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Sexual Orientation Identity Disparities in Awareness and Initiation of the Human Papillomavirus Vaccine Among U.S. Women and Girls: A National Survey

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Abstract

Background—Lesbians and bisexual women are at risk of human papillomavirus (HPV) from female and male sexual partners throughout the life course.

Objective—To examine the association between sexual orientation identity and HPV vaccination among U.S. women.

Design—We used cross-sectional data 2006–2010 National Survey of Family Growth (NSFG) data.

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Setting—U.S. civilian noninstitutional population.

Participants—The NSFG used stratified cluster sampling to establish a national probability sample of 12,279 U.S. women aged 15–44 years. Analyses were restricted to the 3,253 women and girls aged 15–25 years who were asked about HPV vaccination.

Measurements—Multivariable logistic regression was used to obtain HPV vaccine awareness and initiation prevalence estimates adjusted for socio-demographic and health care factors for each sexual orientation identity group.

Results—Eighty-four percent of U.S. women and girls aged 15–25 years reported having ever heard of the HPV vaccine; of these, 28.5% had initiated HPV vaccination. The adjusted prevalence of HPV vaccine awareness was similar among heterosexual, bisexual, and lesbian respondents. Among those who had heard of the vaccine, 8.5% ($p = 0.007$) of lesbians and 33.2% ($p = 0.33$) of bisexual women and girls had initiated HPV vaccination compared to 28.4% of their heterosexual counterparts, adjusting for covariates.

Limitations—Self-report, cross-sectional data. Findings may not be generalizable to time periods after 2006–2010 or all U.S. lesbians aged 15–25 years (small sample size for this group).

Conclusions—Adolescent and young adult lesbians may be less likely to initiate HPV vaccination compared to their heterosexual counterparts. Programs should facilitate access to and utilization of HPV vaccination among young lesbians, a marginalized and underserved population.

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INTRODUCTION

Virtually all cervical cancers are caused by oncogenic strains of human papilloma virus (HPV), with 70% of all cancers of the uterine cervix linked to types 16 and 18 alone (1). Until the U.S. Food and Drug Administration approved the HPV vaccine for use among women and girls aged 11–26 years in 2006 (2), cervical cancer prevention centered on regular Pap testing to detect precancerous changes in cervical cells. Today, the HPV vaccine, which targets HPV types 16 and 18, provides an effective strategy for the primary prevention of cervical cancer (3).

Lesbian and bisexual women are at risk of HPV and cervical cancer from both female and male sexual partners throughout the life course (4–6). Indeed, HPV can be transmitted via not only penile-vaginal sexual intercourse, in which the majority of lesbians have engaged at some time in their life (4), but also skin-to-skin contact with a sexual partner of any sex (6–10). Additionally, the prevalence of genital HPV infection among women with only female sexual partners is similar to that of women who have sex with men (11–13). However, despite their risk of HPV infection, lesbians have limited knowledge of female-to-female HPV transmission and its implications for cervical cancer risk and may not perceive HPV and cervical cancer prevention messages as being relevant to them (14–19).

The Advisory Committee on Immunization Practices recommends that all U.S. women and girls aged 11–26 years receive the HPV vaccine, regardless of sexual identity or sexual

behavior (3). HPV vaccination may be especially critical for lesbians, who may be at higher risk of cervical cancer than heterosexual women. Because U.S. cancer registries do not collect data on sexual orientation, researchers are unable to definitively assess cervical cancer incidence by sexual orientation identity. Nonetheless, multiple studies have consistently shown that regular Pap test use, which is critical for cervical cancer prevention (20), is lower among lesbians relative to their heterosexual counterparts (21–27). Additionally, lesbians may be at higher risk of cervical cancer compared to heterosexual women because of a higher prevalence of smoking (28), a risk factor for cervical cancer morbidity (29), and obesity (30), which has been linked to cervical cancer mortality (31), and a lower prevalence of health insurance (21, 32–35) and access to health care (34, 36).

Despite evidence that lesbians are susceptible to HPV infection and research suggesting that this underserved population may be at elevated risk of cervical cancer morbidity and mortality, no study has investigated the relationship between sexual orientation and HPV vaccine utilization among women and girls, and only one study has assessed the predictors of HPV vaccination in a national, non-probability sample of predominately white lesbian and bisexual young adult women in the United States (37). Thus, we designed a study to examine sexual orientation identity disparities in HPV vaccine awareness and initiation in a national probability sample of adolescent and young adult U.S. women. We hypothesized that, in the United States: (1) lesbians had lower levels of HPV vaccine awareness and initiation compared to heterosexual women and girls, and (2) bisexual and heterosexual women and girls had similar levels of HPV vaccine awareness and initiation.

METHODS

Study participants

We analyzed data from the 2006–2010 National Survey of Family Growth (NSFG), which used a stratified, three-stage cluster sampling strategy to establish a national probability sample of 12,279 civilian noninstitutional U.S. women aged 15–44 years (38). We restricted our analysis to women aged 15–25 years at the time of the survey who participated in Years 2 (2007–2008), 3 (2008–2009), or 4 (2009–2010) of the NSFG (N = 3,253), as older women were not asked about their HPV vaccination history and women who participated in Year 1 (2006–2007) were not asked about their HPV vaccine awareness or utilization.

Measures

The two outcomes of interest were HPV vaccine awareness and HPV vaccine initiation; the primary predictor was sexual orientation identity. The 2006–2010 NSFG assessed HPV vaccine awareness as follows: “Before today, have you ever heard of the cervical cancer vaccine, HPV shot, or Gardasil?” The survey asked women and girls aged 15–25 years who reported having ever heard of the HPV vaccine: “Have you received the cervical cancer vaccine, also known as the HPV shot or Gardasil?” Possible responses for both questions included “yes,” “no,” or “don’t know” (coded as missing). During the Audio Computer-Assisted Self-Interview portion of the survey, respondents were asked about their sexual orientation identity. Response options included “heterosexual or straight,” “bisexual,” and “homosexual, gay, or lesbian” as well as “something else” (in Years 1 and 2 only), “don’t

know,” or “refused,” which were grouped into a single “not reported” category. The choice of covariates included in statistical models was informed by ecosocial theory, which emphasizes the embodiment of societal factors in the form of population health outcomes, including health inequities (39–43). Pre-hypothesized covariates, shown with their categorization in Table 1, included socio-demographic factors and health care access and utilization indicators.

Statistical analysis

After generating descriptive statistics for all pre-hypothesized covariates by sexual orientation identity, we used multivariable logistic regression models adjusting for socio-demographic factors and health care access and utilization indicators to obtain adjusted prevalence estimates (predictive margins) of HPV vaccine awareness and initiation among U.S. women and girls aged 15–25 years for each sexual orientation identity groups. Predictive margins use the distribution of covariates in the study population to obtain standardized outcome estimates that can be compared across groups (45, 46). The predictive margin for a given sexual orientation identity group represents the average predicted response if everyone in the study population had been a member of that group (45, 46). The p-values for the comparison of HPV vaccine awareness and initiation between a given sexual orientation identity group and heterosexual women and girls (reference group) were obtained from the underlying multivariable logistic regression models (45). All analyses accounted for the complex survey design (stratification, clustering, and sampling, response, and coverage rates) using the “svy” commands in Stata, release 13 (47).

We determined that our sample was large enough based on our estimation that a total of 43 lesbians and 43 heterosexual women and girls would provide 80% power to detect expected differences in HPV vaccination, assuming prevalence estimates of 10% among lesbians and 34.5% (48) among heterosexual women and girls and a type I error of 0.05. No data were missing for HPV vaccine awareness; among women who had ever heard of the HPV vaccine, 0.23% (n = 6) was missing data on HPV vaccine initiation. Missing data for age, race/ethnicity, religion in which raised, relationship status, educational attainment, household poverty level, employment status, and health insurance status were imputed by NSFG staff using the sequential regression imputation method (44). The proportion of women missing data on covariates that were not imputed by NSFG staff was small (0.3%).

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RESULTS

Using 2006–2010 NSFG data (response rate for women aged 15–44 years: 77.7%; response rate for women aged 15–19 and 20–44 years: 77.4% and 77.7%), we estimated the distribution of socio-demographic factors and health care access and utilization indicators by sexual orientation identity among U.S. women and girls aged 15–25 years (Table 1). Among

women and girls aged 15–25 years ($N = 3,253$), lesbian respondents tended to be older and raised in a non-religious household relative to their heterosexual counterparts. While they were more likely than heterosexual women and girls to be working in the labor force, have a high school degree or higher, and have a household income at or above 200% of the federal poverty level (FPL), lesbians were more likely to be uninsured or underinsured and considerably less likely to have received contraception and sexually transmitted infection (STI) services in the past year.

Compared to their heterosexual counterparts, bisexual women and girls were more likely to be white, raised in a non-religious household, and living below 100% FPL; they were also less likely than heterosexual respondents to be working in the labor force and have a bachelor's degree or higher. Relative to heterosexual women and girls, they were more likely to be enrolled in a public health insurance plan and have received contraception and STI services in the past year. Further, respondents in the “not reported” sexual orientation identity group were more likely than heterosexual women and girls to be Latina immigrants, have less than a high school diploma, live below 100% FPL, be uninsured or underinsured, and have been raised in a Catholic household (Table 1).

Among U.S. women and girls aged 15–25 years ($N = 3,253$), 84.4% reported having ever heard of the HPV vaccine; of these ($N = 2,698$), 28.5% had initiated HPV vaccination (Table 2). Table 2 also presents the adjusted prevalence of HPV vaccine awareness and initiation by sexual orientation identity, which we obtained using multivariable logistic regression models adjusting for socio-demographic factors and health care access and utilization indicators. Results from these regression models are presented in Appendix Tables 1 and 2. The adjusted prevalence of HPV vaccine awareness was similar among heterosexual, bisexual, and lesbian respondents, as shown by estimates' overlapping 95% confidence intervals (CI; Table 2). Adjusting for covariates, the proportion of women and girls aged 15–25 years who had heard of the HPV vaccine was significantly lower ($p = 0.004$) among respondents in the “not reported” sexual orientation identity group, who tended to be Latina immigrants of lower socioeconomic positions, relative to those who identified as heterosexual (Table 2).

Among those who had heard of the HPV vaccine, 8.5% (95% CI: 0.0%, 17.2%) of lesbians had initiated HPV vaccination compared to 28.4% (95% CI: 25.2%, 31.6%; $p = 0.007$) of their heterosexual counterparts, adjusting for socio-demographic factors and health care access and utilization indicators (Table 2). The adjusted prevalence of HPV vaccine initiation was similar among women and girls in the heterosexual, bisexual, and “not reported” groups, as shown by estimates' overlapping 95% confidence intervals (Table 2).

DISCUSSION

This is the first study to assess the relationship between sexual orientation identity and HPV vaccine awareness and initiation in a national probability sample of U.S. women and girls. Eighty-four percent of U.S. women and girls aged 15–25 years reported having heard of the HPV vaccine; of these, 28.5% had initiated HPV vaccination. The adjusted prevalence of HPV vaccine awareness was similar among heterosexual, bisexual, and lesbian respondents.

Adjusting for socio-demographic factors and health care access and utilization indicators, we found a significantly lower adjusted prevalence of having ever heard of the HPV vaccine among those in the “not reported” sexual orientation identity group, who tended to be Latina immigrants of lower socioeconomic positions, compared to heterosexual respondents. Among those who had heard of the HPV vaccine, the adjusted prevalence of initiating HPV vaccination was significantly lower among lesbians relative to their heterosexual counterparts. The proportion of women and girls who had initiated HPV vaccination was similar among the heterosexual, bisexual, and “not reported” groups, adjusting for covariates.

Similarly to our findings, validation research on the sexual orientation identity measure used in the NSFG showed that Spanish-speaking women and women of lower educational attainment were more likely than women of other social and economic backgrounds to respond “don’t know” or “refuse,” possibly because of issues with the translation or comprehension of the “heterosexual or straight,” “bisexual,” and “homosexual, gay, or lesbian” response categories (49). Thus, women in the “not reported” sexual orientation identity group may also be less likely than heterosexual women to have ever heard of the HPV vaccine because of the lack of available information written in their language and at their reading level and fewer opportunities for communication with health care providers, per a higher prevalence of uninsurance and underinsurance in this group.

As suggested by previous research, adolescent and young adult lesbians may be less likely to have initiated HPV vaccination relative to their heterosexual counterparts because of young women’s, health care providers’, and parents’ and caregivers’ knowledge, attitudes, and beliefs related to sexual orientation and HPV risk. First, lesbian-identified adolescents and young adults may not know or believe that the HPV vaccine is relevant to them. Indeed, prior research shows that, although lesbians are at risk of acquiring HPV and other STIs from female and male sexual partners throughout the life course (6, 18, 50–52), they may not perceive themselves as being at risk of HPV (15, 17) or cervical cancer (19). These risk (mis)perceptions stem from the widespread misconception among lesbians (14, 15, 17) and their health care providers (18, 53, 54) that HPV cannot be transmitted through female-to-female contact and that lesbians are not at risk of HPV from past sexual activity with men, in which the vast majority of lesbians have engaged at some point in their life (4). Such misconceptions are fueled by lesbians’ marginalization and invisibility in sexual health discourse and promotion efforts, which center on penile-vaginal sexual intercourse (15, 18, 19).

Second, as a result of misinformation about lesbians’ HPV and cervical cancer risk and limited training in women’s sexuality and sexual health (18, 53–55), health care providers may not offer cervical cancer prevention services, including Pap tests and possibly the HPV vaccine, to their lesbian patients (14, 18). In fact, clinicians may even discourage lesbians from obtaining such preventive care (56). Underscoring health care providers’ influence on young women’s HPV vaccine use, several studies found that discussing the vaccine with a clinician was positively associated with vaccine initiation among young U.S. women (57–59), including lesbian and bisexual women aged 18–26 years (37). Moreover, lesbians may be reluctant to obtain health services such as the HPV vaccine because of fears and prior

experiences of heterosexism in the health care system, including heteronormative health care provider assumptions and negative treatment upon sexual orientation disclosure (9, 53, 60, 61).

Third, research shows that parents and caregivers play an important role in shaping the HPV vaccination attitudes and behaviors of adolescent and young adult women (62–64). For example, in a cross-sectional study of 972 predominately white female undergraduate students aged 18–25 years, Roberts and colleagues found that mother's approval of HPV vaccination was positively associated with vaccine initiation (63). Additional research is needed to understand the extent to which parent- and caregiver-related factors, such as parents' perceptions of their daughter's HPV risk based on her sexual identity or the sex of her sexual partners, may contribute to sexual orientation disparities in HPV vaccine uptake among young U.S. women.

In contrast, HPV vaccine initiation may not differ between bisexual and heterosexual women because, as other studies show, bisexual women are more likely than lesbians to perceive themselves as at risk for STIs (65). Indeed, although the majority of lesbians have engaged in sexual activity with men at some time in their life (4), bisexual women are more likely than their lesbian counterparts to have a recent or current male sexual partner and to have been in a serious relationship with a man (66). Thus, heteronormative safer sex and STI risk and prevention messages may resonate more with bisexual than lesbian women and girls (15). Similarly, because bisexual women are more likely than lesbians to be in a current relationship with a man (66), health care providers may be more likely to assume that their HPV risk is similar to that of heterosexual women with current male sexual partners.

Our study has several notable strengths, including the use of a large national probability sample with very little missing data and an extensively validated measure of sexual orientation identity asked using Audio Computer-Assisted Self-Interview, which promotes privacy and helps decrease misclassification (e.g., responding “refuse” as opposed to “homosexual, gay, or lesbian” because of perceived interviewer bias) (49). Nonetheless, our findings should be interpreted in light of some limitations. First, we used self-report, cross-sectional data, which precludes causal inference. Second, the 2006–2010 NSFG only measured HPV vaccine awareness; thus, we were unable to assess sexual orientation identity disparities in participants' knowledge of specific aspects of the HPV vaccine or the type, quality, and relevance of the HPV vaccine information they received. Third, the only indicator of HPV vaccine uptake included in the 2006–2010 NSFG was HPV vaccine initiation. As a result, we had no information about whether participants completed the three-dose series, which is of greater relevance to HPV and cervical cancer prevention.

Fourth, the NSFG does not collect data on having a usual source of preventive health care, which may partially account for observed sexual orientation identity disparities in HPV vaccine initiation. Fifth, the data used in this study were collected between 2006 and 2010. Since then, there have been important societal changes that could influence the relationship between sexual orientation identity and HPV vaccine initiation, including the passage of the Affordable Care Act and the legalization of same-sex marriage in the majority of U.S. states. Thus, our findings may not be generalizable to time periods after 2006–2010. Lastly, the

number of lesbians in this study was small; future studies should investigate sexual orientation identity disparities in HPV vaccine awareness and initiation among adolescent and young adult U.S. women using samples that include larger numbers of lesbians in order to obtain more precise national estimates of HPV vaccine awareness and initiation in this population.

Future quantitative and qualitative research is needed to identify the mechanisms that drive sexual orientation identity disparities in HPV vaccine awareness and initiation among U.S. women and girls. In the meantime, government agencies and community-based organizations can develop HPV vaccine education materials that are written in Spanish and at a reading level that is accessible to the predominately Latina immigrants of lower educational backgrounds who responded “something else,” “don’t know,” or “refuse” to the sexual orientation identity question and were less likely than their heterosexual counterparts to have heard of the HPV vaccine.

Moreover, health care facilities and community-based organizations can implement programs that provide young lesbians, their health care providers, and their parents and caregivers with complete and accurate information about HPV transmission between women, HPV and cervical cancer risk among lesbians from both female and male sexual partners throughout the life course, and the need for HPV vaccination among adolescent and young adult women of all sexual orientations (15, 53). Medical and nursing schools should incorporate information on women’s sexuality and sexual health, including HPV and cervical cancer risk and prevention among lesbians, in their curricula (53–55). Additionally, community health centers, hospitals, and schools can offer opt-out HPV vaccination programs tailored to the specific sexual experiences and health care needs of adolescent and young adult lesbians (15). Such initiatives may help ensure that young lesbians, an underserved population at risk of HPV, do not face an undue burden of cervical cancer in adulthood because of barriers to HPV vaccination in earlier years (67).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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TABLE 1

Distribution of socio-demographic factors and health care indicators by sexual orientation identity among U.S. women and girls aged 15–25 years, 2006–2010 National Survey of Family Growth (N = 3,253)

Variable (%)	Total	Heterosexual	Bisexual	Lesbian	Not reported
	N = 3,253	n = 2,914	n = 235	n = 62	n = 42
Total	100.0	90.0	6.6	1.9	1.5
Age (years)					
15–17	27.4	27.6	29.1	13.5	25.7
18–21	41.5	41.4	43.1	42.4	38.5
22–25	31.2	31.0	27.8	44.1	35.8
Race/ethnicity					
White	58.0	58.0	66.4	61.7	18.5
Black	14.8	14.9	10.6	20.1	20.4
Latina	17.8	17.8	11.5	14.4	51.9
Another race or multiracial	9.3	9.3	11.5	3.7	9.2
U.S. born: yes	89.9	90.4	92.3	82.9	60.7
Relationship status					
Never married	78.3	78.4	75.0	89.8	71.0
Currently married	8.1	8.2	8.5	0.7	14.7
Not married, living with a male partner	11.9	11.8	15.7	4.5	14.3
Separated, divorced, or widowed	1.6	1.7	0.8	5.0	0.0
Religion in which raised					
No religion	11.3	10.2	22.8	30.5	6.5
Catholic	31.3	31.7	25.8	18.3	45.2
Fundamentalist Protestant	4.6	4.5	6.3	3.8	1.5
Another type of Protestant	44.3	45.2	34.7	39.1	38.5
Another religion	8.6	8.5	10.4	8.3	8.4
Educational attainment					
< High school degree	42.3	42.0	44.7	27.9	64.4
High school diploma or GED	22.8	22.6	22.5	36.4	18.3
Some college/associate's degree	26.8	26.8	30.6	25.5	17.3

Variable (%)	Total				Not reported			
	N = 3,253	Heterosexual n = 2,914	Bisexual n = 235	Lesbian n = 62	n = 42			
Bachelor's degree or higher	8.1	8.7	2.3	10.2	0.0			
Household poverty level (%)								
< 100	29.7	28.9	36.8	21.3	56.9			
100–199	25.4	25.4	26.3	18.9	25.6			
200–299	17.6	17.5	18.5	24.5	9.0			
300	27.4	28.2	18.4	35.3	8.4			
Employment status								
Working	51.4	52.0	42.0	71.0	29.7			
Not working	25.6	24.8	38.3	16.3	33.2			
Student	23.1	23.3	19.7	12.7	37.2			
Health insurance status								
Private	55.3	57.2	36.3	54.2	26.3			
Public	24.5	23.7	36.7	19.6	22.8			
Uninsured or underinsured	20.3	19.1	27.0	26.2	50.9			
Received contraception in the past year: yes	40.8	40.8	50.0	15.3	32.0			
Received STI services in the past year: yes	23.2	23.1	29.5	9.0	23.3			

Note. GED: General Education Development; STI: sexually transmitted infection. Analyses were restricted to women and girls who participated in Years 2–4 of the survey. Sample sizes (N, n) refer to observed counts. All prevalence estimates (%) account for the complex survey design. Percentages may not add to 100% due to rounding error. The “not reported” group includes women and girls who responded “something else,” “don’t know,” or “refused” to the sexual orientation identity question.

Prevalence of human papillomavirus vaccine awareness and initiation overall and by sexual orientation identity among U.S. women and girls aged 15–25 years, 2006–2010 National Survey of Family Growth

TABLE 2

Variable	Total	Ever heard of HPV vaccine (N = 3,253)				Ever received HPV vaccine ^a (N = 2,698)			
		n	Prevalence estimate (%)	95% CI	p-value [*]	n	Prevalence estimate (%)	95% CI	p-value [*]
Total	3,253	2,698	84.4	81.5, 86.9	--	790	28.5	25.4, 31.8	--
Sexual orientation identity									
Heterosexual	2,914	2,426	84.4	81.6, 87.2	Ref.	719	28.4	25.2, 31.6	Ref.
Bisexual	235	195	85.7	80.5, 90.9	0.64	56	33.2	22.8, 43.7	0.33
Lesbian	62	55	91.8	83.7, 99.8	0.16	7	8.5	0.0, 17.2	0.007
Not reported	42	22	68.4	56.6, 80.2	0.004	8	41.7	13.2, 70.2	0.34

Note. HPV: human papillomavirus. Analyses were restricted to women and girls who participated in Years 2–4 of the survey. Sample sizes (N, n) refer to observed counts. Sexual orientation identity-specific prevalence estimates (%) are predictive margins of the probability of HPV vaccine awareness and initiation standardized for the distribution of age, race/ethnicity, nativity, religion in which raised, relationship status, educational attainment, household poverty level, employment status, health insurance status, receipt of contraception in the past year, and receipt of sexually transmitted infection services in the past year in the study population. All prevalence estimates and 95% confidence intervals (CI) account for the complex survey design. The “not reported” group includes women and girls who responded “something else,” “don’t know,” or “refused” to the sexual orientation identity question.

^a Only applies to those who reported having ever heard of the HPV vaccine.

* P-values (reference: heterosexual) were obtained from multivariable logistic regression models.