Beliefs and Knowledge Related to Human Papillomavirus (HPV) Vaccine among African Americans and African Immigrants Young Adults

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Abstract

Background: Despite the disparate Human papillomavirus (HPV) infection rates among sexually active black young adults, HPV vaccine uptake remains low among this population. This study aimed to explore HPV beliefs, attitudes, and knowledge among black young adults and provide recommendations on ways to improve vaccine uptake.

Methods: We used a mixed-method, convergent design to conduct five focus groups and administered a 40-item electronic survey that was developed with Health Belief Model (HBM) constructs. We assessed HPV and vaccine knowledge, barriers, and attitudes toward vaccination. We analyzed quantitative data using descriptive statistics and bivariate methods. Focus group transcripts were analyzed using content analysis. Results were integrated to obtain a better understanding of the topic.

Results: Forty individuals participated in the study. The mean age was 22.2 ± 4.5 years and 55% identified as African immigrants. Integrated data revealed themes mapped to relevant HBM constructs. Almost one third (32.5%) of participants were unaware of their susceptibility to HPV infection and its severity. From focus group discussions, the majority (75%) believed that vaccines are beneficial. Major cues to action include promoting HPV vaccine uptake via community wide informational sessions, provider recommendation, and social and mass media campaigns.

Conclusion: Barriers to vaccine uptake, limited HPV knowledge, and lack of vaccine recommendation are important factors contributing to low vaccine uptake among black young adults. Interventions to decrease barriers to HPV vaccination, increase HPV knowledge, address misconceptions, and unfavorable beliefs are needed to promote HPV vaccine uptake.

Introduction

Human papillomavirus (HPV) infection is a critical public health matter in the United States (U.S.) and globally [1]. HPV infection is the most common sexually transmitted infection in the U.S. and affects both males and females[2]. HPV infection rates are highest among sexually active young adults and Black women under the age of 25[1, 2]. The Centers for Disease Control and Prevention (CDC) reports that about 79 million Americans are currently infected with HPV and projects that an additional 14 million will become infected annually[2]. High-risk HPV types have been etiologically linked to a number of disease conditions, including certain cancers and benign conditions, such as warts and condylomas [3]. About 26,000 new cancers are attributable to HPV yearly in the U.S; on the average, 17,000 of these new cases are in women [4]. High-risk HPV infections are implicated in almost all cases of cervical cancers, 95% anal cancers, 70% oropharyngeal cancers, 65% of vaginal cancers, 50% of vulvar cancers, and 35% of penile cancers[5]. Despite the high prevalence of HPV infection, there is a general limited public awareness which is more pronounced among the racial/ethnic minority population regarding HPV knowledge, attitudes, and beliefs [6, 7].

Fortunately, there are vaccines available to prevent HPV infection and associated diseases. In the U.S., the Advisory Committee on Immunization Practices (ACIP) recommends HPV vaccine for adolescents age 9-12 years, and catch-up HPV vaccine for all persons through age 26 years who had not been previously vaccinated. For adults aged 27-45 years, shared clinical decision-making for HPV vaccination is recommended [8]. After fall 2016, two doses of the HPV vaccine are recommended for adolescents who initiate the vaccine series between the ages of 9 and 14 and three doses of the vaccine for individuals who initiate between ages 15 and 26 [9]. In countries that have introduced the vaccine, increased vaccination has resulted in major decreases in HPV infection rates as well as associated disease incidence [10].

HPV vaccination is an effective cancer prevention strategy; moreover substantial research supports the vaccine's safety and its low side effect [11, 12]. Additional benefits of the vaccine is that it helped to increase the awareness of HPV infection among adolescents [6]. However, despite the HPV vaccine efficacy and other benefits, vaccine uptake remains low with 49% up to date among young adolescents (13-17 years) [4, 13]. Black race is one of the factors associated with a lower likelihood of vaccine uptake; the vaccination rate uptake among black adults (18-26 years) is 36.7% compared to 42.1% for white young adults [14, 15]. Moreover, given the dearth of research regarding HPV vaccine uptake among black population subgroups, particularly African immigrants, it is difficult to estimate uptake. However, extant literature suggests that black U.S. subgroups are likely at risk for low HPV vaccination uptake [16-18].

Studies have demonstrated that knowledge and awareness of HPV promotes vaccine uptake [19, 20]. Chido-Amajuoyi and colleagues asserted that programs directed towards fostering HPV awareness are one of the most effective strategies for increasing vaccine uptake [21]. Therefore, the aim of this study was to explore HPV beliefs, attitudes, and knowledge among black young adults with a view of providing recommendations on strategies to improve HPV vaccine uptake among black young adults.

Theoretical framework

We used the constructs of the well validated Health Belief Model (HBM) [22] to guide the data collection for the qualitative phases of this study. The HBM has the following constructs: perceived susceptibility, severity, benefits and barriers, self-efficacy, and cues to action. The model posits that individuals are likely to take action to reduce risk if they believe: (1) the action will reduce their risks, (2) that the condition would have potentially serious consequences, (3) that a course of action available to them would be beneficial in reducing either their susceptibility to or severity of the condition, (4) the anticipated benefits of taking action outweigh the barriers to or costs of action or (5) regard themselves as susceptible to a condition [22]. Furthermore, knowledge, attitudes, and beliefs related to a condition are believed to have indirect effects on behavior by influencing the HBM constructs [23].

Methods

Study design

To provide a more complete description of the phenomenon affecting HPV vaccine uptake, we used a mixed-method, convergent design [24].

Sample, recruitment, and setting

Between October 2020 and April 2021, research personnel identified black young adults from Central Kentucky for study participation via purposive and snowball sampling using flyers and word of mouth. Eligibility criteria included the following: (a) self-identified Black (b) 18-45 years of age; (c) able to speak and understand English; (d) Sub-Saharan African-born or U.S born-Black; and (e) ability to provide informed consent. We sought to recruit participants from diverse places of birth (U.S. born and Sub-Saharan African-born Black adults). Interested eligible participants were consented and scheduled to participate in one of five online focus groups and to complete an online survey which was completed after the focus group. The University Office of Research Integrity approved all research procedures.

Data Collection

Qualitative phase

We conducted five focus groups over Zoom video conferencing. Each group included 5-8 participants and lasted 60 to 80 minutes. Focus groups were facilitated by the first author (AA) and were guided with a semi-structured interview guide. Appropriate probes were developed based on the aims of the study and previous literature. The interview guide included topics on HPV vaccine beliefs, barriers, facilitators, and attitudes to vaccination. All sessions were audio recorded. Interviews were conducted until saturation was reached [25], which occurred after 38 interviews. All participants were offered a \$20 incentive for their participation.

Quantitative phase

A 40-item electronic survey that required approximately 12 minutes to complete was used to collect HPV and HPV vaccine knowledge, barriers to HPV vaccination checklist, and sociodemographic characteristics and was administered online via Research Electronic Data Capture (REDCap).

Measures

Participants completed sociodemographic, HPV vaccination history, and a 8-item checklist that assessed barriers to HPV vaccination.

HPV and HPV test knowledge items- HPV knowledge items included 15-items assessing knowledge of HPV (including transmission, consequences, risk factors). Response options were true/false/don't know, with 'don't know' scored as incorrect [26, 27]. HPV vaccine knowledge [26] was assessed with 7 items regarding the protection offered by HPV vaccines.

Data Analysis

Qualitative data analysis

The tape-recorded sessions were transcribed using a transcription software and reviewed for accuracy by a research staff. Another author (OO) began the line-by-line coding of the transcripts, affixing codes to each text segment. The first author (AA) then worked with (OO) to refine and define the codes, eventually developing a preliminary codebook, which allowed standardization of the content analysis. The codebook underwent an iterative procedure to refine the codes and identify emergent themes. In addition to the standardization of the codebook, independent transcript coding by two researchers enhanced verification of themes and an audit trail ensured reproducibility of the findings [28]. After iterative readings of the qualitative data, all authors discussed the relationships between the themes and how they informed the quantitative results and determined how to best integrate, and report results for enhanced understanding.

Quantitative data analysis and data integration

Basic descriptive statistics were reported using frequency distributions, means and standard deviations or medians and interquartile ranges to describe participant sociodemographic characteristics, HPV and HPV vaccination knowledge, and barriers to HPV vaccination uptake. The two-sample t-test, Chi-square test of association or Mann-Whitney U test examined unadjusted associations between sociodemographic characteristics and HPV vaccination status. All data analysis was conducted using SAS, version 9.4 with an alpha of .05.

Results

Forty individuals participated in the study; 38 participated in the focus group sessions. The mean age was 22.2 4.5 years and 55% identified as African immigrants (see Table 1). Fifteen were vaccinated (37.5%) and 80% had heard of HPV and the HPV vaccine. In the bivariate analysis, age, race/ethnicity, length of stay in the U.S. (among immigrant participants), and HPV vaccine knowledge were significantly associated with vaccination status. Those vaccinated were significantly younger ($M = 20.3$, $SD = 2.5$), than those who were not ($M = 23.3$, $SD = 5.0$, $p = .015$; see Table 1). Those who identified as African American had higher vaccination history, compared to African/African immigrant participants (66.7% vs. 33.3%, respectively, $p=.033$), and African immigrants who had a longer length of stay in the U.S, were more likely to be vaccinated (median = 6 years, $IQR = 6-10$), than those who had not (median = 3 years, $IQR = 2-5$, $p=.029$).

Table 2 describe the participants' responses to HPV knowledge and HPV vaccine knowledge scales. Out of 15 knowledge questions regarding HPV, participants were correct on an average of 10 items ($M = 10.1$, $SD = 4.5$) and for HPV vaccination, knowledge was low; participants answered an average of three out of seven items correctly ($M = 3.3$, $SD = 2.0$). While 80% of the participants had heard of HPV, over 70 % of them were unaware that most sexually active people will get HPV at some point in their lives, and 90% were ignorant of the fact that HPV infection usually does not require treatment. Almost one third (32.5%) of participants thought that HPV is rare and were unaware of their susceptibility to HPV infection and its severity (Table 2). Furthermore, 75 % of the participants provided an incorrect response on the item HPV

vaccines are most effective when administered prior to the first sexual encounter, moreover, 60% responded incorrectly to the item that assessed HPV vaccines protection against cervical cancers. Lastly, only 37.5% of the participants had received the HPV vaccine (Table 1). Table 3 shows the emergent themes mapped to the HBM constructs and Table 4 shows focus groups exemplary quotes.

Discussion

Our study revealed low vaccine knowledge and uptake among young black adults. We found that HPV vaccine knowledge was significantly associated with vaccination status. Participants provided important strategies to improve vaccination uptake among this group. These findings are consistent with U.S. data regarding the underutilization of the HPV vaccine and the associated disparities of HPV-related diseases among black Americans [29]. Transition to young adulthood has been identified as a time of changes in lifestyle behaviors that may exacerbate cancer risk and a critical period to institute health-promoting behaviors [30] such as HPV vaccination for unvaccinated young adults. Catch-up HPV vaccination is recommended for all persons through age 26 years who did not start or complete routine vaccination [31]. Additionally, shared clinical decision-making regarding HPV vaccination is recommended for adults aged 27- 45 years who have not started or completed the vaccine series [31].

One of our major findings was that Black young adults had low knowledge of HPV and low HPV vaccination completion. Even though, 80% of participants reported awareness of HPV, the knowledge scores indicated significant gaps in their knowledge about HPV. The majority of the participants admitted having limited evidence-based knowledge regarding HPV and its consequences. This is in accord with findings from college age adults that reported significant knowledge gaps regarding prevention, symptoms, and consequences of HPV infection [32]. HPV vaccine knowledge was significantly associated with being vaccinated. Limited knowledge is a major barrier to vaccination uptake among participants in this study. This finding is consistent with reports from national data that have shown lower HPV awareness and knowledge among Black Americans [6, 7], and is worrisome as knowledge of HPV is necessary for making informed decisions about safe sexual behaviors and HPV risk reduction. According to Cooper and colleagues, high-risk sexual behaviors, such as short-term partnerships, casual, and multiple sex partners are suggestive of a lack of awareness of susceptibility to HPV and a general lack of HPV education [33]. Increasing knowledge of HPV is a critical step in reducing both HPV infection and HPV-related diseases among Black young adults. In addition, this finding highlights the need to increase vaccine promotion efforts, with the hope of reaching the *Healthy People* 2030 goal of 80% HPV vaccination completion rate among adolescents age 13-15 years old [7, 34].

We found that U.S. born participants had higher vaccination rates (66.6%) compared to African born (33.3%, $p = .033$) participants. This is in accord with literature that suggest immigrants lag behind in preventive behaviors uptake. Ashing and colleagues[16] reported that immigrants were less informed regarding vaccine availability and accessibility. These disparities highlight the need for community-based interventions targeting immigrants and other minority groups to promote HPV vaccine. Research shows that using community channels and engaging community health workers in health promotion can lead to

behavior adoption [35]. In addition, efforts should be focused on addressing barriers specific to subgroups of Black populations in the U.S. to achieve high penetrance of HPV vaccination [36]. Future research should examine potential cultural differences (e.g., religious/spiritual beliefs, stigma) to develop tailored interventions for the different sub-groups [16].

Other barriers identified from this study included lack of trust, high cost, and concerns regarding the safety of the HPV vaccine. These barriers are similar to those among minority youths [17]. According to the HBM, barriers may act as impediments to undertaking health behaviors, a kind of cost-benefit analysis occurs, individuals weigh expected benefits with perceived barriers [22]. Our findings that some participants acknowledged the benefits of HPV vaccination was encouraging; however, it was disappointing that 56% of the unvaccinated participants were either neutral or unwilling to be vaccinated. Additionally, some participants discussed a sense of lack of susceptibility to HPV infection. Interventions tailored to specifically address these barriers, heighten susceptibility, and elucidate benefits from vaccination may help alleviate the challenges to HPV vaccine uptake. Moreover, the implementation of programs that incorporate the cues to action identified by participants, such as inclusion in school curriculum, community wide informational sessions, social and mass media campaigns, promotion efforts integrated with other sexually transmitted infection (e.g., HIV) prevention programs, incorporating HPV vaccine as part of college or job entry may also increase vaccine uptake among this population. Based on our findings, and those of others [6, 7, 32], interventionists should prioritize black young adults for programs to promote HPV vaccination and decrease the HPV related burden. HPV prevention programs should include strategies to: 1) provide accurate and credible information on HPV modes of transmission, risk factors, and prevention and HPV-related cancers; 2) provide access to free or reduced-cost HPV vaccinations and financial assistance programs for uninsured and underinsured; 3) leverage community-based interventions and social media platforms for HPV vaccination promotion; and 4) counsel and educate health care providers on how to normalize discussion around sexual health and recommendation for HPV vaccine.

Our findings that more than one third (37.5%) of the participants had not received a healthcare providers' recommendation for HPV vaccination is worrisome. Health care provider recommendation is a strong predictor of vaccination for a wide range of vaccines in young adults [37, 38]. Primary prevention of cancer requires that behaviors contributing to the initiation or progression of tumors be precluded, postponed, or minimized, and behaviors protecting against cancer development be initiated as early as possible and maintained throughout life [30]. Promoting vaccination among young adults is a way to initiate primary prevention. However, individuals who do not receive a vaccine recommendation from a health care provider are significantly less likely to obtain an HPV vaccine. Almost half (47.5%), started that they didn't realize that it was important to get vaccinated. From the participants' discussions, it showed that healthcare providers were not providing recommendations and not doing a thorough job in providing detailed information about HPV and its consequences to their patients. To increase catch-up HPV vaccination among young adults and reduce vaccine disparities an effective intervention may be to target health care providers to increase recommendations and risk reduction counseling for Black adults.

In addition, it is critical that providers cultivate cultural humility to build honest and trustworthy relationships [39]. Harrington and colleagues, 2021, found that the decision to get HPV vaccine is dependent on the reliability and accuracy of information about the vaccine, including the source of the information. A trusted source of information would lead to a positive attitude towards the vaccine [40]. This observation is consistent with our findings from the focus groups about the preferred medium of dissemination of information about HPV. Mistrust of pharmaceutical companies, the government or even healthcare providers was consistently associated with lower HPV vaccine uptake and negative attitudes towards the vaccine among racial and ethnic minorities [40]. Healthcare providers must identify opportunities to take meaningful steps to create a private and conducive environment to encourage discussion and build participant's self-efficacy.

Our study fills an important literature gap regarding the barriers to HPV vaccine uptake among two subgroups of Black (African American and African immigrants). The mixed methods approach provided an in-depth understanding of HPV beliefs, attitudes, and knowledge among Black young adults. However, it is not without limitations. First, the small sample size of the survey and the cross-sectional data limits generalizability. Second, given that we explored a sensitive topic of HPV and sexual health, the participants may have withheld their experiences due to concerns about social desirability. Study strengths include inclusion of two subgroups of Black (African American and African immigrants) and using a mixed method approach provided an in-depth understanding of HPV beliefs, attitudes, and knowledge among Black young adults.

In conclusion, a strong body of research supports the effectiveness, safety and tolerability of the HPV vaccine [11, 12]. While the ideal time for HPV vaccination is during adolescence, given their increased risk of HPV transmission and low vaccine uptake the young adult period is a great opportunity for targeted HPV catch-up vaccination. Our findings underscore the need to prioritize Black young adults for HPV vaccine recommendation and detailed HPV vaccination program to increase HPV knowledge, decrease barriers to vaccination, and promote vaccination among this group of young adults.

Declarations

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Conflicts of interest/Competing interests - The authors have no relevant financial or non-financial interests to disclose.

Authors' contributions - All authors contributed to the study conception and design. Adebola Adegboyega performed data collection. Obielodan Omoadoni, Amanda Wiggins, and Adebola Adegboyega performed data analysis. Adebola Adegboyega and Obielodan Omoadoni wrote the first draft of the manuscript and all authors reviewed versions of the manuscript. All authors read and approved the final manuscript.

Data availability - Due to privacy or ethical restrictions, the data that support the findings of this analysis are not publicly available; however, they are available upon request from the corresponding author.

Ethics approval - This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of University of Kentucky.

Consent to participate - Informed consent was obtained from all individual participants included in the study.

Consent for publication - The authors affirm that human research participants provided informed consent for publication

Code availability - Not applicable

References

1. Bynum, S. A., Brandt, H. M., Friedman, D. B., Annang, L., & Tanner, A. (2011). Knowledge, beliefs, and behaviors: Examining human papillomavirus–related gender differences among African American college students. *Journal of American College Health*, 59(4), 296-302.
2. Centers for Disease Control and Prevention. HPV fact sheet. 2017. Available from: <https://www.cdc.gov/std/hpv/stdfact-hpv.htm>. Accessed September 10, 2021
3. Ragin, C. C., Edwards, R. P., Jones, J., Thurman, N. E., Hagan, K. L., Jones, E. A., ... & Taioli, E. (2009). Knowledge about human papillomavirus and the HPV vaccine—a survey of the general population. In *Infectious agents and cancer*. 4 (1), 1-9). BioMed Central.
4. Dunne, E. F., Markowitz, L. E., Saraiya, M., Stokley, S., Middleman, A., Unger, E. R., ... & Iskander, J. (2014). CDC grand rounds: reducing the burden of HPV-associated cancer and disease. *MMWR. Morbidity and mortality weekly report*, 63(4), 69.
5. National Cancer Institute. HPV and cancer. 2018; Available from: <https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-fact-sheet>. Accessed September 1, 2021.
6. Gerend, M.A. and Z.F. Magloire (2008), Awareness, knowledge, and beliefs about human papillomavirus in a racially diverse sample of young adults. *Journal of Adolescent Health*, 42(3): 237-242.
7. Ojeaga, A., Alema-Mensah, E., Rivers, D., Azonobi, I., & Rivers, B. (2019). Racial disparities in HPV-related knowledge, attitudes, and beliefs among African American and white women in the USA. *Journal of Cancer Education*, 34(1), 66-72.
8. Meites, E., Human papillomavirus vaccination for adults: updated recommendations of the Advisory Committee on Immunization Practices. *MMWR. Morbidity and mortality weekly report*, 2019. 68.
9. Meites, E., A. Kempe, and L.E. Markowitz, Use of a 2-dose schedule for human papillomavirus vaccination—updated recommendations of the Advisory Committee on Immunization Practices. *Morbidity and Mortality Weekly Report*, 2016. 65(49): 1405-1408.

10. Lee, L.-y. and S.M. Garland, Human papillomavirus vaccination: the population impact. *F1000Research*, 2017. 6. 866
11. Quadrivalent vaccine against human papillomavirus to prevent high-grade cervical lesions. *New England Journal of Medicine*, 2007. 356(19): 1915-1927.
12. Villa LL, Costa RL, Petta CA, Andrade RP, Ault KA, Giuliano AR,, Barr E. Prophylactic quadrivalent human papillomavirus (types 6, 11, 16, and 18) L1 virus-like particle vaccine in young women: a randomised double-blind placebo-controlled multicentre phase II efficacy trial. *Lancet Oncol*. 2005. 6(5): 271-278.
13. Centers for Disease control and Prevention. Understanding HPV coverage. 2018. Available from <https://www.cdc.gov/hpv/partners/outreach-hcp/hpv-coverage.html>. Accessed August 10, 2021.
14. Boersma, P. and L.I. Black, Human papillomavirus vaccination among adults aged 18– 26, 2013– 2018. 2020.
15. Chun Chao, Christine Velicer, Jeff M. Slezak, Steven J. Jacobsen (2010), Correlates for Human Papillomavirus Vaccination of Adolescent Girls and Young Women in a Managed Care Organization, *American Journal of Epidemiology*, 171 (3), 357–367,
16. Ashing, K. T., Carrington, A., Ragin, C., & Roach, V. (2017). Examining HPV-and HPV vaccine-related cognitions and acceptability among US-born and immigrant hispanics and US-born and immigrant non-Hispanic Blacks: a preliminary catchment area study. *Cancer Causes & Control*, 28(11), 1341-1347.
17. Amboree, T.L. and C. Darkoh, Barriers to Human Papillomavirus Vaccine Uptake Among Racial/Ethnic Minorities: a Systematic Review. *Journal of Racial and Ethnic Health Disparities*, 2020: p. 1-16.
18. Maness, S. B., Reitzel, L. R., Watkins, K. L., & McNeill, L. H. (2016). HPV awareness, knowledge and vaccination attitudes among church-going African-American women. *American journal of health behavior*, 40(6), 771-778.
19. Nickel, B., Dodd, R. H., Turner, R. M., Waller, J., Marlow, L., Zimet, G., ... & McCaffery, K. (2017). Factors associated with the human papillomavirus (HPV) vaccination across three countries following vaccination introduction. *Preventive medicine reports*, 8, 169-176.
20. Mansfield, L. N., Onsomu, E. O., Merwin, E., Hall, N. M., & Harper-Harrison, A. (2018). Association between parental HPV knowledge and intentions to have their daughters vaccinated. *Western journal of nursing research*, 40(4), 481-501.
21. Chido-Amajuoyi, O. G., Jackson, I., Yu, R., & Shete, S. (2021). Declining awareness of HPV and HPV vaccine within the general US population. *Human vaccines & immunotherapeutics*, 17(2), 420-427.
22. Champion, V.L. and C.S. Skinner, The health belief model. *Health behavior and health education: Theory, research, and practice*, 2008. 4: 45-65.
23. Tarkang, E.E. and F.B. Zotor, Application of the Health Belief Model (HBM) in HIV prevention: a literature review. *Central Afr J Public Health*, 2015: 1-8.

24. Creswell, J.W. and V.L.P. Clark, Designing and conducting mixed methods research. 2017: Sage publications. Los Angeles
25. Creswell, J.W. and C.N. Poth. Qualitative inquiry and research design: Choosing among five approaches. 2012: Sage publications Los Angeles.
26. Marlow, L. A., Zimet, G. D., McCaffery, K. J., Ostini, R., & Waller, J. (2013). Knowledge of human papillomavirus (HPV) and HPV vaccination: an international comparison. *Vaccine*, 31(5), 763-769.
27. Waller, J. O., Ostini, R., Marlow, L. A., McCaffery, K., & Zimet, G. (2013). Validation of a measure of knowledge about human papillomavirus (HPV) using item response theory and classical test theory. *Preventive medicine*, 56(1), 35-40.
28. Speziale, H.S., H.J. Streubert, and D.R. Carpenter, Qualitative research in nursing: Advancing the humanistic imperative. 2011: Lippincott Williams & Wilkins, Philadelphia.
29. Reno, J.E. and A.F. Dempsey, Testing Messages on Facebook to Promote Use of an HPV Educational Web-Intervention. *Frontiers in Digital Health*, 2021. 3: 22.
30. Baranowski, T., Cullen, K. W., Basen-Engquist, K., Wetter, D. W., Cummings, S., Martineau, D. S., ... & Hergenroeder, A. C. (1997). Transitions out of high school: time of increased cancer risk?. *Preventive medicine*, 26(5), 694-703.
31. Oshman, L.D. and A.M. Davis, Human papillomavirus vaccination for adults: updated recommendations of the Advisory Committee on Immunization Practices (ACIP). *jama*, 2020. 323(5): p. 468-469.
32. Kasymova, S., S.E. Harrison, and C. Pascal, Knowledge and awareness of human papillomavirus among college students in South Carolina. *Infectious Diseases: Research and Treatment*, 2019. 12: p. 1178633718825077.
33. Cooper, D. L., Zellner-Lawrence, T., Mubasher, M., Banerjee, A., & Hernandez, N. D. (2018). Examining HPV awareness, sexual behavior, and intent to receive the HPV vaccine among racial/ethnic male college students 18–27 years. *American journal of men's health*, 12(6), 1966-1975.
34. Healthy People.gov. Office of Disease Prevention and Health Promotion. Immunization and Infectious Diseases. Available from, <https://www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases>. Accessed September 15, 2021.
35. Shelton, R. C., Charles, T. A., Dunston, S. K., Jandorf, L., & Erwin, D. O. (2017). Advancing understanding of the sustainability of lay health advisor (LHA) programs for African-American women in community settings. *Translational behavioral medicine*, 7(3), 415-426.
36. Kobetz, E., Mendoza, A. D., Menard, J., Rutten, L. F., Diem, J., Barton, B., ... & McKenzie, N. (2010). One size does not fit all: Differences in HPV knowledge between Haitian and African American women. *Cancer Epidemiology and Prevention Biomarkers*, 19(2), 366-370.
37. Bednarczyk, R. A., Birkhead, G. S., Morse, D. L., Doleys, H., & McNutt, L. A. (2011). Human papillomavirus vaccine uptake and barriers: association with perceived risk, actual risk and race/ethnicity among female students at a New York State university, 2010. *Vaccine*, 29(17), 3138-3143.

38. Ylitalo, K. R., Lee, H., & Mehta, N. K. (2013). Health care provider recommendation, human papillomavirus vaccination, and race/ethnicity in the US National Immunization Survey. *American journal of public health*, 103(1), 164-169.

39. Yeager, K.A. and S. Bauer-Wu, Cultural humility: essential foundation for clinical researchers. *Appl Nurs Res*, 2013. 26(4): 251-256.

40. Harrington, N., Chen, Y., O'Reilly, A. M., & Fang, C. Y. (2021). The role of trust in HPV vaccine uptake among racial and ethnic minorities in the United States: a narrative review. *AIMS Public Health*, 8(2), 352.

Tables

Table 1: Sample characteristics and comparison by vaccination status.

Characteristic	Total sample (<i>N</i> = 40)	HPV vaccination		p
		Yes (<i>n</i> = 15)	No (<i>n</i> = 25)	
	Mean (SD), median (IQR) or n%	Mean (SD), median (IQR) or n (%)	Mean (SD), median (IQR) or n (%)	
Age (years)	22.2 (4.5)	20.3 (2.5)	23.3 (5.0)	.015
Gender				
Male	20 (50.0%)	5 (33.3%)	15 (60.0%)	.10
Female	20 (50.0%)	10 (66.7%)	10 (40.0%)	
Race/ethnicity				.033
African American	18 (45.0%)	10 (66.7%)	8 (32.0%)	
African/African immigrant	22 (55.0%)	5 (33.3%)	17(68.0%)	
Length of time in US ^a (years)	3.5 (2 - 6)	(n=5); 6 (6 - 10)	(n=17);3 (2 - 5)	.029
Education				
High school	9 (22.5%)	3 (20.0%)	6 (24.0%)	.37
Some college	16 (40.0%)	8 (53.3%)	8 (32.0%)	
College graduate	10 (25.0%)	4 (26.7%)	6 (24.0%)	
Graduate school	5 (12.5%)	0 (0.0%)	5 (20.0%)	
Enough income				
Yes	28 (70.0%)	9 (60.0%)	19 (76.0%)	.29
No	12 (30.0%)	6 (40.0%)	6 (24.0%)	
Insurance status				.38
Insured	39 (97.5%)	14 (93.3%)	25 (100.0%)	
Uninsured	1 (2.5%)	1 (6.7%)	0 (0.0%)	
HPV knowledge scale (potential range 0-18)	10.1 (4.5)	11.5 (2.7)	9.2 (5.1)	.074
HPV vaccination	3.3 (2.0)	4.3 (2.0)	2.7 (1.9)	.018

knowledge scale

(potential range 0-7)

Length of time in US^a – Only African immigrants included in this group.

Table 2. Participants responses to HPV and HPV vaccine knowledge items (n=40)			
Variables	Correct n (%)	Incorrect n (%)	Don't know n (%)
HPV can cause cervical cancer (T)	34 (85)	0(0)	6(15)
A person could have HPV for many years without knowing it (T)	22 (55)	3(7.5)	15(37.5)
Having many sexual partners increases the risk of getting HPV (T)	34(85)	0(0)	6(15)
HPV is very rare (F)	27(67.5)	3(7.5)	10(25)
HPV can be passed on during sexual intercourse (T)	37(92.5)	0(0)	3(7.5)
HPV always has visible signs or symptoms (F)	17(42.5)	8(20)	15(37.5)
Using condoms reduces the risk of getting HPV(T)	29(72.5)	3(7.5)	8(20)
HPV can cause HIV/AIDS (F)	17(42.5)	7(17.5)	16(40)
HPV can be passed on by genital skin-to-skin contact (T)	21(52.5)	6(15)	13(32.5)
Men cannot get HPV (F)	31(77.5)	7(17.5)	2(5)
Having sex at an early age increases the risk of getting HPV(T)	20(50)	5(12.5)	15(37.5)
There are many types of HPV (T)	17(42.5)	4(10)	19(47.5)
HPV can cause genital warts (T)	31(77.5)	0(0)	9(22.5)
HPV can be cured with antibiotics (F)	17(42.5)	6(15)	17(42.5)
Most sexually active people will get HPV at some point in their lives (T)	9(22.5)	17(42.5)	14(35)
HPV usually doesn't need any treatment(T)	4(10)	24(60)	12(30)
HPV can cause oral cancer (T)	18(45)	4(10)	18(45)
HPV is a bacterial infection (F)	16(40)	8(20)	16(40)
You can cure HPV by getting the HPV vaccine (F)	22 (55)	3 (7.5)	15 (37.5)
One of the HPV vaccines offers protection against genital warts (T)	16 (40)	2 (5)	22 (55)
HPV vaccines offer protection against all sexually transmitted infections (F)	32 (80)	1 (2.5)	7 (17.5)
Someone who has an HPV vaccine cannot develop cervical cancer (F)	21 (52.5)	2 (5)	17 (42.5)

HPV vaccines offer protection against most cervical cancers (T)	16 (40)	9 (22.5)	15 (37.5)
The HPV vaccine requires at least two doses (T)	15 (37.5)	2 (5)	23 (57.5)
HPV vaccines are most effective if given to people who have never had sex (T)	10 (25)	12 (30)	18 (45)

Table 3. Emergent themes from focus group discussions (n=38).

HBM Constructs	Emergent Themes	Findings
Perceived benefits	Attitudes and beliefs related to HPV vaccine	<ul style="list-style-type: none"> • Belief that vaccines are safe and effective
Perceived barriers	Barriers to HPV vaccination	<ul style="list-style-type: none"> • Lack of trust in the medical community in general and the historical racial discrimination • Cost • Lack of knowledge and awareness • Fear of potential side effects • Lack of health care recommendation
Perceived susceptibility and severity	Misconceptions about risks	<ul style="list-style-type: none"> • Belief not susceptible due to lack of family history of cancer • Not involved in any risky behavior
Self-efficacy	Willing to discuss and learn more about HPV	<ul style="list-style-type: none"> • Pain from HPV vaccine is short-lived and will not stop vaccination • Open and willing to discuss sexual health with health care providers
Cues to action	Platform for providing information about HPV	<ul style="list-style-type: none"> • Inclusion in school curriculum • Community wide informational sessions and health fairs • School organizations and orientation programs, campus campaigns • Social & mass media (Instagram, twitter, YouTube, Tik-tok, websites, video advertisement on HPV) • Healthcare centers and Planned Parenthood Services • Integration into other sexually transmitted infection prevention programs/activities • Incorporation of HPV vaccine as part of college or job entry
	Medium of dissemination of HPV information	<ul style="list-style-type: none"> • Healthcare professionals • Trusted and famous celebrity/influencers from Black community • HPV related-cancer survivor and individuals with a history of HPV disease • Peers who are knowledgeable about HPV
	Information needed to promote HPV vaccination	<ul style="list-style-type: none"> • HPV infection prevention and treatment, risk factors, symptoms and consequences of HPV infection

- Explain the science behind HPV vaccine, benefits of HPV vaccination & side effects
 - Evidence of success rate and effectiveness of HPV vaccine
 - Community HPV vaccine sites and other available resources on HPV
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Table 4: Summary of focus groups exemplary quotes (n=38)

Perceived benefits	<p><i>"I believe they are fine. They are good for the general public." (Male AA)</i></p> <p><i>"I think vaccines are amazing. I mean, we've been able to mitigate so many diseases just by having them available." (Male, SAI)</i></p>
Perceived barriers	<p><i>"I say it's something I've been hearing a lot, but I've never really took time to, like really understand what it is." (Male, SAI)</i></p> <p><i>"I don't know a lot about HPV either not enough to, you know, explain it to somebody". (female, AA) ".....distrust of like, the medical community, in general, may prevent people from wanting to get vaccinated." (Male, AA)</i></p> <p><i>".....and it goes like between not knowing what's in there, and then the history of Black Americans and physicians, how surgeries were done on slaves." (Female, AA)</i></p> <p><i>"the only thing that I could think about would be the cost depending on how much it will cost." (Female, SAI)</i></p> <p><i>"...side effects may prevent people from wanting to get vaccinated just because there's fear that there's potential side effects that come along with that." (Male, AA)</i></p>
Perceived susceptibility and severity	<p><i>"... (most young) they feel that just vaccines in general are unnecessary, because it's not likely that they'll get sick." . (Female, AA)</i></p> <p><i>"I feel like it's more of like female things, like females get infected by more than like, guys". (Male AA)</i></p>
Self-efficacy	<p><i>"I mean, it's just a shot. It's might cause some pain, but I don't think that would have the long-lasting effects, just to discourage people". (Female, SAI)</i></p> <p><i>"I feel like I'm pretty comfortable with discussing with my health provider because I can trust them enough to actually be able to help me if an issue does occur". (Female AA)</i></p>
Cues to action	<p><i>"Social media and mass media would greatly increase knowledge and interest in HPV". (Female AA)</i></p> <p><i>"I think sex education should be more broadly taught in both school curriculum and the community." . (Male AA)</i></p>

"I feel like our younger generation really likes information that's kind of compact, like so just infographics and statistics." (Female SAI)

"since you've had this HIV campaign, that is really out there now, if they can find a way to tie it okay, so I will say for the younger people if, for me, when I'm in church, I don't pay attention." (Female SAI)

"I agree that church might not be the ideal place to talk about something like that. But I feel like if it was, we would have to be separated, like adults separated from like, the young adults, because like she said, we don't want the parents thinking that their kids are like, involved with sex and stuff like that, like privacy reasons." (Male SAI)

"..anything going on in the social media world, if it's not through influencers, it doesn't reach as many people as possible. "I think radio is also a good method because like people listen to the radio while driving back home from work or to work." (Female AA)