



College Students' Digital Media Preferences for future HPV Vaccine Campaigns

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Abstract

In the USA, although college-aged populations are at the greatest risk for initial infection with human papillomavirus (HPV), they are one of the age-based populations with lower HPV vaccine rates, largely due to their lack of perceived need to vaccinate against HPV. Health communication campaigns can help address this perception. This research identifies college students' preferred digital media channels for future HPV vaccine communication campaigns. We conducted qualitative small group interviews with 28 students from one large southwestern university. We used an inductive approach to hand-code interview transcripts, develop a coding structure, and analyze themes that emerged from the data. More than half of the study participants had never heard of the HPV vaccine before participating in a small group interview. When asked how they prefer to receive information about the vaccine, students more often recommended creating educational videos featuring healthcare providers and other college students and sharing them on YouTube. Some students recommended creating and posting health information memes and infographics to Instagram to disseminate the most critical information students need to make an informed decision to receive the vaccine. Given the prominent role of social media and the popularity of video-sharing and image-sharing sites, health educators and communicators should utilize these technologies to promote the HPV vaccine, a cancer prevention resource.

Keywords Human papillomavirus (HPV) · HPV vaccine · Social media · College · Immunization · Qualitative research

Introduction

In the USA, initial infection with human papillomavirus (HPV), the most common sexually transmitted infection, is more common in young adults under age 25 years old, the college-age population [1]. Infection with HPV, specifically with types 6 and 11, can cause non-cancerous genital warts. Persistent infection with cancerous HPV strains,

particularly types 16 and 18, causes most oropharyngeal, anal, cervical, vaginal, vulvar, and penile cancers [2]. The timely completion of a 9-valent HPV vaccine series (GARDASIL 9) can prevent most cases of genital warts and HPV-related cancers [3]. To prevent initial HPV infection, the Center for Disease Control and Prevention's Advisory Committee on Immunization Practices (ACIP) recommends all individuals between ages 9 and 26 years old complete the HPV vaccine series, with the number of doses differing based on age and immune functioning [4]. However, young adults, particularly those between ages 18 and 26, are less likely to be vaccinated against HPV [5]. It is critical to increasing HPV vaccination among young adults, and the vaccine is most effective before initiating sexual activity. Rates of sexual activity initiation increase with age, with approximately 63% of 18-year-old adolescents reported having had sex and 80% of their 20-year-old counterparts having initiated sexual activity [6]. Vaccinating college students could protect these young adults against future HPV infections and re-infections if previously exposed to HPV.

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Colleges serve as an ideal location to vaccinate young adults against HPV. A recent nationwide survey found that 74% of 4-year colleges provide access to the vaccine for students between ages 18 and 26 [7]. The majority of college students (95.7%) report having health insurance [8], making the HPV vaccine more financially accessible, especially since out-of-pocket costs total \$230 per dose for three doses. Past research reported college students' willingness to receive the HPV vaccine at their university health clinic, citing convenience as their main motivation from receiving the vaccine at their school [9]. Results from the Fall 2020 National College Health Assessment report, 44.6% of college men and 56.9% of college women have completed the HPV vaccine series [8].

Past research has used both the Theory of Planned Behavior (TPB) [10] and the Health Belief Model (HBM) [11] to describe influences on HPV vaccine uptake in various populations, including college students [12–17]. TPB theoretical constructs include behavior, intention, attitudes, subjective norms, and perceived behavioral control (self-efficacy to enact a behavior). According to this theory, individuals who have positive attitudes about the HPV vaccine believe other people who are important to them want them to vaccinate against this virus, and who are confident that they can get the vaccine will intend to receive the vaccine, influencing their vaccine-seeking behavior [18]. One health communication campaign which utilized social media to share HPV vaccine information increased college men's self-efficacy to obtain the vaccine [19].

HBM theoretical constructs include perceived susceptibility, perceived severity, benefits and barriers to engaging in a behavior, and cues to action to change a behavior. When applied to HPV vaccination, this theory describes that, when provided with a cue to action to vaccinate, individuals will seek the vaccine if they believe they are susceptible to acquiring HPV, that HPV infection could lead to severe health consequences, and benefits to vaccinating outweigh barriers. Past research has described college students' low perceived need for the vaccine and lack of awareness that they need the vaccine [20], barriers that health communication campaigns can help overcome.

Identifying target audiences' preferred communication channels to receive health information and messaging needs is critical for designing effective health campaigns [21]. Therefore, to create more effective HPV vaccine communication interventions for college students, it is critical to explore their preferred means of receiving health information. Additionally, it is imperative to identify the most salient information college students need to make an informed decision to receive the HPV vaccine. This study, guided by the HBM and TPB, assessed college students' informational needs and their preferred digital media strategies for future health communication campaigns.

Materials and Methods

Participant Recruitment

After receiving Institutional Review Board approval to conduct the study, we began recruiting students through the university's online platform, a site that students use to enroll in classes, access email, and view university announcements. We created an online study announcement with the following information: a short description of the study, inclusion criteria (current university students, between ages 18 and 26 years old, willing to provide informed consent), incentive information, and a REDCap (a platform used for managing surveys and databases) link for students to provide their name, gender (including gender non-conforming), and email address. After collecting students' contact information, we emailed them a Doodle Poll link to schedule dates and times for upcoming small group interviews. We selected this qualitative research methodology because it allows for focus group-style brainstorming for potentially sensitive topics [22]. Additionally, this research method allows for more scheduling flexibility as compared to larger focus groups [22]. When four students selected the same date and time, we scheduled a small group interview to take place on campus. We conducted all small group interviews from September to December 2019.

Before beginning the small group interviews, we asked students to complete a written informed consent which included permission to audio record the small group interviews and a short demographic form. Using the small group interview guide created by the study team and pilot tested with two undergraduate students, we began the discussions. Trained student researchers led the interviews. At the end of the small group discussions, we gave all participants a \$10 Amazon gift card as compensation for their time.

Instrument

Guided by the TPB and HBM, the first author created an in-depth interview guide (see Table 1 for a sample of this guide). The guide's initial questions sought participants' general HPV and HPV vaccine perspectives including their perceived susceptibility, perceived severity, barriers, and facilitators to vaccinate against HPV (HBM constructs). Additional interview guide questions assessed the TPB constructs of attitudes about the HPV vaccine, subjective norms to vaccinate, and self-efficacy to vaccinate. Last, the interview guide explored students' preferred health education preferences for future health communication campaigns (cue to action). This manuscript focuses on students' communication preferences.

Table 1 Small group interview questions

What have you heard about human papillomavirus (also called HPV)?

- What are some of the conditions that can be caused by HPV?
- How do you think this virus could affect you?

What have you heard about the HPV vaccine?

What would keep you from getting the HPV vaccine?

- If you received the vaccine, what do you believe would keep other people from getting the vaccine?

What would make you want to get the vaccine?

What information would you need to know to influence your decision to get the HPV vaccine?

Who expects you to get the vaccine?

Content of message: What is the most important information you believe people who have not gotten vaccinated against HPV need to hear?

- What should be emphasized in the message?

Format of intervention: What is the best way to deliver this information?

- What methods of digital media (including social media) would you recommend for a future health communication campaign?

Data Analysis

We sent all interview audio files (MP3s) to a professional transcription company. We checked all transcribed files against the audio recordings to ensure accuracy. To begin creating a coding guide, we read the same three small group interview transcripts and met to discuss common themes that arose from the data. Using an inductive approach, we hand-coded three interviews together, discussing the emerging themes that arose from the qualitative data [23]. We created an initial coding guide of emerging themes and definitions for each theme, useful for future interpretation of small group interview data. We took an additional three transcripts and used the coding guide to hand-code these new files separately. We met to review codes and resolved all coding discrepancies, and we split the remaining transcripts to hand-code separately. Whenever a new potential theme emerged while we were coding, we alerted the other team member via email of the new code. We entered all codes into ATLAS.ti software, a qualitative coding software that we used to organize our hand-coded materials. We later met to analyze the results, synthesize the themes and subthemes that emerged from the data, and select representative quotes that we believe best-illustrated interview findings [24]. We conducted small group interviews until we reached data saturation, when no new themes emerged from our thematic analysis [25].

Results

A total of 222 students (159 females, 59 males, and 4 gender non-conforming) demonstrated interest in participating in a small group interview. Of these students, 41 signed up to attend a small group interview, 28 of whom attended one of 11 small group discussion sessions. Small group discussions, stratified by gender identity, ranged in size from two

to four students, and, on average, they lasted 32 min (ranging from 18–65 min). We conducted three small group interviews with male students and eight with female students. Table 2 lists participant demographic information.

In terms of HPV vaccine behavior, less than half of the students reported that they had received at least one dose of the HPV vaccine. Among those vaccinated against HPV, few had received all three doses. While some students were not sure if they received the vaccine, others knew they had never been vaccinated against HPV. Of the remaining participants, many were not sure how many doses they had received.

Barriers to HPV Vaccination

When asked what stopped students from receiving the HPV vaccine, participants described both psychosocial and structural barriers. The most commonly reported psychosocial barrier to getting the HPV vaccine, shared by about half of the participants, was their lack of knowledge and awareness about the vaccine followed by their lack of perceived need for the vaccine. Students did not perceive they needed the vaccine if they were not currently sexually active, were in a monogamous relationship, if they used other forms of protection (such as condoms) against sexually transmitted infections, or if they did not believe they were susceptible to HPV infection. Other psychosocial barriers to seeking the HPV vaccine were anticipated pain of receiving the vaccine and potential side effects after receiving the vaccine. The most common structural barrier was time to go to a clinical visit to receive the vaccine.

Important Information About the HPV Vaccine

Researchers asked students to describe the most salient information they would need to make an informed decision to receive the HPV vaccine. The most commonly reported

Table 2 Participant demographics and health information

Participants (<i>N</i> =28)		
Sex	Male	8 (28.6%)
	Female	20 (71.4%)
Age	Range: 18–26 years old	
	Mean: 20.3 years old	
Race	Black/African American	2 (7.1%)
	Hispanic/Latino American	5 (17.9%)
	Native American	0
	Asian/Pacific Islander	5 (17.9%)
	White/Caucasian	12 (42.9%)
	Middle Eastern	2 (7.1%)
	More than one race	2 (7.1%)
Education	Freshman	8 (28.6%)
	Sophomore	7 (25.0%)
	Junior	9 (32.1%)
	Senior	0
	Graduate student	4 (14.3%)
Status in college	Full time	27 (96.4%)
	Part time	1 (3.6%)
Sexual orientation	Homosexual	0
	Bisexual	5 (17.9%)
	Heterosexual	21 (75.0%)
	Asexual	1 (3.6%)
	Not sure	1 (3.6%)
Marital status	Single	15 (51.7%)
	Married	1 (3.4%)
	Divorced	0
	In a relationship with 1 partner	13 (44.8%)
HPV vaccination status	Yes	11 (39.3%)
	No	12 (42.9%)
	Not sure	5 (17.9%)
Doses received	0 doses	13(44.8%)
	1 dose	2 (7.1%)
	2 doses	1 (3.6%)
	3 doses	5 (17.9%)
	Not sure	7(25%)
Sexually active	Yes	14 (50.0%)
	No	14 (50.0%)
Previous diagnosis with genital warts	Yes	1 (3.6%)
	No	27 (96.4%)
Previous diagnosis with other STI	Yes	0
	No	28 (100.0%)
Has health insurance	Yes	24 (85.7%)
	No	4 (14.3%)
How insured	No insurance	4(14.3%)
	Through parent	16 (57.1%)
	Private health insurance	3 (10.7%)
	Through the university	2 (7.1%)
	Through an HMO	1(3.6%)
	Medicaid	1 (3.6%)
	Tricare (military)	1 (3.6%)
Has a primary care provider	Yes	20 (71.4%)
	No	8 (28.6%)

types of information included the safety and effectiveness of the HPV vaccine.

I think side effects especially are something that could be – I think they may possibly be a deal breaker for some people. And I think that's definitely something that should be emphasized a lot, possibly, in this campaign. (Small Group [SG] 4, Male [M]1)

I would need to know how effective it is, how much it's been tested. Its success rate versus not being useful at all. That kind of general thing, so I could feel comfortable to know that it's actually safe to use, and it will actually benefit be. (SG5, Female [F] 3)

Students also described their need to know HPV incidence, HPV-related health outcomes, and what the HPV vaccine protects against before deciding to receive the vaccine.

Personal Digital Media

Students reported that they did not want to receive text messages about the HPV vaccine, and one student described receiving too many texts from the university.

I'm not in favor of all of the texts I get from [name of university]. (SG10, M1)

Additionally, students reported mixed preferences for receiving emails about the HPV vaccine. A few noted that they receive too many emails. Others said that this form of communication is easy to ignore and delete. However, some participants described being willing to receive emails if they reminded them to receive the additional HPV vaccine doses.

Definitely that, and then maybe email reminders. Don't forget to stop by and get your HPV vaccination. (SG9, F2)

Social Media Preferences

Students recommended various social media strategies to disseminate information about HPV and the HPV vaccine. They suggested creating videos and disseminating them on sites such as YouTube and by creating and sharing stories on Instagram. They most often recommended creating an educational video about HPV and the HPV vaccine as their preferred health education source.

I feel like a video would be the best way to present it as well. Real people, personally. (SG8, M1)

They described this form of media as more effective in helping students understand information. Additionally, they emphasized the need for the video to be short in length to help maintain viewers' attention.

I think a video is just quicker and easier, so people will absorb it, but maybe if you did an email or something just sending the video or you sent the email, and you described hey, there are shots available and all this like explain the vaccine and how to get the vaccine. (SG11, F1)

A few participants from various discussion groups recommended creating a short, informational video and posting it on YouTube as an unskippable advertisement.

It could be one of those unskippable ads on YouTube where people have will have to pay attention to the ad anyway to get to the video. It could be like five or six seconds long, but I know... There are some pretty impactful ones out there. There are some minute-long ones out there that I actually pay attention to because they actually catch my attention the first few seconds. You know those vaping ones where they say that vaping is bad? I got that information from watching those unskippable ads on YouTube, and they are pretty influential, too, as long as you can keep the attention of the people. (SG5, F2)

Another student from a different small group interview recommended having an unskippable video, one in which students had to watch before seeing the content they searched for on YouTube.

I think a video was good, but also where students can't just skip through it. I think that was one of the video features where you couldn't just skip to the end. They had to sit there and watch it. (SG9, F2)

In terms of the specific social media site to share an educational video, most students recommended YouTube. For example, one student described her rationale for why she would prefer watching an informational video on YouTube compared to Snapchat.

I would say YouTube. Whenever I see ads on Snapchat, I'm just like "Oh, ew." And then I quickly get out of there, and then I go back and I skip the ad. So, you just have to find an unskippable ad that's short. So, I recommend YouTube. (SG7, F2)

However, some students recommended disseminating short videos through other social media sites, such as posting an Instagram story.

Personally, I use Instagram the most, more than any other [social media site]. That's the only social media I use. I think probably a really effective way for me [to get health information] would be an Instagram story because it's quick, you can attach a link to it, and it can show up every day or a couple of times a week as a story. So, if I see it [an educational Ins-

tagram story], I will remember wanting to look into that [HPV vaccination]. (SG4, F4)

When we probed students about what, specifically, they would want to see in a short video, more described wanting a video of people describing their experiences getting the vaccine.

You could have before and after videos of people and their stories [getting the vaccine]. (SG1, M2)

Others described wanting a healthcare provider to speak about the vaccine.

Have a video or something that students could watch....Have a doctor or something speaking about the vaccine. (SG6, F1)

After sharing videos, participants most often recommended sharing HPV vaccine information on image-sharing sites such as Instagram. The recommended posting pictures, infographics, and health-related memes.

Have a little infographic about it, and post it on Instagram. (SG7, F3)

One student provided reasons why she preferred Instagram as well as recommendations for posting health information on this site.

I think Instagram is actually a really good idea... I'm a very visual person, so I like aesthetics and being able to see pictures. I think it would be even cooler to have, I don't know, a picture of the people who are running the account. And then an introduction to them like stating that this person is credible [a credible source of information] because of this, this, and this and include a "get to know you" type of information about that person. After we've been introduced to each of them, we get, I don't know maybe fun facts, articles like she was saying, stories. I know sometimes places like Planned Parenthood, like organizations, will have days where they're like oh, free HPV testing and things like that. That would be a really good place to include information like that. (SG4, F3)

A few students described how these images should come from university-affiliated social media pages. Having information come from university-affiliated accounts would help students trust both the source and health information posted.

I think if it were a [name of university] affiliated [social media page], it would make me think that this is for me since I am a [name of university] student. Whereas, if I just saw some random HPV vaccine information on Instagram, I'd think they are trying to push something on me, like someone's personal agenda. However, if

the information came from [name of university], I would see the information as a service. (SG4, F4)

Narrators for Health Communication Initiatives

All participants provided suggestions related to who they would prefer to see as the narrator or spokesperson for the health education program. Half wanted the narrator to be a medical professional, citing healthcare practitioners as credible sources. Students also expressed interest in hearing from other students who had previously been infected with HPV. Others noted wanting to hear from other students who had first-hand experience receiving the HPV vaccine. Some students said having a combination of information from health professionals and first-hand accounts from students would be an effective HPV vaccine promotion strategy. Several students recommended that a professor deliver the health education message, especially if the professor was an expert on the topic.

Promoting the Digital Media Health Communication Campaign

Students recommended using various university-based mediated communication when asked the best way to promote an HPV vaccine campaign or intervention. These recommendations included alerts via the university-wide phone app, sending a university-wide email with HPV vaccine health promotion materials (e.g., videos, informational sheets), and posting on university-based social media pages.

Discussion

Although more than half of the students in the small group interviews had heard about HPV and the HPV vaccine, only about a third had received the HPV vaccine. Almost half had never received the vaccine, and the rest were not sure if they previously received this vaccine. According to study participants, the main barriers to receiving the HPV vaccine were lack of awareness about the vaccine and lack of perceived need to receive it. Past research with college students identified the following HPV vaccine barriers: lack of awareness [26, 27], low perceived need to vaccinate [28], their belief that they are too old to receive the vaccine [26], fear related to vaccine safety [28, 29], and lack of social norms (or expectations) to vaccinate against HPV [28, 29]. Health communication campaigns, including those which utilize digital media for their communication channels, can address these psychosocial barriers. Kolff and colleagues apply the Social Ecological Model to describe using technology to influence vaccination. They describe using social media to influence interpersonal sharing of vaccine-related information [30].

A systematic review of the literature reported that social media are useful in increasing HPV vaccine awareness and knowledge; however, they have not successfully influenced HPV vaccine behaviors [31]. Similarly, one feasibility study delivered an HPV vaccine intervention to undergraduate students via Facebook and electronic news. The intervention increased students' knowledge about HPV and the HPV vaccine but did not impact students' vaccine uptake [32]. To our knowledge, only one intervention study has reported the role of social media in influencing vaccine uptake behavior. In this intervention, the research team recruited micro-influencers, individuals with between 5000–10,000 social media followers, to use researcher-created flu vaccine vetted facts and created vaccine-related posts, videos, or image-based messages on Facebook, Instagram, and Twitter [33]. Individuals exposed to the intervention reported increased knowledge, positive attitudes about the flu vaccine, subjective norms to vaccinate, and increased flu vaccine uptake [33]. Future research should use a similar approach of recruiting micro-influencers to increase HPV vaccine uptake and completion among college students.

Students most often recommended posting HPV vaccine information on video-sharing sites such as YouTube. Often research studies that analyze HPV vaccination videos on YouTube describe the content, sentiment (e.g., anti-vaccine, pro-vaccine, neutral), and accuracy of information of posted videos [31, 34]. Ekram and colleagues found that most pro-vaccine YouTube videos about the HPV vaccine did not include information about HPV vaccine safety and effectiveness [34], critical information that college students need to make an informed decision to vaccinate. Future health communication campaigns should include this essential information to create videos and post them on YouTube and TikTok, a video-sharing social media site gaining popularity with young adult users [35], to increase HPV vaccine intentions and behaviors. Although research participants did not discuss TikTok, healthcare professionals have used this social media platform to disseminate health information and combat misinformation (e.g., COVID-19) [36].

Additionally, these videos may want to use a narrative storytelling approach to increase video credibility and source trustworthiness [37]. Past research has described the effectiveness of narrative storytelling about HPV and the HPV vaccine on increasing viewers' perceived susceptibility to HPV and response efficacy in vaccinating [38]. Health education and medical professionals can use TikTok to disseminate short (60 s or less) informational videos, including narrative-driven information, to engage viewers while relaying essential vaccine information in easy-to-view videos [36].

Similar to past research, students also recommended using image-sharing sites such as Instagram for an HPV vaccine social marketing campaign. Recent research suggested using

Instagram and Snapchat to target behavioral change and found this more effective than targeting college students via Facebook [39]. Another research study tested different methods of posting information and pictures together for social marketing. This study recommended embedding a message in a photo and not include additional text (e.g., caption) to communicate health information to young adults [40].

It is important to note that although social media has the potential to serve as a resource for health education, it is also a source for misinformation [41]. The American Journal of Public Health worked with the National Cancer Institute to create an entire special issue dedicated to studies that demonstrated how social media is used to spread misinformation about cancer, ranging from breast cancer misinformation on Pinterest to HPV vaccine misinformation on Twitter [41]. A recent systematic review of health misinformation posted on social media sites found that “vaccines” was the topic with the most amount of false information posted on these user-generated sites [42]. Individuals exposed to vaccine information, including anti-vaccine information, are more likely to spread the negative information as opposed to information that is communicated more positively or neutrally, amplifying the vaccine misinformation [43]. In response, the US Department of Health and Human Services has created a Funding Opportunity Announcement (PAR-19-638) to call for research examining cancer communication, including misinformation, in our “new information ecosystem.”

Limitations

This small, qualitative study included 28 students out of a potential of 222 who signified interest in participating in a small group interview. Nevertheless, participants represented the diversity of this large, southwestern university. Furthermore, we reached saturation, with students recommending similar health communication strategies to promote the HPV vaccine. Additionally, we did not collect information related to when students received the HPV vaccine. Based on the age at which they were vaccinated, students' parents or caregivers may have played a more prominent role in the decision to vaccinate against HPV. However, we do not believe that this influenced college students' current knowledge of HPV and the vaccine and digital media preferences for health communication campaigns.

Conclusions

Students still lack the necessary understanding about HPV and the HPV vaccine to make an informed choice to seek this cancer prevention resource. Health communication campaigns can overcome college students' reported psychosocial

barriers to receiving the vaccine series. This study's findings can be utilized in planning health communication campaigns that may more effectively reach college students. Continued health promotion efforts are needed to increase HPV vaccination rates to 80%, thus reaching herd immunity against HPV on our college campus.

Declarations

Conflict of Interest The authors declare no competing interests.

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