



Published in final edited form as:

Prev Med. 2018 March ; 108: 111–114. doi:10.1016/j.ypmed.2017.12.007.

Primary HPV Testing: U.S. Women's Awareness and Acceptance of an Emerging Screening Modality

Mona Saraiya, MD, MPH¹, Albert Kwan, BS², and Crystale Purvis Cooper, PhD³

¹Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA 30341

²Rollins School of Public Health, Emory University, Atlanta, GA 30322

³Soltera Center for Cancer Prevention and Control, Tucson, AZ 85704

Abstract

Background—Primary HPV testing (without the Pap test) has recently been recommended as a cervical cancer screening option in the United States. U.S. women's awareness and acceptance of primary HPV testing were evaluated.

Methods—Data from a 2015 web-based survey of U.S. adults was examined. Analyses were limited to women who were ≥18 years old, had not undergone a hysterectomy, had not been diagnosed with cervical cancer, and would accept cervical cancer screening (N=1,309). Logistic regression was used to identify predictors of acceptance of primary HPV testing every 3 years.

Results—Primary HPV testing every 3 years was the least accepted cervical cancer screening option (13.5%), and annual Pap testing was the most accepted (41.2%). Most women (65.2%) reported that they were unsure how the HPV test is administered. HPV-vaccinated women were more likely to accept primary HPV testing every 3 years than unvaccinated women (Adj OR=1.80, 95% CI=1.22-2.63, p=0.003). And, women who had participated in HPV testing at any interval were more likely to accept primary HPV testing every 3 years than those who did not have regular HPV tests or were unsure how often they had HPV tests (Adj OR=1.74, 95% CI=1.20-2.52, p=0.003).

Conclusions—Acceptance of primary HPV testing among U.S. women was low and associated with variables which may be indicative of general HPV awareness. Widespread adoption of primary HPV testing may require increasing women's familiarity with the HPV test and screening guidelines.

Corresponding author: Mona Saraiya, Division of Cancer Prevention and Control, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, 4770 Buford Highway, NE, MS F-76, Atlanta, GA 30341, phone: 770-488-4708, fax: 770-488-4760, cgelb@cdc.gov.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Introduction

The human papillomavirus test administered alone (primary HPV testing) has been found to be an effective cervical cancer screening strategy.^{1,2} Primary HPV testing every 3 years was recognized as a screening option for women 25 years old by the American College of Obstetricians and Gynecologists (ACOG) in 2016,³ and the US Preventive Services Task Force (USPSTF) recently released draft guidelines which endorse primary HPV testing every 5 years for women 30–65 years old.⁴ The American Cancer Society (ACS) has not endorsed primary HPV testing to date.⁵ Other cervical cancer screening strategies currently recommended by ACS,⁵ ACOG,³ and USPSTF⁶ include Papanicolaou (Pap) testing every 3 years for women 21–65 years old and co-testing with both the Pap test and the human papillomavirus (HPV) test every 5 years for women 30–65 years old.

Given the recent debut of primary HPV testing in the United States, little is known about the public's knowledge and perceptions of this screening strategy. We analyzed data from a 2015 web-based survey to investigate women's awareness and acceptance of primary HPV testing every 3 years. Women of all ages were included in the present study in order to gauge receptivity to this emerging screening modality across the population.

Methods

The HealthStyles Fall Survey⁷ is an annual, web-based survey that explores the health behaviors and attitudes of U.S. adults. The survey was administered from September 10–29, 2015.

Participants

Participants in the 2015 HealthStyles Fall Survey were recruited from the KnowledgePanel,[®] a 55,000-member, online research panel that is representative of the U.S. population. Panel members were randomly recruited by probability-based sampling (using both random-digit dial and address based sampling methods) to reach respondents regardless of whether they have landline telephones or Internet access. If needed, panel members were provided with a laptop computer and Internet access to support their participation.

The 2015 HealthStyles Fall Survey was sent to a random sample of 4,432 panelists, and 3,529 (1,815 men and 1,714 women) took part in the survey, for a completion rate of 79.6%. Women excluded from the present analyses were those diagnosed with cervical cancer (n=29), those who had had a hysterectomy (n=346), and those who objected to cervical cancer screening (those who indicated they should never have a Pap test; n=30). Thus, the present study was based on a sample of 1,309 adult women. The 2015 HealthStyles Fall Survey was administered by Porter Novelli (Washington D.C.) and complied with the ICC/ESOMAR International Code for ethical research.⁸ This study was not subject to CDC IRB review as it involved secondary data analyses, and no individual identifiers were included in the dataset received by investigators.

Measures

Women's perceptions of how the Pap test and HPV test are administered were assessed with two parallel items: "How does a health care provider administer the Pap test (Pap smear)?" and "How does a health care provider administer the human papillomavirus (HPV) test?" Response options provided for each of these questions were: "Feels inside vagina and presses abdomen," "orders a blood test," "scrapes cells from cervix," "scrapes cells from uterus," "none of these," and "not sure." Only one response per question was accepted. Responses for both questions were collapsed into three categories "scrapes cells from cervix" (classified as "yes," aware how administered), "not sure" (classified as "not sure"), and all other responses (classified as "no," unaware how administered).

Awareness that the HPV vaccine prevents cervical cancer was measured by asking, "The human papillomavirus (HPV) vaccine helps to prevent which of the following?" Response options were "anal cancer," "cervical cancer," "ovarian cancer," "oral cavity cancer," "penile cancer," "skin cancer," "uterine cancer," "vaginal cancer," "vulvar cancer," "none of these," and "not sure." Multiple responses were accepted unless "none of these" or "not sure" was selected. Responses were collapsed into three categories "cervical cancer" (classified as "yes," aware that HPV vaccine prevents cervical cancer), "not sure" (classified as "not sure"), and all other responses (classified as "no," unaware that HPV vaccine prevents cervical cancer).

Acceptance of primary HPV testing was evaluated with the question, "Which of the following cervical cancer screening options would be acceptable to you if your doctor recommended it for you?" Response options were: "Pap test alone once a year," "Pap test alone once every 3 years," "HPV test alone once every 3 years," "Pap test with HPV test once every 3 years," "Pap test with HPV test once every 5 years," and "none of these." Multiple responses were accepted to this item unless "none of these" was selected.

Analyses

Descriptive analyses were conducted—unweighted and weighted on age, race/ethnicity, educational attainment, income, and geographic region matched to 2014 U.S. Current Population Survey⁹ estimates. Bivariate analyses of the weighted data with Pearson Chi-Square tests were used to compare participant characteristics by acceptance of HPV testing every 3 years. Finally, significant variables ($p < 0.05$) in the bivariate analyses were included in a forward, stepwise logistic regression model using the weighted data to predict acceptance of primary HPV testing every 3 years.

Results

Primary HPV testing every 3 years was the least accepted cervical cancer screening option (13.5%), and annual Pap testing was the most accepted (41.2%, Table 1). More than half of women (56.3%) correctly reported that the Pap test involves "scraping cells from cervix," and 93.9% were able to describe their current Pap interval with only 6.1% reporting they were "not sure." Conversely, 65.2% reported that they were unsure how the HPV test is

administered, and 34.4% were unsure how often they had HPV testing. Awareness that the HPV vaccine prevents cervical cancer was more widespread (43.9%).

In the bivariate analyses, acceptance of primary HPV testing every 3 years was associated with age (more likely among 25–34 year-olds), menopause status (more likely among premenopausal women), HPV vaccination status (more likely among vaccinated women), and HPV testing participation (more likely among women who participated at any interval) (Table 2). In the adjusted logistic regression model, HPV vaccination status and HPV testing participation remained significant predictors. HPV-vaccinated women were more likely to accept primary HPV testing every 3 years than unvaccinated women (Adj OR=1.80, 95% CI=1.22-2.63, $p=0.003$, results not shown). And, women who participated in HPV testing at any interval were more likely to accept primary HPV testing every 3 years than those who did not have regular HPV tests or were unsure how often they had HPV tests (Adj OR=1.74, 95% CI=1.20-2.52, $p=0.003$, results not shown).

Discussion

Both awareness and acceptance of primary HPV testing was low among U.S. women. Most did not know how the HPV test is administered, and many were unsure how often they personally participated in HPV testing. In this context, the lack of acceptance of primary HPV testing is not surprising. Women may be understandably reluctant to undergo an unfamiliar screening modality, particularly without first discussing it with a health care provider.

Acceptance of primary HPV testing in the adjusted model was associated with variables which may be indicative of general HPV awareness—HPV vaccination status (acceptance was more likely among vaccinated women), and HPV testing participation (acceptance was more likely among women who participated in HPV testing at any interval). This result implies that increasing basic HPV familiarity may overcome resistance to primary HPV testing.

It is notable that women exhibited more knowledge about the HPV vaccine than the HPV test. Twice as many women knew that the HPV vaccine prevents cervical cancer (43.9%) than those who knew how the HPV test is administered (20.2%). This result is consistent with widespread news coverage of the HPV vaccine^{10–12} and the efforts of pharmaceutical companies, health agencies, and non-governmental organizations to promote vaccine uptake through improved clinician recommendation and increased parental awareness.^{13–17} In contrast, there has been less public information about HPV testing to date.

Women's acceptance of longer cervical cancer screening intervals in the present study represents an increase. Compared with the 2012 HealthStyles Fall Survey results,¹⁸ the 2015 data reported here indicate rising acceptance of a 3-year screening interval (Pap testing every 3 years—2012: 14.8%, 2015: 24.8%, $\chi^2=43.4$, $df=1$ $p<0.001$; co-testing every 3 years—2012: 22.9%, 2015: 31.9%, $\chi^2=28.2$, $df=1$ $p<0.001$) and a 5-year screening interval (co-testing every 5 years—2012: 9.6%; 2015: 15.0%, $\chi^2=18.2$, $df=1$ $p<0.001$). Annual Pap testing was the most widely accepted cervical cancer screening modality in both 2012 and

2015, but acceptance of this screening modality fell during this time period (2012: 61.0% and 2015: 41.2%, $\chi^2=109.01$, $df=1$ $p<0.001$).

The primary limitation of this study is the use of self-reported data from participants in a preassembled research panel. While data were weighted to reflect the U.S. population, the extent to which results are generalizable is unknown. It is also important to emphasize that cervical cancer screening guidelines are in a period of transition. Primary HPV testing was not recommended by any U.S. organization in 2015, when the present study was conducted, and women's awareness and acceptance of HPV testing may have changed since that time. In addition, women's acceptance of all combinations of cervical cancer screening tests and screening intervals were not investigated, and the closed-ended format of the survey questions may have obscured important nuances. Also, acceptance of cervical cancer screening options was assessed in a hypothetical context, and women may be more accepting of primary HPV testing in real life, particularly if a health care provider recommends it.

Primary HPV testing has emerged as a cervical cancer screening modality in the United States. But, it is clear that many women lack sufficient knowledge about HPV testing to make an informed choice about screening. Widespread adoption of primary HPV testing at recommended screening intervals may depend on increasing women's familiarity with the HPV test and screening guidelines.

Acknowledgments

This study was funded through CDC's *Inside Knowledge: Get the Facts about Gynecologic Cancer* campaign. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of Centers for Disease Control and Prevention.

References

1. Ronco G, Dillner J, Elfstrom KM, et al. Efficacy of HPV-based screening for prevention of invasive cervical cancer: follow-up of four European randomised controlled trials. *Lancet*. 2014; 383:524–532. doi: 10.1016/S0140-6736(13)62218-7. [PubMed: 24192252]
2. Wright TC, Stoler MH, Behrens CM, Sharma A, Zhang G, Wright TL. Primary cervical cancer screening with human papillomavirus: end of study results from the ATHENA study using HPV as the first-line screening test. *Gynecol Oncol*. 2015; 136(2):189–97. DOI: 10.1016/j.ygyno.2014.11.076. [PubMed: 25579108]
3. American College of Obstetricians and Gynecologists. Cervical cancer screening and prevention. Practice Bulletin No. 157. *Obstet Gynecol*. 2016; 127(1):e1–20. [PubMed: 26695583]
4. US Preventive Services Task Force. Draft recommendation statement cervical cancer: screening. www.uspreventiveservicestaskforce.org/Page/Document/draft-recommendation-statement/cervical-cancer-screening2. September 2017. Accessed October 19, 2017
5. Saslow D, Solomon D, Lawson HW, et al. American Cancer Society, American Society for Colposcopy and Cervical Pathology, and American Society for Clinical Pathology screening guidelines for the prevention and early detection of cervical cancer. *CA Cancer J Clin*. 2012; 62:147–172. [PubMed: 22422631]
6. US Preventive Services Task Force. Screening for cervical cancer: US Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2012; 156:880–891. [PubMed: 22711081]
7. Basil, M. Survey for formative research. In: Kubacki, K., Rundle-Thiele, S., editors. *Formative research in social marketing*. Singapore: Springer; 2017.

8. ESOMAR. The ICC/ESOMAR Code. 2008. Available at: www.esomar.org/knowledge-and-standards/codes-and-guidelines.php (Accessed June 12, 2017)
9. US Census Bureau. Current Population Survey (CPS). Available at: <https://www.census.gov/programs-surveys/cps.html> (Accessed June 13, 2017)
10. Gollust SE, LoRusso SM, Rebekah H, Nagler RH, Fowler EF. Understanding the role of the news media in HPV vaccine uptake in the United States: Synthesis and commentary. *Hum Vaccin Immunother.* 2016; 12(6):1430–1434. [PubMed: 26554612]
11. Quintero Johnson J, Sionean C, Scott AM. Exploring the presentation of news information about the HPV vaccine: a content analysis of a representative sample of U.S. newspaper articles. *Health Commun.* 2011; 26(6):491–501. DOI: 10.1080/10410236.2011.556080. [PubMed: 21469005]
12. Habel MA, Liddon N, Stryker JE. The HPV vaccine: a content analysis of online news stories. *J Womens Health.* 2009; 18(3):401–7. DOI: 10.1089/jwh.2008.0920.
13. Brewer NT, Hall ME, Malo TL, Gilkey MB, Quinn B, Lathren C. Announcements versus conversations to improve HPV vaccination coverage: a randomized trial. *Pediatrics.* 2017; 139(1) pii: e20161764. doi: 10.1542/peds.2016-1764.
14. Fu LY, Bonhomme LA, Cooper SC, Joseph JG, Zimet GD. Educational interventions to increase HPV vaccination acceptance: a systematic review. *Vaccine.* 2014; 32(17):1901–20. [PubMed: 24530401]
15. Hughes J, Cates JR, Liddon N, et al. Disparities in how parents are learning about the human papillomavirus vaccine. *Cancer Epid Biomark.* 2009; 18(2):363–72.
16. Pepper JK, Reiter PL, McRee AL, Brewer NT. Advertisements promoting human papillomavirus vaccine for adolescent boys: does source matter? *Sex Transm Infect.* 2012; 88(4):264–5. DOI: 10.1136/sextrans-2011-050197. [PubMed: 22223814]
17. Cates JR, Diehl SJ, Crandell JL, Coyne-Beasley T. Intervention effects from a social marketing campaign to promote HPV vaccination in preteen boys. *Vaccine.* 2016; 32(33):4171–8. DOI: 10.1016/j.vaccine.2014.05.044
18. Cooper CP, Saraiya M, Sawaya GF. Acceptable and Preferred Cervical Cancer Screening Intervals Among U.S. Women. *Am J Prev Med.* 2015; 49(6):e99–107. DOI: 10.1016/j.amepre.2015.04.025 [PubMed: 26141914]

Highlights

- Primary HPV testing every 3 years was the least accepted screening option.
- Most women (65.2%) reported that they were unsure how the HPV test is administered.
- Women were more open to HPV testing if they had HPV vaccine or HPV testing.

Table 1

Participant characteristics and acceptable cervical cancer screening options, U.S. women, HealthStyles Fall Survey, 2015 (N=1,309)^a

		n	%	Weighted % ^b
Age	18–24 years	109	8.3	14.4
	25–34 years	231	17.6	20.2
	35–44 years	189	14.4	18.5
	45–54 years	201	15.4	16.1
	55–64 years	309	23.6	15.4
	65 years	270	20.6	15.4
Race/ethnicity	White, non-Hispanic	997	76.2	66.9
	Black, non-Hispanic	124	9.5	10.8
	Other, non-Hispanic ^c	57	4.4	8.6
	Hispanic	131	10.0	13.7
Educational attainment	High school	424	32.4	35.6
	Some college	402	30.7	31.1
	Bachelor degree	291	22.2	20.5
	Graduate degree	192	14.7	12.9
Income	< \$25,000	190	14.5	15.4
	\$25,000-\$49,999	330	25.2	22.3
	\$50,000-\$74,999	279	21.3	20.6
	\$75,000-\$99,999	195	14.9	16.5
	\$100,000	315	24.1	25.1
Geographic region ^d	Northeast	243	18.6	18.5
	Midwest	345	26.4	23.2
	South	443	33.8	35.9
	West	278	21.2	22.3
Menopause status	Pre-menopausal	584	44.6	56.0
	Post-menopausal	571	43.6	31.2
	Peri-menopausal/not sure	139	10.6	12.8
Prior abnormal Papanicolaou (Pap) test result	Yes	268	20.5	18.0
	No	1024	78.2	82.0
Prior human papillomavirus (HPV) infection diagnosis	Yes	67	5.1	5.9
	No	1230	94.0	94.1
HPV vaccination status	Vaccinated	146	11.2	15.0
	Unvaccinated	1160	88.6	85.0
Aware how Pap test is administered ^e	Yes	771	58.9	56.3

		n	%	Weighted % ^b
	No	359	27.4	27.7
	Not sure	166	12.7	15.9
Aware how HPV test is administered ^e	Yes	260	19.9	20.2
	No	188	14.4	14.7
	Not sure	843	64.4	65.2
Aware that HPV vaccine prevents cervical cancer	Yes	592	45.2	43.9
	No	186	14.2	16.0
	Not sure	518	39.6	40.1
Current Pap testing interval	More often than once a year	8	0.6	0.5
	Annual	468	35.8	36.6
	Every 2 years	264	20.2	17.9
	Every 3 years	148	11.3	11.0
	Every 4 years	15	1.1	1.3
	Every 5 years	28	2.1	2.2
	Every 6 years or longer	20	1.5	1.3
	Does not have regular Pap tests	282	21.5	23.2
	Not sure	61	4.7	6.1
	3- or 5-year Pap testing interval	176		13.2
Current HPV testing interval	More often than once a year	3	0.2	0.3
	Annual	104	7.9	8.0
	Once every 2 years	54	4.1	4.0
	Once every 3 years	36	2.8	2.6
	Once every 4 years	4	0.3	0.5
	Once every 5 years	13	1.0	1.0
	Once every 6 years or longer	4	0.3	0.1
	Does not have regular HPV tests	683	52.2	49.1
	Not sure	390	29.8	34.4
	HPV testing participation (any interval)	218	16.7	16.5
Acceptable cervical cancer screening options ^f	Annual Pap test	520	39.7	41.2
	Pap test every 3 years	326	24.9	24.8
	HPV test every 3 years	172	13.1	13.5
	Pap test with HPV test every 3 years	433	33.1	31.9
	Pap test with HPV test every 5 years	198	15.1	15.0
	None of these	190	14.5	17.4

^aAnalyses were limited to women who had never been diagnosed with cervical cancer, had not undergone a hysterectomy, and would accept cervical cancer screening. When variable responses do not sum to N, responses are missing unless otherwise noted.

^bPercentages were weighted to match 2014 U.S. Current Population Survey estimates for age, race/ethnicity, educational attainment, income, and geographic region.

^c“Other, non-Hispanic” category includes participants who reported more than one race.

^d“Northwest” category includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; “Midwest” category includes Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Ohio, South Dakota, and Wisconsin; “South” category includes Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; “West” category includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

^eResponses were collapsed into three categories: “scrapes cells from cervix” was classified as “yes,” “not sure” was classified as “not sure,” and all other responses (“feels inside vagina and presses abdomen,” “orders a blood test,” and “scrapes cells from uterus”) were classified as “no.”

^fMultiple responses were accepted.

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2

Acceptance of primary human papillomavirus (HPV) testing every 3 years by participant characteristics, U.S. women, HealthStyles Fall Survey, 2015 (N=1,309)^a

		Would accept	Would not accept	p
Age	18–24 years	16.7	83.3	0.014
	25–34 years	18.0	82.0	
	35–44 years	11.9	88.1	
	45–54 years	14.6	85.4	
	55–64 years	10.9	89.1	
	65 years	8.1	91.9	
Race/ethnicity	White, non-Hispanic	14.1	85.9	0.370
	Black, non-Hispanic	12.1	87.9	
	Other, non-Hispanic ^b	16.0	84.0	
	Hispanic	10.0	90.0	
Educational attainment	High school	11.2	88.8	0.129
	Some college	14.3	85.7	
	Bachelor degree	13.2	86.8	
	Graduate degree	17.9	82.1	
Income	< \$25,000	10.6	89.4	0.725
	\$25,000–\$49,999	14.7	85.3	
	\$50,000–\$74,000	14.2	85.8	
	\$75,000–\$99,999	13.1	86.9	
	\$100,000	13.8	86.2	
Geographic region ^c	Northeast	14.6	85.4	0.264
	Midwest	10.9	89.1	
	South	12.9	87.1	
	West	16.0	84.0	
Menopause status	Pre-menopausal	16.2	83.8	0.002
	Post-menopausal	10.9	89.1	
	Peri-menopausal/not sure	7.8	92.2	
Prior abnormal Papanicolaou (Pap) test result	Yes	15.3	84.7	0.369
	No	13.2	86.8	
Prior HPV infection diagnosis	Yes	12.9	87.1	0.915
	No	13.3	86.7	
HPV vaccination status	Vaccinated	21.6	78.4	<0.001
	Unvaccinated	12.2	87.8	
Aware how Pap test is administered ^d	Yes	14.1	85.9	0.677

		Would accept	Would not accept	p
	No	12.3	87.7	
	Not sure	13.8	86.2	
Aware how HPV test is administered ^d	Yes	14.3	85.7	0.885
	No	13.9	86.1	
	Not sure	13.2	86.8	
Aware that HPV vaccine prevents cervical cancer	Yes	15.7	84.3	0.056
	No	14.3	85.7	
	Not sure	11.0	89.0	
3- or 5-year Pap testing interval	Yes	15.4	84.6	0.414
	No	13.2	86.8	
HPV testing participation (any interval)	Yes	20.0	80.0	0.001
	No	12.2	87.8	

^aAnalyses were limited to women who had never been diagnosed with cervical cancer and had not undergone a hysterectomy, and would accept cervical cancer screening. Percentages were weighted to match 2014 U.S. Current Population Survey estimates for age, race/ethnicity, educational attainment, income, and geographic region and compared using Pearson Chi-Square asymp. two-sided tests. P-values <0.05 are bolded.

^b“Other, non-Hispanic” category includes participants who reported more than one race.

^c“Northwest” category includes Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont; “Midwest” category includes Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Ohio, South Dakota, and Wisconsin; “South” category includes Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia; “West” category includes Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

^dResponses were collapsed into three categories: “scrapes cells from cervix” was classified as “yes,” “not sure” was classified as “not sure,” and all other responses (“feels inside vagina and presses abdomen,” “orders a blood test,” and “scrapes cells from uterus”) were classified as “no.”