Published in final edited form as:

J Sch Health. 2017 September ; 87(9): 705–714. doi:10.1111/josh.12540.

Acceptability of school-based health centers for human papillomavirus vaccination visits: a mixed methods study

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Abstract

BACKGROUND—Countries with high human papillomavirus (HPV) vaccination rates have achieved this success largely through school-based vaccination. Using school-based health centers (SBHCs) in the US, where HPV vaccine remains underutilized, could improve uptake. In this mixed-methods study, we examined acceptability, facilitators, and barriers of HPV vaccination visits at SBHCs from the perspectives of adolescents and parents.

METHODS—We conducted qualitative interviews and structured surveys with adolescents and parents recruited from an urban, hospital-based clinic. Interviews with parents (N = 20) and adolescents (N = 20) were audio-recorded and transcribed for analysis using an iterative thematic approach. Quantitative measures for a survey administered to parents (N = 131) were derived from the qualitative findings. Survey results were analyzed by chi-square tests.

RESULTS—Many participants expressed favorable opinions of HPV vaccination at SBHCs in qualitative interviews. Facilitators included convenience, ease of scheduling, and not missing work or school. However, barriers were noted including concerns about obtaining care outside the medical home, fragmentation of medical records, and negative perceptions about SBHCs.

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Human Subjects Approval Statement

The Yale University Institutional Review Board approved all study procedures (Protocols #1209010770 and 1308012532).

Quantitative findings revealed that a higher proportion of parents with experience using SBHCs were willing to use a middle school (59.5%) or high school (80.5%) SBHC for HPV vaccinations compared to those who had not used SBHCs ($p < .05$ for both comparisons).

CONCLUSIONS—HPV vaccination visits at SBHCs were acceptable, and SBHC users expressed more favorable attitudes. Barriers to HPV vaccination at SBHCs can be addressed through more education about SBHCs' role, and improvement of systems to coordinate care.

Keywords

HPV vaccine; school-based health centers; adolescent health; mixed methods research

Safe and effective human papillomavirus (HPV) vaccines are available to prevent HPV-associated cancers (of the cervix, anus, penis, vagina, and vulva) and genital warts. In the United States (US), national guidelines recommend immunization of adolescents with 3 doses of HPV vaccine at 11 or 12 years of age.^{1–3} However, uptake remains suboptimal, with only 40% of girls and 22% of boys having received all 3 doses of HPV vaccine by 2014,⁴ and completion of the vaccine series poses challenges for adolescents who may present less frequently to medical care.^{5–7} With only minimal gains seen in HPV vaccination rates in recent years,⁴ new approaches are needed to improve the state of adolescent HPV vaccination and reduce the burden of HPV-associated disease.

One promising strategy to increase HPV vaccination rates is school-located vaccination.⁸ In contrast to the US, countries such as Australia and England have achieved high rates (70%) of HPV vaccine series completion,^{9–11} largely through school-based vaccination programs.^{12,13} These high rates of coverage have produced population-level reductions in HPV infections and associated diseases,¹⁴ and the sharpest declines in HPV-associated outcomes have occurred in countries with school-based vaccination delivery.¹² In the US, whereas HPV vaccine is predominantly provided in the clinical setting, several local, school-based HPV vaccination interventions have demonstrated promising results.^{15–19} Expanding vaccination efforts to schools could help improve national HPV vaccination rates.

A potential strategy to expand HPV vaccination to schools is to harness the existing network of school-based health clinics (SBHCs). SBHCs are school-located clinics that offer primary care medical services to students.²⁰ There are nearly 2000 SBHCs throughout the US, a majority of which provide and support adolescent immunizations.^{21,22} SBHCs can reduce structural barriers to vaccination, including clinic accessibility, parental availability to attend health visits, and ensuring adolescent attendance at scheduled vaccination visits.²³ SBHC staff also express interest in low-cost initiatives to increase HPV vaccine uptake.²⁴

Whereas prior research has demonstrated that adolescent vaccination at SBHCs is generally acceptable to parents and adolescents, and parents generally support school-located HPV vaccination,²³ relatively little is known specifically about their views on HPV vaccination at SBHCs. Because HPV vaccination rates are lower than those of other adolescent vaccines and the 3-dose HPV vaccine series requires extra visits, barriers to provision of HPV vaccine through SBHCs may differ from those of other vaccines. In addition, though previous research has examined stakeholder opinions of school-located HPV vaccination,²⁵

acceptability of HPV vaccination at SBHCs may differ from that of school-located vaccine clinics due to the advanced medical training of SBHC staff and the comprehensive services offered. Therefore, understanding parents' and adolescents' perspectives is important for informing strategies to use SBHCs to increase rates of HPV vaccination, and to identify and address potential barriers. We conducted a mixed methods study of parents and adolescents to examine acceptability of and perceived facilitators and barriers to HPV vaccination at SBHCs among parents and adolescents living in a geographic area with access to SBHCs.

METHODS

We used an exploratory sequential mixed methods design that consisted of 2 phases: qualitative and quantitative.^{26,27} In the first phase of the study, qualitative data were collected through semi-structured interviews with parents and adolescents to explore acceptability of and facilitators/barriers to HPV vaccination at SBHCs. Preliminary results from the initial qualitative interviews identified key themes, which were used to develop a survey that was subsequently administered to a larger number of parents to build upon and confirm the qualitative findings.

Participants

Participants were a convenience sample of adolescent patients of a single urban, academic, hospital-based primary care clinic and parents of clinic-enrolled adolescents. This clinic serves a predominantly low-income, black and Hispanic population, and is affiliated with 7 school-based health centers: 3 high schools and 4 middle/elementary schools. Consequently, many adolescents served by this clinic also have access to SBHCs that provide HPV vaccine. We have conducted previous qualitative studies in this setting which demonstrated that although awareness of HPV vaccine is limited, in general, this population holds favorable attitudes towards HPV vaccine and brief information about the vaccine is met with enthusiasm.^{28,29}

For both the qualitative and the quantitative phases of the study, parents of adolescents (subsequently referred to as "parents") and adolescents were approached in the clinic waiting area and invited to participate. Parents were eligible if they had a child 11–18 years of age and adolescents 11–18 years of age were eligible because HPV vaccine is typically administered in SBHCs between these ages. A single parent interview was conducted per family, including one or both parents. For the qualitative phase of the study, if parents had more than one child in the age range, they were permitted to answer with regards to each child. Adolescents who attended a school with a SBHC and parents of adolescents with a SBHC were eligible to participate in the qualitative phase. We continued to enroll participants in the qualitative phase until thematic saturation was achieved.³⁰ Parents were eligible to participate in the quantitative phase regardless of whether they reported that their child attended a school with a SBHC. Refusals to participate were not systematically recorded, but those who declined generally cited lack of time or interest. Parents and 18-year-old adolescents provided written informed consent and younger adolescents provided written assent.

Instrumentation and Procedure

Data were collected during July 2013–November 2014. During the qualitative phase, members of the research team conducted in-depth, semi-structured interviews with participants to elicit their attitudes towards HPV vaccination at SBHCs. Before beginning data collection, we created separate interview guides for parents and adolescents that covered similar topics, which were informed by review of the literature of school-located vaccination^{22,31} and discussions with SBHC practitioners. Key domains of the interview guide elicited participants' attitudes towards provision of HPV vaccine at SBHCs (eg, What would you think about getting HPV vaccine at the SBHC? What about completing the second and third shots there?), helpfulness of HPV vaccination at SBHCs (eg, How would this help you? Would getting it at the SBHC help you get all 3 doses?), and challenges related to provision of HPV vaccine at SBHCs (eg, Do you see any challenges or issues with getting HPV vaccine at the SBHC?). If both members of a parent and adolescent pair, for example a mother and her son or daughter, participated, they were interviewed separately so as not to influence each other's responses. The interviews were audio-recorded and transcribed for analysis.

Development of the quantitative survey was informed by our initial review of preliminary qualitative interviews. Questions were designed to assess key barriers and facilitators related to HPV vaccination visits at SBHCs. The survey was pilot tested with 11 parents to ensure that questions were clear and understandable. The survey was administered by computer with the use of a Web-based survey tool (Qualtrics, LLC). Questions solicited parents' demographic characteristics and whether their child's school had a SBHC, and if so, whether their child had used it. Items were also included to assess parents' willingness to use a SBHC for a middle school-aged or high school-aged child (How willing would you be to have a middle school child (7th or 8th grade) get their first HPV shot at the SBHC? How willing would you be to have a high school child (9th–12th grade) get their first HPV shot at the SBHC?). Survey measures were designed to obtain parents' responses by the child's grade level rather than by age to provide information that would enable targeting HPV vaccination efforts by school. Finally, perceived facilitators and barriers to acceptance of HPV vaccination at SBHCs were measured with 5-point Likert scale responses (very/somewhat/not very/not at all/don't know). For example, parents were asked to rate how much of an advantage certain perceived facilitators – Not missing work; My child not missing school; Not having to schedule at the hospital-based clinic; Not having to go to the hospital-based clinic; Reinforces importance of the shot – were to their child getting HPV vaccine at the SBHC. Likewise, they were also asked to indicate how much of a concern certain perceived barriers would be to them seeking out HPV vaccine for their child at a SBHC. These perceived barriers included: Making sure it's in the medical records; That I might not know my child got the shot; That I would not be there; That my child would have a side effect at school; That it might not be private; That it is not the usual doctor.

Data Analysis

Qualitative interview transcripts were uploaded to ATLAS.ti 7 qualitative data analysis software (ATLAS.ti Scientific Software Development GmbH, Berlin) for management and analysis. We used a team-based, iterative thematic analytic approach.³⁰

Based on initial reading of interview transcripts, we developed a coding guide, which was iteratively revised and refined through discussion with the research team. Following coding, we discussed patterns observed in the data and identified key themes. Interpretation of emerging patterns in the data was refined through discussion among the research team.

For the quantitative survey analysis, descriptive statistics were calculated for demographic variables, including sex, race/ethnicity, and whether the child had a school with a SBHC. Because our qualitative data suggested that more participants who had previously used SBHCs found the concept of HPV vaccination visits at SBHCs acceptable, we decided to categorize parents into 3 strata for analysis: (1) child had used a SBHC (“SBHC users”); (2) child’s school had a SBHC but child had not used it; and (3) child did not have a SBHC or parent did not know if there was one. Responses were compared across the 3 strata with chi-square tests. Questions measured on a Likert scale were collapsed in the final analyses (very/somewhat vs. not very/not at all/don’t know/missing) to dichotomize results into actionable categories: parents who would be likely to use SBHCs for HPV vaccination and those who would not. Analysis was performed with IBM SPSS Statistics version 21.0 (Armonk, NY).

RESULTS

We conducted qualitative interviews with 20 parents and 20 adolescents, including 7 parent-child pairs and 1 interview conducted with both parents from 1 family; 131 parents completed quantitative surveys. Six parents participated in both study phases. Participant demographics are shown in Table 1. Facilitators of and barriers to HPV vaccination visits at SBHCs that were identified in analysis are presented below, with qualitative themes first, followed by corresponding quantitative results. Illustrative quotes from qualitative interview respondents that demonstrate key themes are presented in Table 2.

Facilitators – Qualitative

Acceptability of HPV vaccination visits at SBHCs—A majority approved of HPV vaccination at SBHCs. Adolescents who reported previous experience using a SBHC expressed uniform acceptance of HPV vaccination there; among those without prior experience using a SBHC, most found the idea acceptable. Adolescents generally felt that HPV vaccination at SBHCs would be “normal” and similar to that at the hospital-based clinic.

Most parents, regardless of prior SBHC use, also approved of HPV vaccination at SBHCs for their children, and a few parents remarked on the advantages it could have for all children. Many parents’ acceptance of HPV vaccination at SBHCs, however, was tempered by certain reservations. While most parents responded positively to the idea, several expressed preferences that certain assurances, such as safety of the vaccines and notification, be provided. For example, a few parents mentioned that they would agree with HPV vaccination at SBHC if it followed appropriate protocols, while other parents expressed desires to be notified of vaccination so they could update their records.

Convenience—Participants viewed convenience as a major benefit of HPV vaccination at SBHCs. Not having to arrange transportation to the doctor’s office, not missing work or

school to attend an appointment, and avoiding scheduling challenges at the hospital-based clinic were all seen as important advantages. Adolescents commented on the convenient location, hours, and ease of scheduling appointments at SBHCs.

Indirect benefits of HPV vaccination at SBHCs—In addition to practical benefits of HPV vaccination visits at SBHCs, participants cited various indirect benefits. Some parents felt that the use of SBHCs for HPV vaccinations would increase adolescents' responsibility, as use of SBHCs for HPV vaccination visits would provide them with opportunities to make and keep medical appointments, something that was viewed as important during their transition to adulthood. Parents also mentioned how provision of HPV vaccine at SBHCs could serve to emphasize its importance and provide adolescents an opportunity to learn more about it. Several adolescent participants positively associated HPV vaccination at SBHCs with increased responsibility as well, as SBHCs were viewed as a place where adolescents "can take care of themselves," and the ability to obtain HPV vaccine there contributed to this perception.

Facilitators – Quantitative

Results from the quantitative survey are presented in Table 3. We found that a higher proportion of SBHC users were willing to have their middle school-aged child initiate or complete the HPV vaccine series at a SBHC compared to parents whose children had not used a SBHC or did not have one (initiation: 59.5% vs. 26.9%, 43.5%, respectively, $p=.027$; completion: 65.9% vs. 26.9%, 45.2%, respectively, $p=.006$). Similar findings were observed for parents of high school-aged children (initiation: 80.5% vs. 53.8%, 48.4%, $p=.003$; completion: 80.5% vs. 50.0%, 51.6%, $p=.005$). In addition, the proportion of parents who reported that HPV vaccination at SBHCs would be helpful to them was significantly higher among SBHC users (85.0% vs. 57.7% (hadn't used) and 62.9% (didn't have), $p=.01$).

Factors that parents most commonly cited as advantages of HPV vaccination at SBHCs included: availability of HPV vaccine at SBHCs reinforced the importance of the vaccine (77.1%); not missing school (75.6%); not having to schedule an appointment at the hospital-based clinic (69.4%); not having to go to the hospital-based clinic (68.7%); and not missing work (58.8%). These did not differ significantly across strata of SBHC usage.

Barriers – Qualitative

Negative perceptions of SBHCs—Some parents and adolescents held negative perceptions of SBHCs. These included believing that SBHCs could not provide the same quality of care as the hospital-based clinic, or that vaccines provided there were not the 'same'. One parent explained how he perceived the SBHC facility and staff to be of lower quality, noting "the hospital [clinic] is better...it's more safer, they know what they're doing more." Some adolescents also reported a lack of trust in the SBHC, stating that the staff "don't really know what they're doing" and that "I trust the shots more here [at the hospital-based clinic] in a way."

Participants' incomplete understanding of the difference between the SBHC and the school nurse's office emerged in several interviews, which may have contributed to these negative

perceptions. As one adolescent stated when provided with clarification during the interview that the SBHC was different from the nurse's office, "...I think both of them is the same." One parent who recalled a negative experience with what she believed to be the SBHC remarked, "...the nurse doesn't even have a stethoscope to listen."

Limited awareness of scope of services at SBHCs—Parents had limited awareness of the services offered by SBHCs. Some felt that SBHCs were only intended for emergency medical issues or sick visits. Furthermore, a number of parents were unaware that SBHCs offered vaccines. This perception led some parents to view the hospital-based clinic as the location best suited for well child visits and vaccines, and preferences to not seek HPV vaccine at a SBHC.

Fragmentation of care—Another concern raised by participants with HPV vaccination visits at SBHCs was the potential for fragmentation of care. Some parents expressed desires to maintain their child's medical records in one location and feared that receiving vaccines at multiple locations, such as both the primary care provider's office and SBHC, would disrupt record keeping. One parent had specific concerns about completing the 3-dose HPV vaccine series at the SBHC as records might be inaccurate, and result in her daughter receiving an unnecessary, extra dose. Adolescents' concerns about fragmentation of care tended to center on their preferences to maintain their medical care in a familiar location, as several respondents had received care at the hospital-based clinic since birth.

Dislike of vaccines—Dislike of vaccines and fear of pain associated with vaccine administration was a concern of a few, mostly younger, adolescents. One adolescent who had received a flu shot at the SBHC recalled how painful the vaccine was, but explained that he recognized the importance of vaccination and would not forgo future vaccines at the SBHC. Other adolescents reported being fearful of receiving HPV immunizations at the SBHC due to the associated pain and anticipated absence of their parent at the time of vaccination.

Notification—Most parents felt that for their child to receive HPV vaccine at the SBHC, it would be important for them to be notified, usually prior to vaccination. One mother recalled a negative experience of her son receiving a vaccine at the SBHC without being notified ahead of time. As a result of this episode, she reported she would not want to use the SBHC again.

Barriers – Quantitative

Parents' leading concerns with HPV vaccination at SBHCs included that vaccine administration would not be in their child's medical record (82.4%), they would not know that the vaccine was given (79.4%), there would be side effects (70.2%), it would not be their child's usual doctor (64.9%), they would not be present at the vaccine appointment (62.6%), and it would not be private (61.1%). These concerns did not differ significantly across strata of SBHC usage with the exception of side effects, which were of greater concern among parents whose child had not used the SBHC previously or did not have a SBHC ($p=.005$). Barriers identified in the quantitative survey are presented in Table 2.

DISCUSSION

We observed that the concept of HPV vaccination at SBHCs was generally acceptable to parents and adolescents. Participants noted several benefits, including the conveniences of not missing work or school, not needing to schedule an appointment, and elimination of transportation. For HPV vaccine, where additional healthcare visits are required to complete the 3-dose series, these practical benefits are significant. In addition, respondents felt there was indirect value to providing HPV vaccine at SBHCs, as it could encourage adolescents to take responsibility for their health, and reinforce the importance of the vaccine by offering it at an additional location apart from the hospital-based clinic. These findings are in agreement with previous research that has found that, in general, SBHCs are an acceptable setting for adolescent vaccination^{32–35} However, the current study provides a unique contribution to the literature in several ways due to its specific focus on HPV vaccine in the SBHC setting and use of a mixed-methods approach.

We also identified several potential barriers that will be important to overcome to ensure success of HPV vaccination programs at SBHCs. Notably, our qualitative interviews indicated that awareness of the healthcare services offered by SBHCs was poor, even among participants who reported previously using them. Limited understanding of the full scope of services at SBHCs is likely to be a barrier to their wider use for HPV vaccination, and may contribute to negative perceptions about the quality of care provided at SBHCs held by certain participants. In addition, parents had concerns regarding fragmentation of medical records and notification about vaccination. Some adolescents expressed discomfort with receiving HPV vaccine at SBHCs because they were unfamiliar with the medical providers, while others were fearful of pain associated with the immunization. Finally, a greater proportion of parents expressed willingness for vaccination of high school-aged children at SBHCs, despite the target age for HPV vaccination of 11–12 years aligning with the middle school years.

Fortunately, many barriers are addressable. For example, raising awareness of SBHCs' role in children's health, such as through educational outreach during school orientation or information sent to the home, will be important to informing parents and adolescents better about the full range of services that SBHCs provide, including immunizations. To address concerns regarding fragmentation of care, it will be important to improve structural frameworks to enable seamless coordination of adolescents' vaccination records across the healthcare system, for example, through statewide immunization registries or structured protocols to communicate immunizations to other healthcare providers. Assurance of close communication with parents around the time of vaccination will be important to maintain parents' trust in immunization at SBHCs, as some parents may not recall earlier consent they provided. Simple strategies, such as a letter to remind parents that their child will receive HPV vaccine and provide an opportunity to accompany their child to the vaccination visit, are likely to be welcomed by parents and easily implemented.

Other barriers may be more challenging to address. First, negative perceptions of SBHCs, a model of care that may be unfamiliar to parents and adolescents, may be challenging to overcome. However, a recent educational, trust-building intervention among parents with a

SBHC in their child's school showed that trust in SBHCs might be a modifiable factor.³⁶ Second, parents' greater willingness for vaccination of high school-aged children may hinder the use of SBHCs for HPV vaccination in accordance with national guidelines for immunization at ages 11–12 years. Lastly, despite our finding for overall enthusiasm for HPV vaccination at SBHCs, our quantitative findings revealed that a substantial subset of parents were unwilling to have their middle school-aged child either initiate or complete the HPV vaccine series at a SBHC. Adolescents with a regular source of primary care may find it unnecessary to use SBHCs for immunizations, and they and their parents may prefer to seek immunizations in the office-based setting. However, because SBHCs can be both a source of primary care and a critical safety net for reaching vulnerable youth³⁷ who may be at high risk for HPV infections and associated diseases, it is important to make HPV immunizations more accessible through this route.

This study has several limitations. First, our sample was recruited from a single hospital-based clinic that generally holds favorable attitudes towards HPV vaccination,²⁸ which may limit the generalizability of our findings. In addition, while HPV vaccine is currently offered at the SBHCs in this study, SBHCs are often under local control, which may affect HPV vaccine availability, and therefore limit the transferability of our findings. Because we recruited participants from the clinic waiting room, our sample reflects a population that is already able to access healthcare, and could potentially differ from those with greater barriers to reaching the health system. This group, while not included in our study, could potentially benefit from SBHC vaccination programs most, and future studies should seek to engage these populations. In addition, our recruitment procedures resulted in a small number of male parent participants, which likely reflects fewer male than female caregivers accompanying adolescents to medical appointments. In the quantitative phase, we included parents who reported their child did not have a SBHC, which may influence their opinions. However, the opinions of participants who may have access to SBHCs but be unaware of them are important to consider when expanding use of SBHCs. Lastly, while time and resources did not permit us to conduct quantitative surveys with adolescents, the inclusion of qualitative interview data with adolescents in our study is an important strength.

In summary, we found that HPV vaccination at SBHCs were acceptable to parents and adolescents in our sample. Participants who had used SBHCs were more likely to approve of using SBHCs for HPV vaccination. A number of potential barriers were identified that can be addressed, such as increasing education and awareness of the role of SBHCs, and improving systems to coordinate care across different medical homes.

IMPLICATIONS FOR SCHOOL HEALTH

Given that rates of HPV vaccine uptake continue to be suboptimal among US adolescents, and that SBHCs play an important role in reaching underserved adolescent populations who are most at risk for HPV-associated diseases, HPV vaccination at SBHCs should be supported by schools and other partners of SBHCs. The findings from this study inform several next steps that SBHCs can take to raise adolescent HPV vaccine coverage. First, our findings suggest that efforts to promote HPV vaccination among SBHC users, such as targeted HPV vaccine reminder systems, are likely to be well received. Second, interventions

to enhance attitudes towards vaccination at SBHCs, such as outreach campaigns to raise awareness of immunization services available at SBHCs, could also help improve HPV vaccine uptake in the SBHC setting. Finally, SBHCs can develop structured protocols to communicate immunizations administered at SBHCs to other healthcare providers and caregivers. In summary, SBHCs have the potential to make an impactful contribution to increasing HPV vaccine uptake.

Acknowledgments

This work was supported by National Institutes of Health grants R21 CA163160, P30 MH062294, P30CA016356 and T32 AI007210; the Edith P. Rausch Fund of The Community Foundation for Greater New Haven; and Yale CTSA grant UL1TR000142 from the National Center for Advancing Translational Science (NCATS), NIH. The study sponsors had no role in study design; in the collection, interpretation, or analysis of data; in the writing of the report; or in the decision to submit the article for publication. Its contents are solely the responsibility of the authors and do not necessarily represent the official view of NIH.

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Table 1

Sample Characteristics

	Qualitative Phase		Quantitative Phase
	Parents N = 20	Adolescents N = 20	Parents N = 131
Sex			
Female	19 (95%)	12 (60%)	122 (93.1%)
Male	1 (5%)	8 (40%)	9 (6.9%)
Race/ethnicity			
Black	12 (60%)	6 (30%)	69 (52.7%)
Hispanic	7 (35%)	12 (60%)	54 (41.2%)
Other	1 (5%)	2 (10%)	8 (6.1%)
Age in years, range (median)	31–61 (40)	11–18 (16)	26–61 (38)
Grade in school, range (median)	N/A	5–12 (10)	N/A
SBHC status [*]			
Have one, used it	9 (45%)	8 (40%)	42 (32.1%)
Have one, haven't used it	11 (55%)	12 (60%)	26 (19.8%)
Don't have one/don't know	N/A	N/A	63 (48.1%)

* Attendance at a school with a SBHC or having an adolescent who attended a school with a SBHC was a requirement for participation in the qualitative phase of the study.

Table 2

Themes Identified in the Qualitative Phase with Illustrative Comments from Participants

Category	Theme	Illustrative Quote
Facilitators of HPV vaccination at SBHCs	Most respondents expressed favorable attitudes towards HPV vaccination at SBHCs	<p>Parents: “I think it would be great.” “Actually, I always think it would help all the children. A lot of parents that don’t even go to take their kids for their shots. If the school is offering them, I think that can get a lot of kids vaccinated.” “That’s fine as long as they’re safe and everything’s sanitized and stuff, prepared right.” “Well, as far as they notify me they need to get the shot it’s no problem...I need to put it down in the records so I make sure they got everything up to date.”</p> <p>Adolescents: “I wouldn’t mind.” “I don’t think getting the shot there <i>[at the SBHC]</i> would be different than here <i>[at the hospital-based clinic]</i> because at least I’ll talk to somebody that I’ve actually had a conversation with...I’ll be comfortable to get it either here or there, it doesn’t matter.”</p>
	HPV vaccination at SBHCs is convenient	<p>Parents: “Sometimes I don’t have a car, sometimes I do. It <i>[HPV vaccination at SBHC]</i> will be good because he is already getting transportation to go to school so that will be great.” “That helps me a lot because if they give it to <i>[sic]</i> the school and I don’t have to go over there, they...not gonna miss school and I don’t miss work.” “Given how long <i>[clinic name]</i> takes to get appointments, given that they do need shots for school and everything, I think it would be good for the parents.”</p> <p>Adolescents: “It’s easier because I’m in school and I don’t have to go out somewhere like to the doctor’s”. “If I’m in school, then I’d rather get it in school because I don’t want to miss any school, like classes, or make an appointment after school coming here <i>[the hospital-based clinic]</i>.” “She <i>[my mother]</i> will think it’s better because she won’t have to make appointments.”</p>
	There are indirect benefits to HPV vaccination at SBHCs	<p>Parents: “It would even make it even better for me, because it would...it’d make them more responsible.” “I mean, I think it’s not a bad idea because maybe most of the students don’t know about it <i>[HPV vaccine]</i>, and maybe they could teach it and know more about it...You know they teach it, they talk about it in school, like that they got the kids knowing what it is, what it prevents.”</p> <p>Adolescent: “I think it <i>[HPV vaccination at SBHC]</i> is better because that is where most people meet their boyfriends and girlfriends, is at school. So if they are giving it out at school, then there’s a better chance that they are getting it too.”</p>
Barriers to HPV vaccination at SBHC	Some participants held negative perceptions of SBHCs	<p>Parent: “I don’t know, the hospital is better...it’s more safer, they know what they’re doing more, I mean you got nurses, half of them are in school, I don’t think they know what they are doing”.</p> <p>Adolescent: “I don’t know, I really wouldn’t feel comfortable with it. Because I trust the shots here <i>[at the hospital-based clinic]</i> in a way. I don’t believe in those <i>[at the SBHC]</i>...it could be something else.”</p>
	Parents had a limited awareness of the scope of services offered at SBHCs	<p>Parents: “He has no reason to go yet. He hasn’t been sick or anything like that to go in there.” “...do they vaccinate the children in the school-based clinic? ...I know they do a lot of things in the school-based but I do not remember the children being able to get vaccinated.” “To me the school-based clinic, I look at it as like maybe if, maybe like if the child get hurt at school or something like that...I don’t look at it as like giving them their important shots that they need. I would think that their healthcare provider, that’s where a healthcare provider come in at.”</p>
	HPV vaccination at SBHCs could lead to fragmentation of medical care	<p>Parents: “No, I wouldn’t personally. Not for mine. I just don’t think that’s appropriate. I – doctor’s offices for that <i>[HPV vaccination]</i>. Private doctor, yeah. Somebody who knows you, who knows your history, has your chart and your file and your records.” “...sometimes they mess things up. Nobody’s perfect. I certainly wouldn’t want somebody to mess up with my kid. Maybe they are thinking they are giving her the first shot, and it is actually the second shot. No, I don’t like it, it is confusing.”</p> <p>Adolescent: “I’m not really used to the school clinic, and this hospital is more, I’m used to it because I’ve been coming here since I was a little baby.”</p>
	Some adolescents expressed a dislike of shots	<p>Adolescents: “I didn’t like it. It hurts, like the last time I was like, so skinny...it hurt me a lot.” “at school they’re scary because after that <i>[the shot]</i> it kind of hurts when you move or something.”</p>

Category	Theme	Illustrative Quote
	Suboptimal notification of HPV vaccination at SBHCs could occur	Parents: “I would want them to notify me first, so I could know just in case he come home complaining that his arm or his shoulder or something hurts I would know why.” “Yeah, when he told me, ‘I had the shot,’ I got mad because I told him why she no ask me first? So I’m not happy with that.”

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Table 3

Responses to Quantitative Survey Questions by SBHC Usage Group

Question/Response	Proportion of Parents, N(%)				p-value
	Total N = 131	SBHC Users N = 42	SBHC Non-Users N = 26	No SBHC/DK/Missing N = 62	
How willing would you be to have a child get their HPV shot at school? <i>Very/somewhat</i>					
Middle school-aged [*] – 1 st dose	59 (45.4)	25 (59.5)	7 (26.9)	27 (43.5)	.027
Middle school-aged – 2 nd /3 rd dose	62 (48.1)	27 (65.9)	7 (26.9)	28 (45.2)	.006
High school-aged [^] – 1 st dose	77 (59.7)	33 (80.5)	14 (53.8)	30 (48.4)	.003
High school-aged – 2 nd /3 rd dose	78 (60.5)	33 (80.5)	13 (50.0)	32 (51.6)	.005
How helpful would it be for your child to get HPV shots if he/she could do it at their school? <i>Very/somewhat</i>					
	88 (68.8)	34 (85.0)	15 (57.7)	39 (62.9)	.018
How much of an advantage is each of the following to you about getting HPV shots for your child at school? <i>Very/somewhat</i>					
Reinforcement	101 (77.1)	33 (78.6)	22 (84.6)	46 (74.2)	.542
Not missing school	99 (75.6)	37 (88.1)	20 (76.9)	42 (67.7)	.047
Not needing to schedule appt.	91 (69.4)	32 (76.2)	17 (65.4)	42 (67.7)	.547
Not going to hospital-based clinic	90 (68.7)	32 (76.2)	15 (57.7)	43 (69.4)	.281
Not missing work	77 (58.8)	28 (66.7)	15 (57.7)	34 (54.8)	.472
How much of a concern is each of the following to you about getting HPV shots for your child at school? <i>Very/somewhat</i>					
Not in medical record	108 (82.4)	37 (90.2)	22 (84.6)	49 (79.0)	.301
Not knowing	104 (79.4)	32 (76.2)	18 (69.2)	54 (87.1)	.121
Side effects	92 (70.2)	22 (52.4)	19 (73.1)	51 (82.3)	.005
Not usual doctor	85 (64.9)	23 (54.8)	21 (80.8)	41 (66.1)	.081
That I wouldn't be there	82 (62.6)	22 (52.4)	18 (69.2)	42 (67.7)	.220
That it wouldn't be private	80 (61.1)	24 (57.1)	17 (65.4)	39 (62.9)	.759

* Middle school: 7th–8th grade

High school: 9th–12th grade

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