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HPV vaccine acceptance among African-American mothers and their daughters: An inquiry grounded in culture

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Abstract

Background: Much of the research on African-Americans' HPV vaccine acceptance has largely focused on racial/ethnic differences related to cognitive, socio-economical, and structural factors that contribute to differences in HPV vaccine acceptance and completion. A growing body of literature suggest that cultural factors, such as mistrust of healthcare providers (HCPs) and the healthcare system, religion, and social norms related to appropriate sexual behaviors, also plays a prominent role in their HPV vaccine acceptance. However, these studies were limited in their use of theoretical approaches necessary to conceptualize and operationalize culture.

Objective: To explore the influence of culture on African-American mothers' and daughters' HPV vaccine acceptance using the PEN-3, a culturally-centered conceptual framework.

Methods: Grounded theory techniques were used to explore cultural factors that influenced the acceptance of the HPV vaccine among African-American mothers ($n=28$) and their daughters ($n=34$).

Results: Positive attitudes towards vaccination stemmed from beliefs that the HPV vaccine has cancer prevention benefits and that vaccinations in general protected against infectious diseases. Negative attitudes stemmed from beliefs that the HPV vaccine was too new, not effective, daughters were too young, and that vaccines were not a one-size-fits-all intervention. Majority of

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mothers and daughters indicated that their religious doctrine did not impede their HPV vaccination decisions. For a few mothers, religious beliefs could not be separated from their HPV vaccination decisions and ultimately deterred HPV vaccine acceptance. HCP recommendations were valued however mothers were often dissatisfied with the detail of information communicated. Support networks provided both positive and negative types of social support to mothers and daughters. The media highlighted the cancer prevention benefits of the HPV vaccine and unintentionally communicated negative information of the HPV vaccine, which deterred HPV vaccine acceptance.

Conclusion: Study findings can inform the development of culturally appropriate interventions that advances the evidence on cervical cancer prevention.

Keywords

culture; human papillomavirus; HPV vaccine acceptance; African American; females

In the United States (US), African-American women have the highest cervical cancer mortality rate compared to Hispanic and non-Hispanic white women, and the second highest cervical cancer incidence rate, following that of Hispanic women (National Cancer Institute 2015). Cervical cancer is caused by persistent infection with high-risk strains of the human papillomavirus (HPV), which is the most common sexually transmitted infection (STI) among females and males worldwide and is associated with vaginal, vulvar, anal, penile, and oro-pharyngeal cancers (World Health Organization (WHO) 2016). A safe and effective preventive alternative against HPV-associated cancers are the HPV vaccines, which are recommended for routine administration for females and males aged 11 to 12 years old by the US Advisory Committee on Immunization Practices (ACIP) (Garland et al. 2015, Markowitz et al. 2013). Catch-up vaccination is recommended for females aged 13 to 26, males aged 13 to 21, and up to age 26 for men who have sex with men. For adolescents younger than 15-years-old, a two-dose vaccination series is recommended at 0 and 6–12 months, while for adolescents who initiate the HPV vaccine at age 15 or older, a three-dose series is recommended at 0, 1–2 and 6 months (WHO 2016, Reagan-Steiner et al. 2016).

Despite empirical evidence indicating that the HPV vaccine is safe and effective, and strong recommendations for HPV vaccination from executive bodies such as ACIP and the President's Cancer Panel, HPV vaccination coverage and completion rates remain below the Healthy People 2020 three-dose coverage goal of 80% for adolescent girls (HealthyPeople.gov 2015, NCI 2014). Prior research on HPV vaccine acceptance among African-Americans has largely focused on documenting racial/ethnic differences related to cognitive, socio-economical, and structural factors influencing HPV vaccine acceptance and completion (Galbraith et al. 2016). Research findings indicate that compared to non-Hispanic white mothers, African-American mothers have lower knowledge of HPV, leading to broad misconceptions of threats to HPV exposure (Joseph et al. 2014, Hamlish, Clarke, and Alexander 2012). Concerns also exist regarding the safety and side effects of HPV vaccination, such as death, infertility, or autism, in addition to concerns that HPV vaccination would provide a false sense of protection against all strains of HPV (Thomas et al. 2012, Ferrer et al. 2014). Studies on socio-economic and structural factors influencing HPV vaccine acceptance indicate that Black adolescent females have 22% lower odds of initiating and completing the HPV vaccine compared to white adolescent girls (Kester et al.

2013, Polonijo and Carpiano 2013). Similarly, lack of a healthcare provider recommendation (HCP), time, cost, and lack of access has also contributed to disparate HPV vaccination rates (Gilkey et al. 2015).

A growing body of literature indicates that attitudes and beliefs shaped by culture may play a prominent role in HPV vaccine acceptance among African-Americans (Gerend, Zapata, and Reyes 2013, Lechuga, Swain, and Weinhardt 2011, Salad et al. 2015). For example, factors such as mistrust of HCPs and the healthcare system, religion, and social norms related to appropriate sexual behaviors were identified as factors that play a role in HPV vaccination decisions among African-Americans. For example, in a qualitative study of African-American parents from St. Louis, Sanders Thompson, Arnold, and Notaro (2012) identified that mistrust of HCPs and the healthcare system was as a barrier to African-American parents' HPV vaccine acceptance. Specifically, male parents reported concerns about the role of the government in HPV vaccination and compared the government's role to that during the Tuskegee Syphilis Experiment. Numerous other cross-sectional surveys found similar results, reinforcing the importance of trust among HCPs and the medical system, and African-Americans' HPV vaccine acceptance (Allen et al. 2012, Hull et al. 2014). Most recently, a cross-sectional study which surveyed 400 African-American parents identified that having a higher level of trust in HCPs was associated with higher uptake of HPV vaccination (Fu et al. 2017).

Religious affiliation, frequency of church attendance, and religious beliefs, also influence HPV vaccine acceptance among African-Americans, however, findings are inconsistent. For example, one study indicates that African-Americans who identified as non-Baptists were 3.6 times more likely to vaccinate their children compared to Baptist parents (Thomas et al. 2013). While another study conducted by Shelton et al. (2013) indicated that Protestant parents were more likely to report vaccine non-acceptance compared to other parents, and parents with frequent religious service attendance were more likely not to HPV vaccinate their daughters than parents who did not attend religious services. In yet another study, when asked about the role of religious beliefs on HPV vaccine acceptance, African-Americans reported that although their religious beliefs were important to them, religious beliefs did not influence their HPV vaccine decisions (Sanders Thompson, Arnold, and Notaro 2012).

Among African-Americans, beliefs about appropriate sexual behaviors are strongly rooted in religious doctrine, which confines the practice of sexual relations only to married couples (Pinn 2013). Adherence to religious doctrine among African-American mothers may underlie the concern and vaccination barrier that vaccinating daughters against HPV may be misconstrued as condoning premarital sexual activity (Allen et al. 2010, Brawner et al. 2012, Joseph et al. 2012). Other studies of parents of vaccine eligible daughters have also found that parents held the belief that HPV vaccination was unnecessary due to the perception that daughters were too young for sexual activity and therefore too young for HPV vaccination (Dorell et al. 2014, Hull et al. 2014).

Although previous studies have contributed to our understanding of the influence of certain cultural factors on African-Americans' HPV vaccine acceptance, important gaps remain. First, to our knowledge, prior studies have not been directly informed by theoretical

approaches that more broadly describe the factors that are shaped by culture. Use of a theoretical approach broadens the factors one is able to inquire about (Airhihenbuwa 2000, Dressler, Oths, and Gravlee 2005, Kagawa-Singer 2006). Second, prior studies investigating the effect of culture on HPV vaccination decisions have not sampled African-American daughters and compared how their perspective may vary from those of their parents. To address these limitations, the purpose of this study is to explore the influence of culture on African-American mothers' and their daughters' HPV vaccine acceptance. In this study, culture is defined as shared values, norms, and codes that collectively shape a group's beliefs, attitudes, and behavior through their interaction in and with their environment, and is operationalized according to the domains of the PEN-3 cultural model (Airhihenbuwa 2000).

Conceptual framework

The PEN-3 cultural model (Figure 1; (Airhihenbuwa 1989) identifies culture as a key factor facilitating or deterring an individual's engagement in preventive health behaviors.

The two domains of the PEN-3 used to operationalize culture in this study are the Relationships and Expectations domain and Cultural Empowerment domain. The Relationships and Expectations domain operationalizes culture as Perceptions, Enablers and Nurturers that influence the person, family and/or community's actions towards performing a health behavior. The Relationships and Expectations domain identifies perceptions (knowledge, attitudes, beliefs), enablers (community, environmental, structural factors) and nurturers (family, support networks) as important influences on health behaviors. The Cultural Empowerment domain provides criteria for categorizing perceptions, enablers, and nurturers as positive, exotic or negative. Perceptions, enablers, and nurturers categorized as positive promote the behavior in question. Perceptions, enablers, and nurturers categorized as exotic are beliefs and practices unfamiliar to western medicine, are not harmful, and do not necessarily influence health behavior. Perceptions, enablers, and nurturers categorized as negative are barriers to performing the health behavior.

Methods

Grounded theory techniques guided the exploration of cultural factors that influenced African-American mothers' and their daughters' HPV vaccine acceptance, and included theoretical sampling and constant comparison analysis (Corbin and Strauss 2014). According to Corbin and Strauss (2014), theoretical sampling is the process of comparing incidents and events in the data on the basis of their potential representation of important theoretical constructs to uncover variations and identify relationships between constructs. Constant comparison analysis is the process of comparing incidents in the data with other incidents for similarities and differences in cases (Corbin and Strauss 2014). Items from the Consolidated Criteria for Reporting Qualitative Research-32 were used while reporting study methods and findings (Tong, Sainsbury, and Craig 2007). Data was collected by the first author (KVG), a nurse and doctoral candidate at the time of study, with previous training in interviewing and qualitative methods. The Institutional Review Board of the University of North Carolina at Chapel Hill approved this study.

Participants and setting

The study's inclusion criteria were (1) African-American ethnicity by self-report, (2) parent or guardian of an adolescent daughter, and, (3) daughters between the ages of 12–17 years. This age range of daughters was selected because parental consent is required for HPV vaccination of individuals younger than 18 years of age. Participants were recruited from two health departments (HD) serving low-income families in Guilford County, NC (Greensboro Department of Health and Highpoint Health Department), and from churches, hair salons, and public libraries in New York City. Recruitment was enhanced through partnerships with community stakeholders, such as nurses from Guilford County HDs, Pastors and directors of community organizations that serve inner city youths, to identify and recruit eligible parents and daughters for this study. Recruitment sites were selected due to their location in areas in which residents experienced high rates of sexually transmitted diseases and infections (CDC 2016, NC HIV/STD Surveillance 2016). Recruitment strategies involved publishing advertisements within the HDs' newsletter, distributing flyers, receiving referrals by community stakeholders, and through word of mouth.

Procedure

Prior to beginning the interviews, informed consent and assent was obtained, and participants completed a socio-demographic form. Socio-demographic forms collected information of participants' race and ethnicity, age, marital status, health insurance, income level, education, religious denomination, daughters' HPV vaccination status, zip code, and their county of residence. Zip-codes and counties were used to determine participants' urban or rural classification according to the 2010 census (US Census Bureau 2016). An open-ended semi-structured interview guide was also used (Table 1). Interviews were conducted face-to-face either in private offices at the HDs, participant's homes, or other private settings. Participants were interviewed once between June 2014 and October 2015. Interviews for mothers ranged from 1 to 2 hours while interviews for daughters ranged from 30 minutes to 1 hour. Mothers and daughters were interviewed separately and were given a \$20 gift card at the end.

The interview guide was developed based on the constructs of the PEN-3 and included questions about factors that influenced HPV vaccine acceptance. For example, mothers and daughters were asked: (1) "What are some good and bad things about vaccines," and (2) "What do you think of the HPV vaccine and what influences the way you think?" Questions were designed to promote open discussion of individual, familial and community factors that influenced beliefs about health, vaccinations and HPV vaccine acceptance. As interviews progressed, questions became more directed as the interviewer pursued analytic lines that emerged in previous interviews and probing questions were asked. For example, mothers and daughters who reported talking to a family member or friend about HPV vaccination were asked, "Please describe in what ways [person mentioned] helped you decide to accept or reject the HPV vaccine?" and "Would you classify the support you received as helpful or a barrier to HPV vaccine acceptance?"

Data analysis

Interviews were audiotaped, transcribed verbatim, and checked for accuracy. Interview data was de-identified and stored on password-protected computers in locked private offices. Descriptive summaries were written for each participant that included a summary of their experiences with cultural factors and included exemplar quotes. Theoretical sampling and constant comparative analysis were used to sample specific factors among mothers and daughters that influenced HPV vaccine acceptance. Theoretical sampling consisted of the first author reading each transcript to sample theoretical constructs reported among mothers and daughters as influencing their HPV vaccine acceptance. Once a theoretical construct was identified in one transcript, remaining transcripts were examined with the goal of extracting and comparing incidents and events for similarities and variations in cases. Each theoretical construct was then organized into categories according to whether the construct facilitated or was a barrier to HPV vaccine acceptance. During constant comparison analysis, categories were then compared to each other within and across mother and daughter groups, and compared to existing concepts of culture within the PEN-3 framework and the HPV vaccine literature. This process was carried out until no new construct was identified and theoretical saturation was achieved (Corbin and Strauss 2014). Strategies to enhance validity (Maxwell 2013) included the first and last author reviewing the developed categories and their incidents and events, and refining the coding of categories until there was agreement. Additionally, the first author randomly selected transcripts from each mother and daughter interviews, and with assistance from the last author, reviewed whether the constructs, interpretations and conclusions accurately represented the data.

Results

Mothers had a mean age of 42.6 years ($SD=6.2$) with the majority characterized as insured, married, Christian, with at least some college (Table 2). Mothers were primarily from urban areas with income levels above \$30,000 annually. Daughters had a mean age of 14.9 years ($SD=1.5$) with the majority characterized as insured and Christian. A majority of daughters had not initiated the HPV vaccine series ($n=22$, 64.7%), however among those who had, the majority had completed the 3-dose series.

In the sections that follow, the specific cultural factors reported among mothers and daughters that influenced their HPV vaccine acceptance are presented according to mothers whose daughters initiated the HPV vaccine series and those whose daughters did not.

Attitudes and beliefs towards vaccines in general

Regardless of daughters' HPV vaccination status, a majority of mothers and daughters held positive attitudes and beliefs towards vaccines in general. Mothers' attitudes and beliefs towards vaccines in general was influenced by their positive experiences with vaccines during childhood in which vaccinations prevented mortalities occurring as a result of infectious diseases. As mothers in this study were US born and foreign born, researchers sought to identify whether childhood experiences with vaccinations and perceptions differed among the groups. Regardless of place of birth, mothers indicated that once vaccinations became accessible, vaccinations were utilized and valued as an important aspect for disease

prevention. One mother who intended to HPV vaccinate her daughter described how vaccinations were valued for disease prevention:

We come from a West Indian country, we have mosquito and various kind of insects. So you had to be immune. We had to get those [vaccines] because when you were growing up it was Typhoid. Tuberculosis. They had these diseases that people died from, lots of people died from. Vaccines is very important. (Interview #35, mother aged 49)

Daughters' positive attitudes and beliefs towards vaccines in general was based on their belief that vaccinations were beneficial, while also acknowledging that vaccinations may have side effects. One HPV vaccinated daughter described her beliefs toward vaccines:

I think they're [vaccines] needed so you can be protected from diseases and they can help your immune system fight off things that you may catch. [But] they may have side effects. You may be allergic to it or something. (Interview #2, daughter aged 16)

Attitudes and beliefs towards HPV vaccine

A majority of mothers described having positive and negative attitudes and beliefs towards HPV vaccination. However, among parents who initiated the HPV vaccination series for their daughters, all of them reported that their positive attitudes and beliefs towards the HPV vaccine was enough to motivate their HPV vaccine acceptance. This finding was similar for daughters as well. For example, mothers' and daughters' positive attitudes and beliefs frequently stemmed from the perception that the HPV vaccine prevents HPV infection and cervical cancer (Table 3). A mother whose daughter had initiated the HPV vaccine series said:

Like I said, it [HPV vaccine] helps prevent cancer or different sexually transmitted diseases. But cancer was my main thing because my husband's mother experienced breast cancer ...once I heard about it, I wanted to get her involved in it because of that. (Interview #10, mother aged 43)

Daughters were more likely than mothers to hold the belief that all girls should be HPV vaccinated. A daughter who was not yet vaccinated spoke of her positive attitude and belief towards the HPV vaccine:

I think every girl should get it [HPV vaccine] just in case to be on the safe side. I would think every mother would want their child to get it even though they are not sexually active and if they are it's still good because they got the vaccine. (Interview #14, daughter aged 16)

Among mothers who did not initiate the HPV vaccine series for their daughters, mothers' negative attitudes and beliefs stemmed from concerns about side effects, and perceptions that the HPV vaccine was too new, not safe, not effective, not a vaccine for kids, given at too young an age, and that all vaccines were one size fits all. One mother of an unvaccinated daughter said:

I think some vaccinations are looked at as a one size fits all sort of thing, but different populations of people are different. Someone who's from Africa, they may have a different genetic make-up and so their bodies would react to a vaccine differently than someone who's in North America. But I don't know if that's taken into consideration when vaccines are developed. I believe it's sort of a one size fits all sort of thing. (Interview #59, mother aged 44)

Daughters' negative attitudes and beliefs stemmed from concerns about side effects, and the perception that the HPV vaccine was not safe, too new, and not effective. One unvaccinated daughter expressed her negative attitudes in this way: 'I won't want to get it [HPV vaccine]. I'm scared of the results and what might happen. Some people's bodies are different. I don't think I'll take it.' (Interview #5, daughter aged 17)

Awareness of HPV

A majority of mothers and daughters, regardless of HPV vaccination status, were aware of HPV and the HPV vaccine. Mothers who initiated the HPV vaccine for their daughters were aware of HPV and the HPV vaccine, however, awareness was higher among mothers who did not initiate the HPV vaccine for their daughters. Mothers and daughters learned about HPV and the HPV vaccine from daughters' HCP, daughters' school, television, the internet, or from family and friends. One mother who decided not to HPV vaccinate her daughter recalled her reasons why an awareness of the HPV vaccine did not result in HPV vaccination for her daughter. She said:

I knew some but not enough [information] and I chose not to do it. Typically, when something comes out I'm always like, I'm going to try it [but] let me wait a little while. Let everybody else try it and see what they say comes out of it, and then I'll be more willing to try it. As opposed to being the first one on the bandwagon. (Interview #1, mother aged 44)

Knowledge of HPV

The majority of mothers and daughters did not believe their knowledge of HPV and the HPV vaccine was adequate, regardless of daughters' HPV vaccination status. Even among mothers whose daughters had initiated the HPV vaccine, only two of these mothers perceived themselves as having adequate knowledge of HPV. Mothers and daughters lacked knowledge on the symptoms and risk factors of HPV, and on the effectiveness, safety, and side effects of the HPV vaccine. When HPV vaccine knowledge was low, mothers were reluctant to accept the vaccine. A mother of an unvaccinated daughter spoke of her lack of knowledge on vaccine effectiveness and her hesitance to have her daughter vaccinated:

When I read that there's different strains, I'm like, how do I know this is going to work? I'm going to expose her [daughter] to the virus, she probably doesn't even need it and then in the long run she still gets cervical cancer. So that was my thing, a lack of knowledge. I need more proof that this thing works (Interview #37, mother aged 47)

Religious beliefs

Among mothers whose daughters initiated the HPV vaccine series, none of these mothers reported that their religious beliefs affected their decision to vaccinate their daughters. Similarly, among mothers who did not HPV vaccinate their daughters, a majority of these mothers also reported that their religious beliefs were not a factor that influenced HPV vaccine acceptance. These mothers realized that religious teachings were not necessarily realistic with issues related to sexual activity. Mothers reported that their decision to accept or reject the HPV vaccine for their daughter was based solely on the information they received about HPV and the HPV vaccine, and their perception that it was the right thing to do to protect their daughters. A mother of an unvaccinated daughter reported:

The only way my religious beliefs affect me would be that I know the Bible says you should not have sex until you are married. Do I think that's realistic in this day and age? Hardly... So no my religious belief would not hinder me or encourage me to do this [HPV vaccination]. This is going to be a decision I make based on what I see and what I hear and what I read. (Interview #1, mother aged 44)

Similarly, among a majority of daughters, their religious beliefs did not influence their HPV vaccine acceptance regardless of their HPV vaccination status. These daughters reported that their HPV vaccine acceptance was based on what they believed would protect them. In response to the question asking whether religious beliefs influenced HPV vaccine acceptance, one daughter said: 'Not really. I just think it's not based on God. Just on how I think it [HPV vaccine] protects people' (Interview #58, daughter aged 14). A majority of the mothers and daughters in this study separated their religious beliefs from HPV vaccine acceptance.

For a minority of mothers whose daughters did not initiate the HPV vaccine, HPV vaccination was more than just a vaccination against cervical cancer; it was a vaccination against a STI. These mothers reported the belief in religious doctrine against premarital sex, and therefore believed HPV vaccination was unnecessary. A mother of an unvaccinated daughter said:

There are consequences. Whatever seeds you sow, that's what you reap. That's sort of the rationale about vaccinations for STIs. It's a difference if you're talking about a vaccination for like pneumonia, the flu, certain things that are known that children have because of their interactions with others...that's not something that they can make a choice that will be a consequence of their choice, that's totally different. But when you talking about STIs, most of the time that's a lifestyle choice. Not all the time but most of the time. (Interview #21, mother aged 30)

Messages in the media

Hearing negative messages in the media was not an influencing factor among mothers whose daughters initiated the HPV vaccine series. However, among mothers whose daughters did not initiate HPV vaccine series, a majority of mothers reported that the messages in the media was a negative influence. Among mothers, these negative influences included a) side effects of medications, b) side effects of the HPV vaccine, c) historical abuses by the medical profession among African-Americans, and d) viewing divisive discussions among

politicians who were anti or pro HPV vaccination. A mother of two unvaccinated daughters recounted viewing a televised program on the side effects of HPV vaccination:

I heard on T.V. that some girl died from it [HPV vaccination] and that made me more uncomfortable. So then I called them back and said well I'm just going to hold off for now. And then she [the HCP] called me back and said the percentages- it's like point one. I said what if my daughter is the point one percent. (Interview #51, mother aged 46)

Among daughters, although they reported seeing televised HPV vaccine commercials, the commercials had no effect on their HPV vaccine acceptance since the images on the screen did not reflect the seriousness of HPV or seem relatable to them. This finding was reported regardless of daughters' HPV vaccination status. One HPV vaccinated daughter said:

I always saw the Gardasil commercials but I guess I never really listened to them because they were always jumping rope or something. That's probably bad but yes I always heard the cancer part but I never really listened to if they said anything about HPV and if they said HPV I didn't really know what it was anyway. (Interview #12, daughter aged 17)

HCP recommendation and communication

Mothers whose daughters had initiated the HPV vaccine, as well as mothers whose daughters did not initiate the HPV vaccine series reported valuing their HCP recommendation concerning vaccinations. Twenty-two mothers reported receiving a recommendation for their daughters to receive the HPV vaccine, although only ten of these mothers initiated the HPV vaccination series for their daughters. Mothers reported that their HCP sighted daughters being within the appropriate age range as reason for their HPV vaccine recommendation. Recommendations discouraging HPV vaccination were based on knowledge of pre-existing health condition and a belief that daughters were too young. One mother of an HPV vaccinated daughter described her regard for her HCP's recommendation for HPV vaccination:

...I just kind of talk to the doctor and see what's what. I feel like they have a little more knowledge. God gave everybody some type of gift.... He's the healer but He's given them the knowledge of medicine. (Interview #8, mother aged 38)

While mothers reported valuing their HCP recommendation, mothers also reported a concern that their HCP did not communicate information about HPV in a satisfactory way. Specifically, mothers perceived they did not receive enough information on the contents of the HPV vaccine, effectiveness, and side effects. Mothers were also dissatisfied with the lack of advanced notification about HPV vaccination. One mother of an unvaccinated daughter voiced her dissatisfaction with HCP communication in this way:

Maybe they [doctors] could go into it more, what's the effect and what will happen. The doctors don't explain like that. They just say X is at the age that she should have HPV vaccine. No, no, no, X is not at the age. ... that wasn't enough [information]... (Interview #35, mother aged 49)

Support networks and social support

A majority of mothers and all daughters described family and friends as important members of their support network. Mothers consulted family, friends, and church members for advice on HPV vaccination whereas daughters consulted family, and friends. One mother who consulted her Pastor described their conversation:

I told Pastor X about getting X the shots. She said it was a good idea. She was like, do you think that X wants to have sex? ... She said it was a good idea for the vaccination and that I did need to get her some birth control when she expressed that she thought she may be ready (Interview #6, Mother aged 32).

A majority of mothers and daughters reported receiving informational support from their support network regarding HPV vaccine acceptance. Mothers and daughters received positive advice, information about the HPV vaccine, validation of information received from their HCP, and assistance to understand that information. For example, one grandmother raising her granddaughter recalled turning to a friend for advice:

I speak to my girlfriend and she recommended that I get it for her [her granddaughter]. Ninety-nine percent of the time, I take her advice. She's a nurse, so in her field of work she recommended it and for her children as well. (Interview #49, mother aged 51)

The informational support received by mothers and daughters was not always positive. A daughter described how information received from her mother about HPV vaccination side effects negatively influenced her HPV vaccine acceptance:

I probably wouldn't be in favor of the HPV vaccine. I know that it's a shot and I know that they inject some of the disease into you so that you can be immune to it.... Our mom was explaining to us the side effects. I feel like if you're okay with those side effects, then you can get the vaccine but I'm not okay with those side effects... (Interview #41, daughter aged 12)

Emotional support in the form of encouragement regarding HPV vaccination, and instrumental support in the form of assistance getting to and from appointments, were less frequently received by mothers and their daughters.

While members of their support network were present, a minority of mothers and daughters reported not engaging their support network during their HPV vaccine decision making due to the perception that their support network lacked knowledge on or had negative perceptions about HPV vaccine acceptance. One mother of an unvaccinated daughter described the negative perception of the HPV vaccine among her family and friends:

The friends that I do have in my circle is small, no one was an advocate for it. All of us were kind of against it even if we didn't know why. We just knew we were against it...it didn't sound right... (Interview #1, mother aged 44)

Communication between mothers and daughters about sex and health

A majority of mothers reported having discussions with their daughters about sex and health. Mothers reported growing up in households where conversations about sex and health were

considered taboo and inappropriate for kids, which made it difficult for them to have such discussions with their daughters. However, for some mothers, the HPV vaccination appointments provided an opportunity to initiate conversations about HPV, STIs, and reproductive health. This finding was consistent regardless of daughters' HPV vaccination status. A mother of two HPV vaccinated daughters described how she used the HPV vaccination appointment to talk to her daughters about HPV, sex, and health:

I told them that there are certain things the human papillomavirus causes, and with cervical cancer, I showed them where the cervix is... And then X [her youngest daughter] was like why are we talking about sex? I said because it's going to happen. ...she's like I don't want to have this conversation. I said okay when you're ready we can have it. And we did have that conversation, eventually.
(Interview #42, mother aged 43)

Discussion

The purpose of the study was to understand the manner in which culture may influence HPV vaccination decisions among African-American mothers and daughters. Importantly, the PEN-3 model, a prominent theoretical model describing the influence of culture on health behaviors, guided our inquiry. Overall, our findings indicated that positive attitudes towards vaccination stemmed from the belief that the HPV vaccine has cancer prevention benefits and from a general belief in the protection conferred by vaccines against infectious diseases. Although studies suggest that African-Americans are generally mistrustful of vaccines (Plough et al. 2011, Shui et al. 2005), our findings portray a different scenario. In the current study, whether mothers were born inside or outside the US, mothers had been socialized to accept and value the importance of vaccines as interventions that curb mortality rates due to infectious diseases.

Negative attitudes, on the other hand, stemmed from beliefs that the vaccine is too new, not effective, and that daughters may be too young to get vaccinated against HPV. These findings are consistent with existing research among other racial/ethnic groups (Lee et al. 2016, Oz et al. 2016) and highlight the need for educational interventions that go beyond raising awareness, as our study also suggests that awareness was higher among mothers who had not vaccinated, and include factual information about the time sensitive window of opportunity to vaccinate at the right age to maximize immunological protection. An important contribution of this study is the finding that negative attitudes towards vaccination may also stem from the belief that vaccines are not "one size fits all interventions." Specifically, a mother correctly pointed out the need to include ethnic minority populations in clinical trials testing vaccine effectiveness. Perhaps attempts to increase HPV vaccine acceptance among African-Americans should address the concern of safety and effectiveness through the increased representation of members of this population in HPV vaccine clinical trials.

Spirituality and religion are core aspects of African-American culture and experience (Taylor and Chatters 2010), and research suggests that these cultural influences weigh on African-Americans' HPV vaccine acceptance (Thomas, Blumling, and Delaney 2015). In the

present study, a majority of mothers and daughters indicated that their religious doctrine did not impede their HPV vaccination decisions. For some mothers, though, religion mattered and our study sheds light on how religious beliefs may hinder vaccination decisions. Specifically, a mother expressed her concern that the HPV vaccine confers protection against an STI, and as such, this vaccine is different from other types of vaccines. For this mother, a person's risk of getting HPV is directly associated with behaving in a way that is not consistent with religious doctrine. Hence, getting HPV is the consequence of violating scripture prescriptions on sexual behavior, and the key preventive measure is adherence to religious doctrine. This belief in the doctrine of no premarital sex was also found to influence Somali mothers' HPV vaccine acceptance, such that, mothers were not accepting of the vaccine due to fears that HPV vaccination would signal endorsement of early sexual activity (Dailey and Krieger 2015). Future studies may consider using a measure of religiosity to examine differences among African-American mothers who accept and reject the HPV vaccine.

Another key finding of this study, is that regardless of vaccination status, mothers and daughters felt they needed more information about HPV, and HPV vaccine safety, side effects, and effectiveness. This finding is again highlighted in mothers' dissatisfaction with the information shared by their HCPs about HPV and the vaccine. As in previous studies (Gargano et al. 2013), mothers indicated that receiving a HCP recommendation is important. However, our findings indicate that when mothers' informational needs were not addressed, they were less accepting of the HPV vaccine. In fact, one mother shared her experience of declining vaccination after learning of the probability of a negative side effect from her HCP. Even though the HCP attempted to explain that the probability of a side-effect from vaccination is low, it appears that the HCP missed the opportunity to compare the probability of a negative side effect vis a vis the probability of daughter contracting HPV and being diagnosed with cervical cancer. This finding suggests the need for interventions to promote HCP-patient shared decision-making and communication about HPV, the contents of the vaccine, and potential side effects.

Lastly, our study illustrates that information about HPV vaccination is obtained by different sources including social networks and the media. In our study, and similar to other research on African-Americans and Latinos (Brawner et al. 2012, Javanbakht et al. 2012), when family and friends provided reassurance of the benefits of the HPV vaccine, and shared their own experiences of vaccine acceptance for their own daughters, the HPV vaccine was accepted. However, support for the HPV vaccine among family and friends was not always forthcoming. When family and friends verbalized fears about safety and unknown side effects, mothers and daughters were less accepting of the HPV vaccine. The expressed fears among family and friends on topics related to HPV also resulted in reluctance among mothers to discuss the HPV vaccine. These findings suggest that an intervention inclusive of mothers, daughters, and the broader African-American community may be useful to promote communication to address knowledge deficits, and negative perceptions around HPV and the HPV vaccine. Regarding the influence of the media, televised commercials were instrumental in highlighting the cancer prevention benefits of the vaccine, however, these commercials also unintentionally communicated to viewers the negative outcomes of the HPV vaccine. Exposure to conflicting health information such as that in the media can lead

to confusion as well as decreased intentions to perform a health behavior (Nagler 2014). Considering the amount of conflicting information contributing to the stigmatization of the HPV vaccine (Keelan et al. 2010, Wailoo et al. 2010), consistent messaging in HPV vaccine media campaigns from trusted information sources could possibly reduce misinformation and concerns about HPV vaccination.

Limitations

Our study had several limitations including limited generalizability due to the demographic composition of our sample and our non-randomized purposive sampling approach. Our study was guided by the PEN-3 and as such, could have restricted aspects of culture important to attitudes and beliefs related to HPV vaccine acceptance. Despite these limitations, a major strength of the study was use of a culturally grounded framework to inquire about African-Americans' perceptions towards the HPV vaccine. The majority of prior research has been informed by traditional health behavior change theories, which leads to a focus on personally derived attitudes at the expense of contextual influences such as culture. Understanding the diverse factors that contribute to African-American mothers' and daughters' HPV vaccine acceptance may inform the development of culturally-appropriate interventions that advances the field of cervical cancer prevention.

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Figure 1.
The PEN-3 cultural model

Table 1.

Semi-structured interview guide organized according to the PEN-3 cultural model.

Perceptions	Enablers	Nurturers
1. What are some good and bad things about vaccines?	1. Did you grow up inside or outside the United States?	1. Who makes up your social network (SN)? Who do you turn to when you need help?
2. Are you in favor of vaccinations in general?	2. Can you describe the community where you grew up? (urban, rural)	2. What is each person's position in your network? (Who are the leaders, decision-makers?)
3. What do you know about the human papillomavirus (HPV) and the HPV vaccine?	3. Can you describe your family dynamics growing up? (language(s) spoken at home, parents' job, religious affiliations, religious beliefs)	3. What is your role within your SN? (Are your opinions acknowledged)
4. Where did you learn about HPV and the HPV vaccine?	4. Were there stories or beliefs told within your community that would make you mistrust doctors, vaccines, medications, or the medical system?	4. When its time to make decisions about your daughters' health, who in your SN do you talk to?
5. How do you decide what vaccines your daughter receives? *	5. Were there stories or beliefs told within your family that would make you mistrust doctors, vaccines, medications, or the medical system?	5. Did you talk to members of your SN about HPV and the HPV vaccine? Who? How were those conversations?
6. How did you decide if your daughter will receive the HPV vaccine?	6. Were there historical factors – things that happened a long time ago – that influenced your decision to accept or reject the HPV vaccine?	
7. What are some reasons you would HPV vaccinate your daughter? *	7. Growing up, how did your family members talk to you about health? sex?	
8. What are some concerns that would prevent you from vaccinating your daughter with the HPV vaccine? *		

Note.

* Questions were rephrased when directed towards daughters

Table 2.Characteristics of study participants ($N = 62$)

	Mothers, $n = 28$	Daughters, $n = 34$
Marital status, n (%)		
Divorced	1 (3.6)	-
Married	16 (57.1)	-
Not married/ Living with partner	3 (10.7)	-
Single	8 (28.6)	34 (100)
Urban or Rural n (%)		
Urban	21 (75.0)	-
Rural	7 (25.0)	-
Income, n (%)		
<\$10k	3 (10.7)	-
\$10k-\$30k	5 (17.9)	-
\$30k-\$50k	10 (35.7)	-
>\$50k	10 (35.7)	-
Educational status, n (%)		
< High school/ Middle school	-	6 (17.6)
Some HS/ HS diploma	6 (21.4)	27 (79.4)
Some college or college degree	11 (39.3)	1 (2.9)
Graduate diploma / Terminal degree	9 (32.1)	-
Other (technical training)	2 (7.1)	-
Employment status, n (%)		
Employed	26 (92.9)	-
Unemployed	2 (7.1)	-
Religious association, n (%)		
Christian	27 (96.4)	32 (94.1)
No religious association	1 (3.6)	2 (5.9)
Mothers whose daughter(s) initiated the HPV vaccine series	10 (35.7)	
1-Dose	1 (3.6)	-
2-Doses	1 (3.6)	-
3-Doses	8 (28.6)	-
Mothers whose daughter(s) did not initiate the HPV vaccine series	18 (64.3)	

Table 3.

Mothers' and their daughters' attitudes and beliefs towards HPV vaccine.

	Parents <i>n</i> = 28		Daughters <i>n</i> = 32	
	n	%	n	%
Positive attitudes^a	23	82.1	28	82.4
Cervical cancer prevention benefits	17	56.7	23	71.9
STI prevention benefits	14	46.7	19	59.4
HPV vaccine is safe	5	16.7	8	25.0
All girls should be HPV vaccinated	1	3.3	13	40.6
Negative attitudes^a	22	73.3	17	50.0
Age range is too young	5	16.7	-	-
HPV vaccine too new	15	50.0	2	6.3
Concerns about safety	16	53.3	6	18.8
Doubts about effectiveness	12	40.0	1	3.1
Concerns about side effects	19	63.3	15	46.9
STI vaccine not for children	6	20.0	-	-
All vaccines one size fits all	3	10.0	-	-
HPV vaccine mandate	1	3.3	-	-
Concerned >3 doses needed	2	6.7	-	-
Unsure if HPV vaccine is as important as other vaccines	-	-	1	3.1

Note. Participants could have reported more than one type of attitudes and beliefs. STI= Sexually transmitted infections; HPV= Human papillomavirus.

^a*n*=34 daughters responded.