Yes	34.5	47.0	26.0

* $p < .05$ (χ^2 analyses).

[†] $p < .0001$ (χ^2 analyses).

[‡] $p < .01$ (χ^2 analyses).

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Table 3

Unadjusted and Adjusted Odds Ratios of Receiving the HPV Vaccine among Dual Method Users, National Survey of Family Growth, 2006 Through 2010

Characteristic	Dual Method Users vs. Single Method Users, OR (95% CI)	Dual Method Users vs. No or Ineffective Method Used, OR (95% CI)	Dual Method Users vs. No Sexual Intercourse in Past 12 Months, OR (95% CI)
Contraceptive use at 3rd sexual intercourse, all respondents (<i>n</i> = 1,820)			
Unadjusted model	1.60 (1.06–2.42) [‡]	1.64 (0.99–2.70)	
Adjusted model ^{*,†}	1.42 (0.96–2.09)	1.29 (0.77–2.17)	
Contraceptive use at 3rd sexual intercourse, ages 15–19 (<i>n</i> = 673)			
Unadjusted model	2.04 (1.23–3.39) [‡]	2.04 (1.06–3.91) [‡]	
Adjusted model [*]	1.74 (1.09–2.80) [‡]	1.55 (0.84–2.87)	
Contraceptive use at 3rd sexual intercourse, ages 20–24 (<i>n</i> = 1,147)			
Unadjusted model	1.41 (0.73–2.71)	1.48 (0.66–3.29)	
Adjusted model [*]	1.17 (0.62–2.21)	1.10 (0.47–2.59)	
Contraceptive use at last sexual intercourse, all respondents (<i>n</i> = 1,820)			
Unadjusted model	2.68 (1.69–4.25) [‡]	3.79 (1.81–7.93) [‡]	3.78 (2.21–6.48) [‡]
Adjusted model ^{*,†}	1.98 (1.22–3.19) [‡]	2.53 (1.19–5.39) [‡]	2.37 (1.35–4.15) [‡]
Contraceptive use at last sexual intercourse, ages 15–19 (<i>n</i> = 673)			
Unadjusted model	2.57 (1.38–4.79) [‡]	2.35 (0.86–6.45)	2.91 (1.42–5.99) [‡]
Adjusted model [*]	2.18 (1.21–3.92) [‡]	1.79 (0.64–5.03)	2.22 (1.04–4.76) [‡]
Contraceptive use at last sexual intercourse, ages 20–24 (<i>n</i> = 1,147)			
Unadjusted model	2.55 (1.37–4.74) [‡]	6.39 (2.55–16.01) [‡]	4.25 (2.13–8.50) [‡]
Adjusted model [*]	1.83 (0.99–3.42)	3.92 (1.44–10.68) [‡]	2.66 (1.25–5.65) [‡]

Abbreviation: OR, odds ratio.

^{*} Adjusted for race/ethnicity, education, parental sex communication, health insurance status (past 12 months), and early sexual debut.

[†] Adjusted for age.

[‡] *p* < .05.