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Changes in Strength of Recommendation and Perceived Barriers to HPV Vaccination: Longitudinal Analysis of Primary Care Physicians, 2008–2018

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Abstract

Objectives: To evaluate among pediatricians) and family physicians (how HPV vaccination recommendation practices for 11–12 year-old youth; reported parental refusal/ deferral of HPV vaccination; and reported barriers to HPV vaccination changed over time:.

Study design: We surveyed nationally representative networks of pediatricians and family physicians in 2008, 2010, 2013–2014 and 2018. Male vaccination questions were not asked in 2008; barriers and parental vaccine refusal questions were not asked in 2010.

Results: Response rates were 80% in 2008 (680/848), 72% in 2010 (609/842), 70% in 2013–2014 (582/829), and 65% in 2018 (588/908). The proportion of physicians strongly recommending HPV vaccination for 11–12 year-old patients increased from 53% in 2008 to 79% in 2018 for female patients, and from 48% in 2014 to 76% in 2018 for male patients (both $p<0.0001$). The proportion of physicians indicating ≥50% of parents refused/deferred HPV vaccination remained steady for female patients (24% in 2008 vs. 22% in 2018, $p=0.40$) and decreased for male patients (42% in 2014 vs, 28% in 2018, $p<0.001$). Physician barriers to providing HPV vaccination

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were rare and decreased over time. Increasing numbers of physicians reported perceived parental barriers of vaccine safety concerns (5% 'major barrier' in 2008 vs. 35% in 2018, p<0.0001) and moral/religious concerns (5% in 2008 vs. 25% in 2018, p<0.0001).

Conclusions: Between 2008 and 2018, more primary care physicians reported recommending HPV vaccination for adolescents, fewer reported barriers, and more physicians reported parents had vaccine safety or moral/religious concerns.

Keywords

immunization; adolescent health; vaccines; human papillomavirus

The Advisory Committee on Immunization Practices (ACIP) first recommended routine Human papillomavirus (HPV) vaccination for 11–12 year-old females in 2006[1]. In 2009, after the Food and Drug Administration (FDA) licensed quadrivalent HPV vaccine (4vHPV) for prevention of anogenital warts in 9–26 year-old males, ACIP advised HPV vaccination could be used permissively in males but did not make a routine recommendation.[2] In 2011, after FDA added an indication for anal cancer prevention, ACIP expanded the recommendation for routine HPV vaccination for 11–12 year-olds to include males.[3] Currently, HPV vaccination is recommended routinely for all 11–12 year-olds (can start at age 9 years), with "catch-up" vaccination recommended for all 13–26 year-olds who were not adequately vaccinated at the routine age. In 2016, a reduced 2-dose schedule was recommended for patients initiating HPV vaccination before age 15 years, while a 3-dose schedule was maintained for those initiating on or after the 15th birthday.[4] Additionally, ACIP now recommends shared clinical decision-making regarding HPV vaccination for some 27–45-year-old adults.[5]

U.S. HPV vaccination coverage has increased over time, and 54% of U.S. adolescents completed an HPV vaccine series in 2019; however, this is still well below the Healthy People 2030 target of 80%.[6, 7] Previously reported barriers to HPV vaccination include refusal or deferral by parents, lack of a strong recommendation from providers, and financial factors.[8]

We previously conducted a series of four surveys among nationally representative samples of pediatricians and family physicians to assess recommendation practices and barriers related to adolescent HPV vaccination (Figure 1 online).[9–12] In the longitudinal analyses presented here, our objectives were to evaluate among pediatricians and family physicians how HPV vaccination recommendation practices for 11–12 year-old youth among physicians overall and by physician specialty; reported parental refusal or deferral of HPV vaccination; and reported physician and parental barriers to HPV vaccination changed over time.

Methods

During 2008 through 2018, we administered a series of four surveys about HPV vaccination to national networks of physicians who spent at least half of their time practicing primary care. The surveys were conducted in January-March 2008, July-September 2010, (October

2013–January 2014, and July-September 2018. The human subjects review board of the University of Colorado Denver approved these studies as exempt research not requiring written informed consent.

Study Population

These surveys were conducted in collaboration with the Centers for Disease Control and Prevention (CDC) as part of the Vaccine Policy Collaborative Initiative, which designs and executes surveys to assess physician knowledge, attitudes, and practices about vaccination. To develop networks of primary care physicians (defined as spending >50% of their time practicing primary care), we recruited pediatricians and family physicians from members of the American Academy of Pediatrics (AAP) and American Academy of Family Physicians (AAFP). We recruited new networks of physicians approximately every three years; the four surveys were conducted among unique samples without any overlap in participants from year to year. We used quota sampling[13] to ensure these networks of physicians were similar to AAP and AAFP memberships for the characteristics of region, urban versus rural location, and practice setting. Our previous work demonstrated responses from network physicians were similar to responses of physicians sampled randomly from the American Medical Association (AMA) Physician Masterfile with regard to practice characteristics, demographics, and attitudes about vaccination in general.[13]

Survey Design

Each survey was developed in collaboration with CDC, pretested by a national advisory panel of pediatricians and family physicians, and then piloted among a national sample of pediatricians and family physicians. Strength of recommendation for HPV vaccination was assessed by asking whether respondents strongly recommend, recommend but not strongly, make no recommendation, or recommend against HPV vaccination. Strength of recommendation for HPV vaccination was measured for 11–12 year-old female patients in 2008[9], 2010[10], 2014[12], and 2018[11], and for 11–12 year-old male patients in 2010, 2014, and 2018. Because the 2010 survey was conducted before ACIP recommended routine HPV vaccination for 11–12-year-old male adolescents, these data were excluded from the longitudinal analysis. Physicians were asked what proportion of parents refused or deferred HPV vaccination, with response options of <10%, 10–24%, 25–49%, and ≥50%. Parental refusal or deferral of HPV vaccination was assessed for 11–12 year-old female patients in 2008, 2014, and 2018, and for 11–12 year-old male patients in 2014 and 2018. Barriers to HPV vaccination were measured by asking “To what degree are the following barriers to giving the HPV vaccine your practice?” and presenting a 4-point Likert scale with responses ranging from major barrier to not at all a barrier. Barrier items were assessed for both male and female patients in 2008, 2014, and 2018. Eleven barrier items were measured in all three years, eighteen items were measured in two years, and ten items were measured in only one year.

Survey Administration

Surveys were sent via Internet (using software from Verint, Melville, NY, formerly Vovici Corporation, Dulles, VA) or mail according to physician preference. Using the same methods for each survey, we sent the Internet groups an initial email message with up

to eight e-mail reminders, and we sent the mail group an initial mailing with up to two additional mailed reminders.[14] Non-respondents from the Internet group were also sent one (in 2008) or up to two (in 2010, 2014, and 2018) mail surveys.

Statistical Analyses

We combined Internet and mail survey responses for analyses because prior work has shown physician attitudes are similar when obtained by either method.[15, 16] Unique identifiers were used to identify and exclude any duplicate surveys from respondents. For each survey sample, we compared respondents to non-respondents using t-tests, Wilcoxon tests and chi-square tests, as appropriate. Non-respondent characteristics were obtained from the recruitment surveys for the sentinel physician networks. We compared pediatrician and family physician responses using chi-square tests. We compared strength of recommendation for HPV vaccination and reported barriers to HPV vaccination across survey years using chi-square tests. McNemar's test was used to test whether the proportion of physicians that strongly recommend HPV vaccination to males vs females within the same year was different and to test whether the proportions of physicians that reported ≥50% of parents refused or deferred HPV vaccination for males vs females within the same year were different. To look at whether any differences between strongly recommending HPV vaccination for males vs females changed across surveys, we used a GEE framework to account for clustering of responses within a person to questions regarding males and females within the same survey. We used a binomial model with the dependent variable being strength of recommendation. The independent variables were the gender associated with the recommendation, the year of the response and the interaction between the gender associated with the recommendation and the year. Analyses were performed using SAS, version 9.4 (SAS Institute, Cary, North Carolina).

Results

Response rates among physicians were 80% in 2008 (680/848), 72% in 2010 (609/842), 70% in 2014 (582/829), and 65% in 2018 (588/908). Respondent and non-respondent characteristics are presented in Table 1 online.

Strength of Recommendation for HPV Vaccination

The proportion of physicians who strongly recommended HPV vaccination for 11–12 year-old female patients increased from 53% in 2008 to 79% in 2018 ($p<0.0001$). Pediatricians were more likely than family physicians to strongly recommend HPV vaccination to 11–12 year-old female patients in 2018 (85% vs 72% $p<0.001$, Figure 2), but there was no difference between specialties in prior years.

The proportion of physicians who strongly recommended HPV vaccination for 11–12-year-old male patients increased from 48% in 2014 to 76% in 2018 ($p<0.0001$). Pediatricians were more likely than family physicians to strongly recommend HPV vaccination to 11–12-year-old male patients in 2014 (52% vs 41%, $p=0.008$) and in 2018 (83% vs 67%, $p<0.0001$). Physicians were more likely to strongly recommend HPV vaccination to 11–12-year-old female patients vs 11–12-year-old male patients in 2014 (60% vs 48%, $p<.0001$)

and in 2018 (79% vs 76%, p<0.0001), although the magnitude of the difference decreased between 2014 and 2018 (from 12 to 3 percentage points, p<.0001).

Parental Refusal or Deferral of HPV Vaccination

The proportion of physicians who indicated ≥50% of parents refused or deferred HPV vaccine for 11–12-year old female patients was 24% in 2008, 35% in 2014, and 22% in 2018 (p=0.40). However, the proportion of physicians who indicated ≥50% of parents refused or deferred HPV vaccine for 11–12-year old male patients decreased from 42% in 2014 to 28% in 2018 (p<0.001). Physicians were less likely to report ≥50% of parents refused or deferred HPV vaccination for 11–12-year-old female patients vs 11–12-year-old male patients in 2014 (35% vs 42%, p<.0001) and in 2018 (22% vs 29%, p<0.0001).

Barriers to HPV Vaccination: Physician Beliefs and Logistical Issues

Financial issues including up-front costs, insurance coverage, and lack of adequate reimbursement were each reported as a major barrier/somewhat of a barrier to HPV vaccination by 39%, 56% and 44% of physicians respectively in 2008, yet decreased markedly to 15%, 21%, and 17% in 2018 (p<0.001 for all three items, Figure 3). Physicians reporting concern about the time needed to discuss HPV vaccination with parents as a major barrier/somewhat of a barrier also decreased over time, from 14% in 2008 to 7% in 2018 (p<0.001).

Fewer than 5% of physicians in each survey year reported physician concerns about vaccine efficacy, need for HPV vaccination (based on disease incidence and severity), or vaccine safety were a major barrier or somewhat of a barrier to HPV vaccination for male or female patients (Figure 4 online). Physicians had fewer concerns over time about safety of HPV vaccination for female patients, with 5% indicating this was a major barrier/somewhat of a barrier in 2008 compared to 1% in 2018 (p<0.001), or male patients, with 2% reporting as a major barrier or somewhat of a barrier in 2014 and 1% in 2018 (p=0.82). Physician concern about giving too many vaccines in one visit decreased over time, with 5% indicating it was a major barrier/somewhat of a barrier and 81% indicating this was not at all a barrier in 2014 compared to 5% indicating it was a major barrier/somewhat of a barrier and 86% indicating it was not at all a barrier in 2018 (p=0.04).

Perceived Barriers to HPV Vaccination: Parental Concerns

The proportion of physicians reporting parental concern about HPV vaccine efficacy as a major barrier/somewhat of a barrier remained stable (17% in 2008 vs. 15% in 2018, p=0.07) and the proportion reporting parental concern about waning immunity if HPV vaccine is given too early as a barrier decreased (13% in 2014 vs. 7% in 2018, p=0.02) (Figure 5). The proportion of physicians reporting that parents not thinking HPV vaccine is necessary for their daughters or their sons as a major barrier/somewhat of a barrier did not change over time [63% in 2014 vs. 59% in 2018 for daughters (p=0.09) and 62% vs 67% for sons (p=0.17)].

The proportion of physicians reporting parental concern about safety of HPV vaccination as a major barrier/somewhat of a barrier increased over time (29% in 2008 vs. 73% in 2018,

p<0.0001). Physicians also increasingly identified parental concerns that their child will suffer long-term complications from HPV vaccine as a major barrier/somewhat of a barrier (35% in 2014 vs. 57% in 2018, p<0.001). Parental concern about short-term complications from the HPV vaccine and about giving too many vaccines at one visit were less frequently identified by physicians as a barrier and this did not change over time. Parental concern about HPV vaccine causing infertility was rarely perceived as a barrier, but was reported by more physicians between 2014 and 2018 as a concern parents expressed about both daughters (p<0.001) and sons (p=0.01).

Parental concern about HPV vaccination encouraging earlier sexual behavior for their daughters was identified as a major barrier/somewhat of a barrier by more physicians over time (26% in 2008 vs. 43% in 2018, p<0.001, Figure 6). The proportion of physicians reporting parental concern about HPV vaccination potentially encouraging riskier sexual behavior for their daughters as a major barrier/somewhat of a barrier also increased (26% in 2008 vs. 38% in 2018, p<0.001). Parental concern about HPV vaccination potentially encouraging earlier or riskier sexual behavior for their sons was identified as a major barrier/somewhat of a barrier by similar proportions of physicians over time [40% in 2014 vs. 34% in 2018 for earlier (p=0.18), 35% vs. 29% for riskier (p=0.40)]. The proportion of physicians reporting parents opposing HPV vaccination for moral or religious reasons as a major barrier/somewhat of a barrier increased from 28% in 2008 to 63% in 2018 (p<0.0001).

Discussion

This analysis showed the proportion of U.S. primary care physicians who strongly recommend HPV vaccination for both male and female adolescents has increased over the past decade, as scientific evidence has continued to accumulate for safety and effectiveness of HPV vaccination. At the same time, physicians perceived few barriers in general to HPV vaccination, although more reported awareness of certain parental concerns. Physician concerns about vaccine efficacy, need for vaccination, and vaccine safety were rarely barriers to HPV vaccination and remained stable or decreased over time. Physicians perceived that parental questions about need for vaccination and concerns about vaccine safety and moral and religious issues remained barriers to HPV vaccination; many of these perceived concerns increased over time.

Examining this series of surveys over time reveals encouraging improvements in physician recommendations for HPV vaccination as well as some targets for building upon this progress. Since HPV vaccine was first introduced for routine use, the proportion of physicians strongly recommending the vaccine has increased from just over 50% to 77% for 11–12-year-old female patients and to 73% for 11–12-year-old male patients. Receiving a strong recommendation from a provider is associated with HPV vaccine acceptance, and lack of a strong recommendation from a provider is a barrier to HPV vaccination.[8, 17, 18] Family physicians were less likely to strongly recommend HPV vaccination than pediatricians in 2014 (male patients) and 2018 (female and male patients). Work to improve physician recommendations should focus on family physicians as they provide care for a large proportion of US adolescents[19] and remain less likely than pediatricians to strongly recommend HPV vaccination.

Our surveys confirmed physicians remain less likely to strongly recommend HPV vaccination to male patients than to female patients, although this disparity has decreased over time.[20] One study examining gender disparities in HPV vaccination found parents of unvaccinated adolescent sons were more likely to report not receiving a provider recommendation compared to parents of unvaccinated adolescent daughters.[21] Additional work has found parental HPV vaccine acceptance for adolescent males is associated with perceived provider knowledge[22], perceived future benefits of vaccination for the adolescent and his future partners, and perceived future regrets related to not vaccinating.[23] Nevertheless, data from the National Immunization Survey- Teen in 2019 show 70% of 13–17-year-old males and 73% of females of the same age had received ≥1 dose of HPV vaccine, continuing a trend of increased HPV vaccination among male adolescents and a narrowing gap between males and females. While physicians increasingly strongly recommend HPV vaccination, communication should include messages about the benefits of HPV vaccination for adolescents regardless of sex.

Physician beliefs were rarely barriers to HPV vaccination and remained stable or decreased over time. Of note, financial and practice barriers related to HPV vaccination, which were more common than any physician concerns related to HPV vaccine efficacy, need for vaccination, or vaccine safety decreased from 2008 to 2018. These findings suggest physician education about and experience with HPV vaccine have been successful in reducing physician barriers to HPV vaccination.

Perceived parental barriers related to need for vaccination, vaccine safety, sexual behavior and moral/religious concerns were common and several of these barriers were reported by more physicians over time. By 2018, a majority of physicians reported parents not thinking HPV vaccination is necessary was a major barrier/somewhat of a barrier- 67% and 59% for male and female adolescents respectively. Analysis of parent responses to the National Immunization Survey (NIS)-Teen data found that about one-third of parents of unvaccinated teens reported that the HPV vaccine was not necessary in 2015.[24] Viewed within the Health Belief Model, this barrier about need for vaccination may reflect parental perceptions of their adolescent's susceptibility to HPV, the severity of HPV, and/or the benefits of HPV vaccination.[25] Many prior studies have shown parental perception of HPV risk and the benefits of vaccination influence vaccination decisions for their sons and daughters.[8, 26, 27] A belief of not being at risk for HPV was also a reason for forgoing vaccination among adolescent women 15–24 years of age.[28] Lack of awareness about HPV and associated cancers has been identified as a barrier since HPV vaccine was first introduced; our survey results suggest that this remains a parental barrier to vaccination. Communication and education efforts to reach parents directly and to improve physician communication must continue to emphasize the high prevalence of HPV infection, the risks associated with HPV infection and HPV-related cancers, and the cancer prevention benefits of HPV vaccination.[29, 30]

Parental safety concerns were reported as a major barrier/somewhat of a barrier by 29% of physicians in 2008 and 73% in 2018, with concerns about long-term complications from vaccination and giving too many vaccines at once recognized as prominent safety concerns. Questions about vaccine safety are a challenge for vaccine acceptance in general

and have been identified in prior HPV work.[8] In NIS-Teen parent surveys concerns about HPV vaccines safety decreased among parents of unvaccinated females but increased among parents of unvaccinated males between 2010 and 2015.[24] Recent studies have examined the influence of misinformation from social media on vaccine safety concerns[31, 32] and a few studies have used social media to promote HPV vaccination.[33, 34] Parental concern about HPV vaccine causing infertility was uncommon but increased from 2014 to 2018 even as studies have shown HPV vaccination is not associated with female infertility.[35, 36] Identifying these sorts of infrequent yet growing safety concerns is key to development of targeted public health messages for dissemination by health care providers and through social media.

Moral/religious concerns and concerns about the influence of HPV vaccination on adolescent sexual behavior represent a category of parental barriers that physicians perceive to be increasingly common. Parental concerns about earlier or more risky sexual behavior were perceived to be more common for adolescent females than males and increased for females between 2008 and 2018. Several other studies have identified moral/religious concerns and questions about sexual behavior as parental barriers to HPV vaccination across diverse geographic, racial and ethnic populations since introduction of the vaccine.[37–39] Physician perception is that these parental concerns have increased with time, suggesting a continued association of HPV vaccination with sex rather than cancer prevention. Myths about HPV vaccination encouraging earlier or riskier sexual behavior have been disproven.[40, 41] Moral/religious vaccine concerns may be addressed by reframing HPV vaccination as cancer prevention, and may also benefit from more in-depth exploration of the role of social and community norms and the role of values in adolescent vaccination.

The data from these nationally representative surveys should be interpreted in the context of some limitations. Responses from sentinel physicians surveyed may not be completely generalizable, although prior work showed that the survey methods described here yield demographic and vaccine attitude responses similar to responses of physicians sampled randomly from AMA physician databases.[13]. Survey non-respondents may have different views and experiences than respondents. Depending on how vaccine attitudes and experiences of non-respondents differed from respondents in each survey year, year to year comparisons may not be representative of true differences among all physicians. Survey data are based on self-report rather than direct observation and may not reflect actual physician practice. Analysis of temporal trends in barriers to HPV vaccination included multiple comparisons; therefore, statistical significance of changes in barriers over time should be interpreted with caution. Individual barrier items were measured at different points in time but not all barriers were measured in all survey years. Barriers represent physician perceptions of parent beliefs but actual parent beliefs or the proportion of parents with any given belief were not measured. Noting that reported parental refusal of HPV vaccination remained stable (females) or decreased (males), caution should be used in interpreting physicians' report of increasing parental barriers. Parents who refuse vaccination in more recent survey years may have strongly held beliefs and may articulate their reasons for refusing vaccination more clearly to physicians, or unmeasured factors may have made physicians more attuned to perceived parental barriers over time.

Through a series of surveys between 2008 and 2018, we demonstrated that strength of physician recommendations for HPV vaccination has increased, reported parental refusals of HPV vaccine have decreased somewhat, and physician barriers to vaccination have decreased. However, perceived parental barriers have increased with concerns about the need for vaccination, vaccine safety, and moral/religious issues persisting as common barriers. To maintain and improve HPV vaccine confidence, communication and educational strategies should present HPV vaccination as cancer prevention to move the focus away from sexuality[29], emphasize the need for vaccination by focusing on the risks of HPV infection[30], and counteract misinformation about vaccine safety including through social media interventions. Efforts to address parental barriers should be paired with communication strategies proven effective at increasing HPV vaccine uptake such as motivational interviewing and a strong provider recommendation.[17, 18, 42, 43]

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Abbreviations:

ACIP	Advisory Committee for Immunization Practices
CDC	Centers for Disease Control and Prevention
HPV	human papillomavirus
AAP	American Academy of Pediatrics
AAFP	American Academy of Family Physicians

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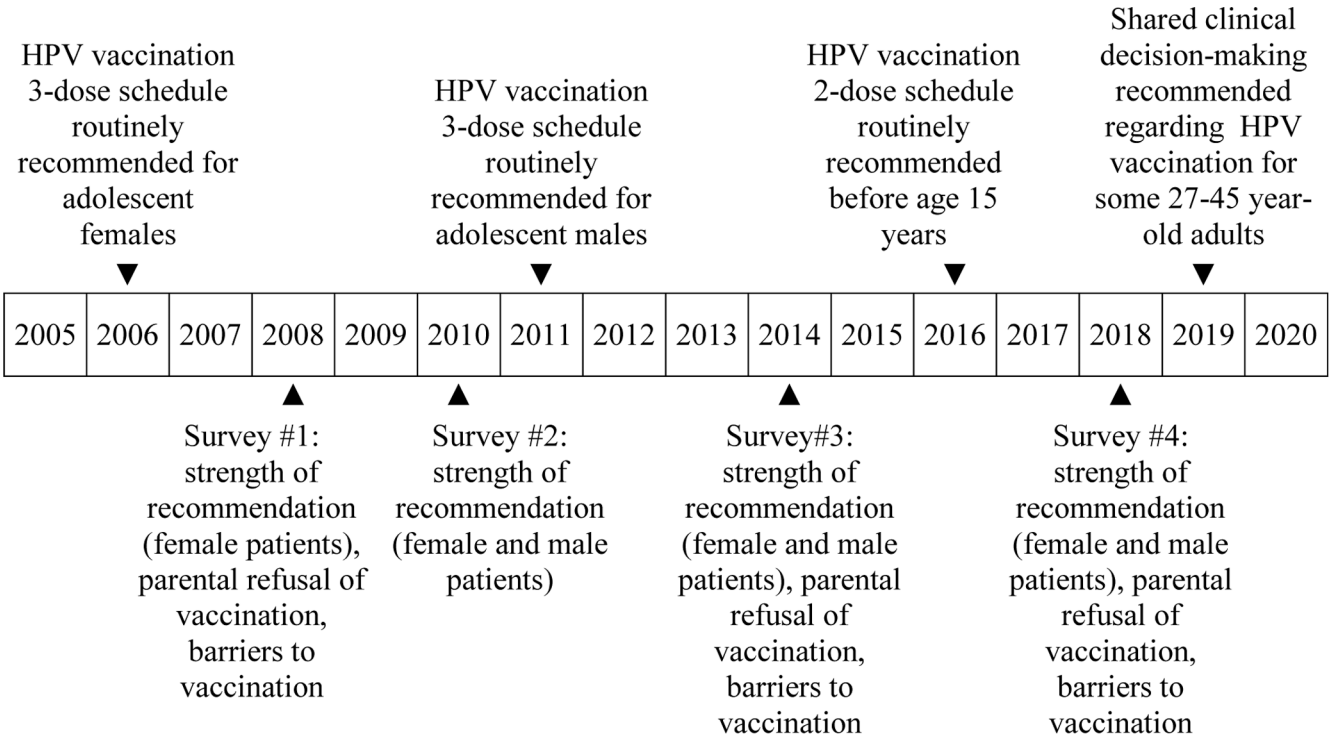

Figure 1 online:
Timing of Survey Administration Relative to Relevant HPV Vaccination Recommendations for U.S. Adolescents.

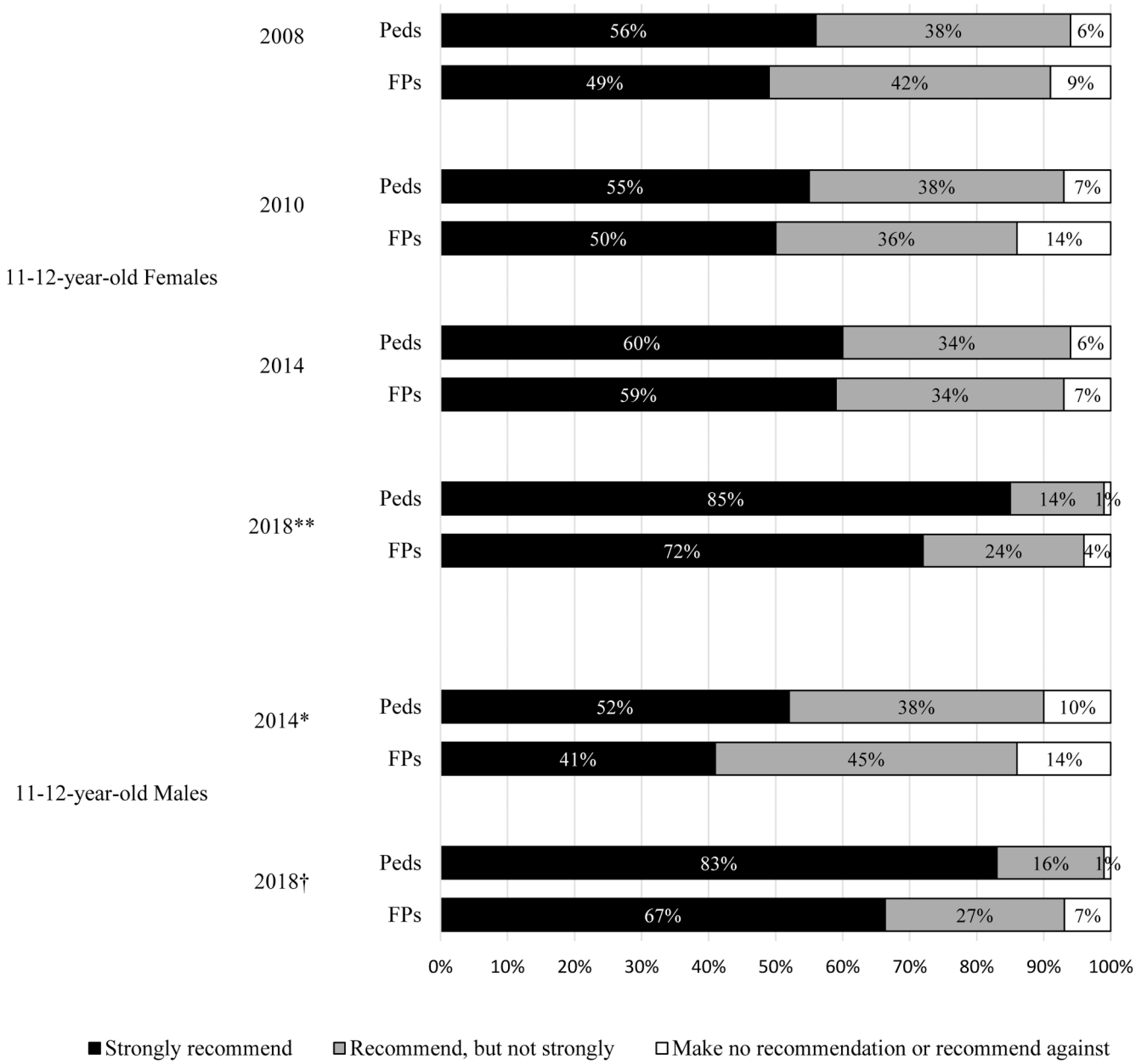

Figure 2:

Strength of Recommendation for HPV Vaccination for 11–12-year-old Female and Male Patients by Pediatricians (Peds) and Family Physicians (FPs) by Survey Year.

*p<0.05, **p<0.001, †p<0.0001 for single-year comparison of strength of recommendation between pediatricians (Peds) and family physicians (FPs) by chi-square test

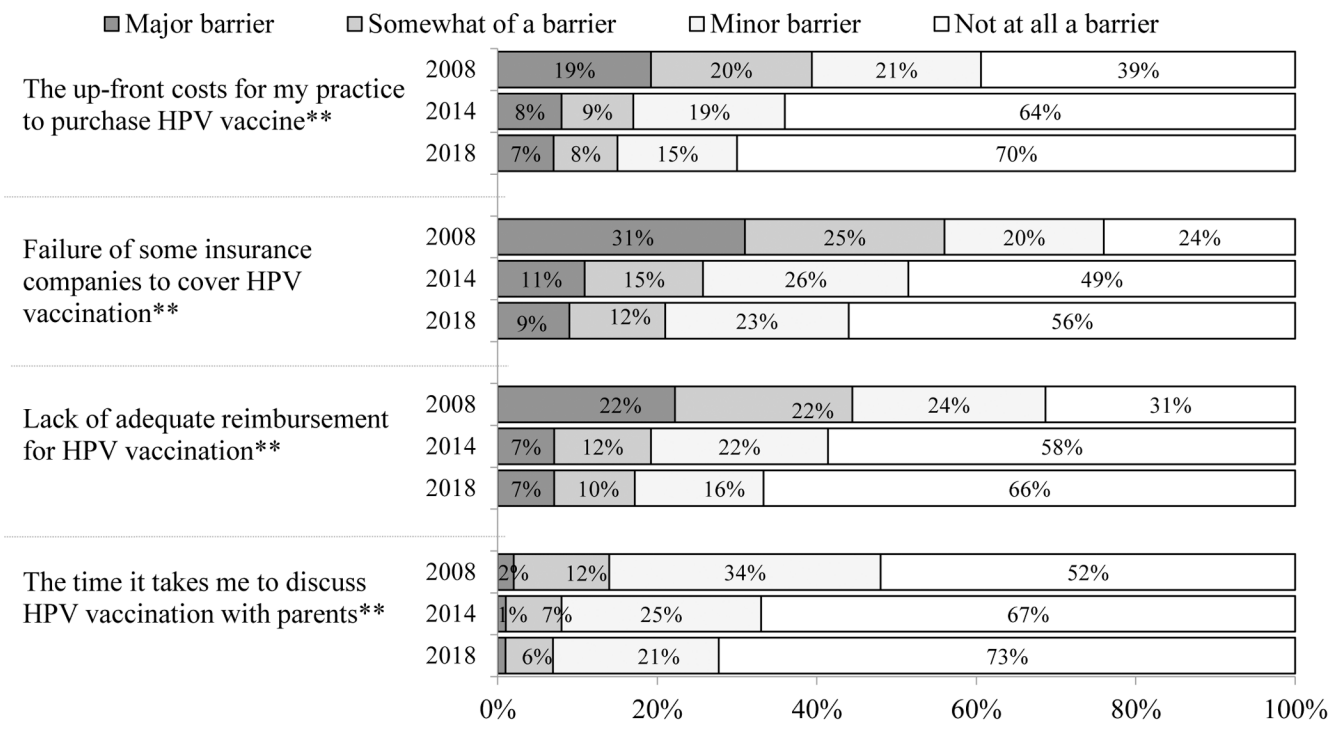

Figure 3:

Financial and Practice Barriers to HPV Vaccination by Survey Year.

**p<0.001 for comparison of barriers across surveys using chi-square test

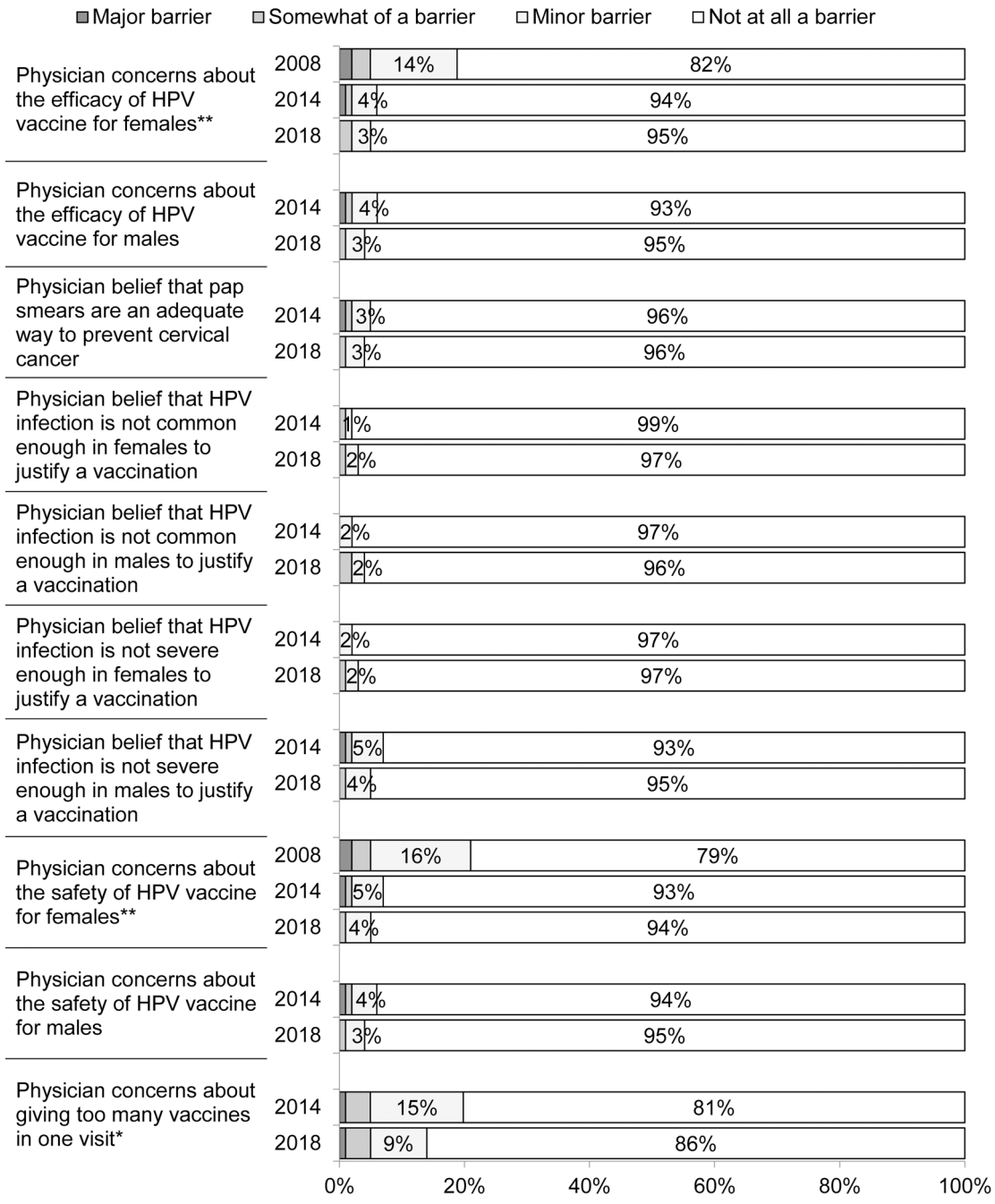

Figure 4 online:

Physician Belief Barriers to HPV Vaccination by Survey Year: Vaccine Efficacy, Need, and Safety.

*p<0.05, **p<0.001 for comparison of barriers across surveys using chi-square tests

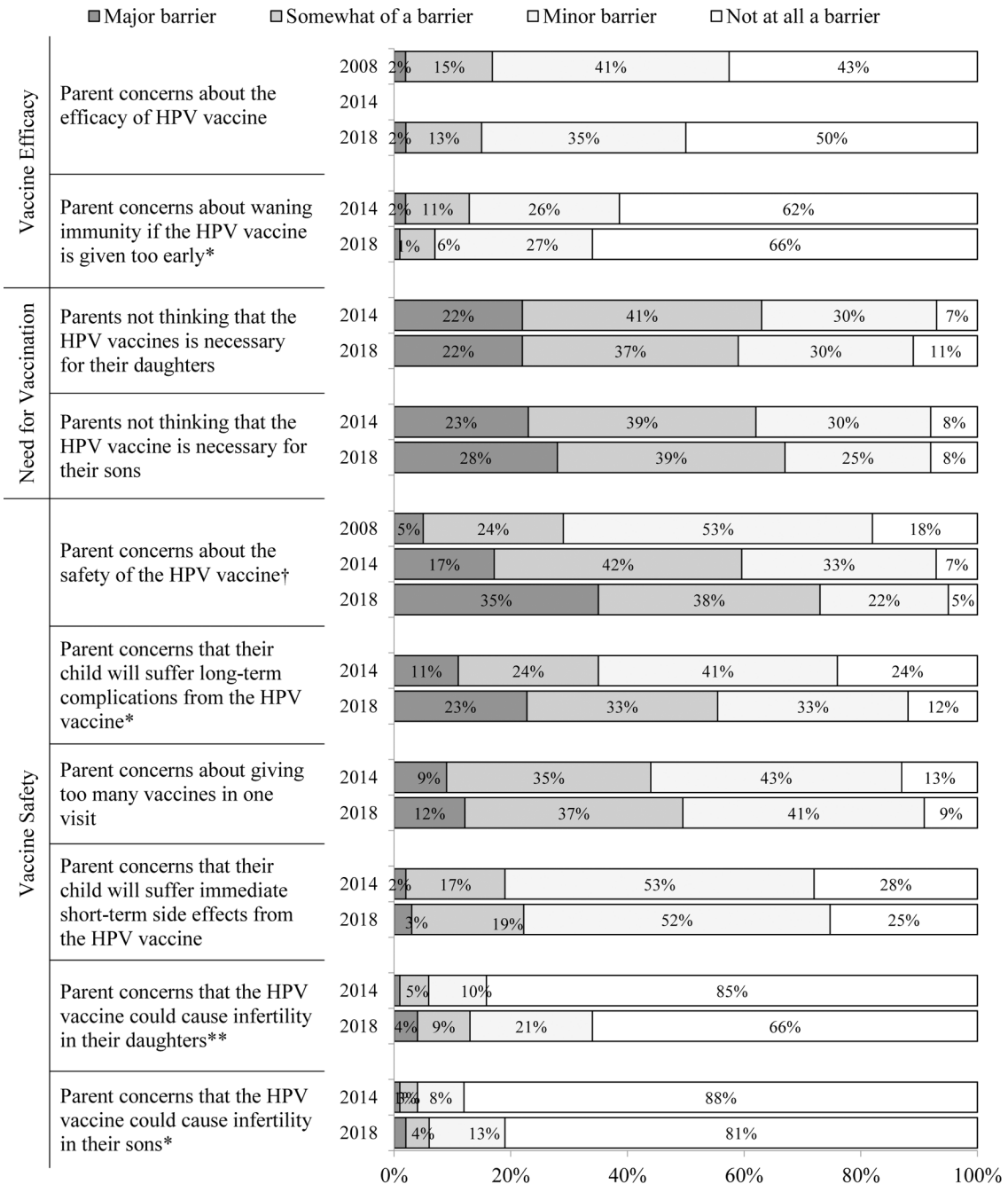

Figure 5:

Parental Belief Barriers to HPV Vaccination by Survey Year: Vaccine Efficacy, Need, and Safety.

*p<0.05, **p<0.001, †p<0.0001 for comparison of barriers between survey years using chi-square tests

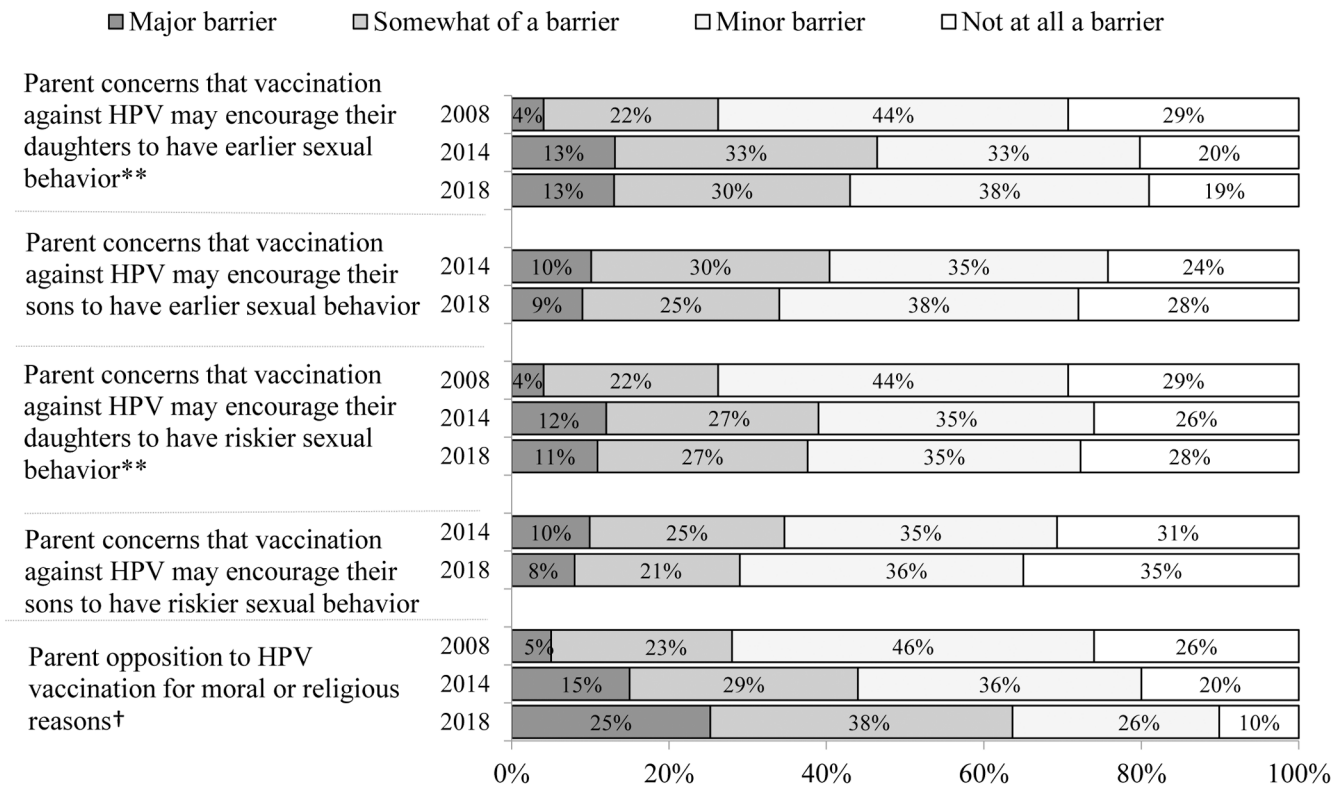

Figure 6:

Sexual Behavior and Moral/Religious Barriers to HPV Vaccination by Survey Year.

**p<0.001, †p<0.0001 for comparison of barriers across surveys using chi-square tests

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Table 1 online:

Characteristics of Survey Respondents and Non-respondents by Survey Year.

	2008		2010		2014		2018	
Characteristic	**Respondents n=680**	**Non-respondents n=168**	**Respondents n=609**	**Non-respondents n=233**	**Respondents n=582**	**Non-respondents n=247**	**Respondents n=588**	**Non-respondents n=320**
Female gender, %	48	54	55 *	33 *	59 *	45 *	53	51
Setting, %								
Private practice	83	78	77	79	75	75	76	77
Hospital or clinic	14	20	19	17	22	20	19	18
HMO	2	2	4	4	3	5	6	5
Location, %					*	*		
Urban	35	39	38	31	39	29	24	27
Suburban	45	42	44	49	44	49	68	63
Rural	20	18	18	20	17	22	8	10
Region, %	*	*			*	*		
Midwest	25	24	23	29	24	24	26	25
Northeast	23	19	20	17	21	18	20	16
South	30	43	34	33	32	40	32	40
West	22	14	22	21	24	18	22	20
Mean age in years (SD)	51 (10)	50 (10)	50 (10)	51 (9)	51 (11)	51 (10)	54 (9)	55 (10)
Median (IQR) number of providers in practice	5 (3–9)	NA	6 (3–10) *	5 (2–8) *	6 (3–10)	5 (2–10)	6 (3–10)	5 (3–9)
Proportion of Medicaid or CHIP patients, % ‡								
0–24	66	NA	59	NA	52	NA	56	NA
25–49	20	NA	21	NA	21	NA	22	NA
≥50	14	NA	20	NA	27	NA	22	NA
Patient race/ethnicity, %								
≥10% Black/African American	43	NA	43	NA	51	NA	43	NA

	2008		2010		2014		2018	
Characteristic	**Respondents n=680**	**Non-respondents n=168**	**Respondents n=609**	**Non-respondents n=233**	**Respondents n=582**	**Non-respondents n=247**	**Respondents n=588**	**Non-respondents n=320**
≥10% Hispanic/Latino	45	NA	39	NA	51	NA	49	NA

NA=not assessed, CHIP=Children's Health Insurance Program. Percentages may not total 100 due to rounding.

*p≤0.05 for chi-square test for difference in one survey year for respondents versus non-respondents,

**p<0.05 for Wilcoxon rank test for difference within specialty in one survey year for respondents versus non-respondents,

†p<0.05 for t-test for difference within specialty in one survey year for respondents versus non-respondents.

‡Proportion Medicaid presented for 2018, proportion Medicaid or State CHIP presented for 2008, 2010, 2014.