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Social networks for HPV vaccine advice among African American parents

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Abstract

Purpose—Despite that human papillomavirus (HPV) vaccination could prevent ~90% of HPV-associated cancers, only 60.6% of American adolescents initiate vaccination. African Americans have the highest prevalence of morbidity and mortality from HPV-associated cancers. Mounting evidence suggests that advice from social contacts is associated with vaccine acceptance. The current study examines the associations of social processes with HPV vaccine refusal among African American parents.

Methods—A cross sectional survey was conducted among African American parents of children ages 10–12 years prior to a healthcare visit at which HPV vaccine was offered by the healthcare provider. Data from the 353 parents who named at least one social contact who advised them about vaccines were included in these analyses.

Results—Only 54.4% of the participants consented to HPV vaccination for their children. On average, parents had 2 to 3 social contacts who provided vaccine advice. Vaccine advice networks were generally dense, family-centric, and homophilous. Slightly over 80% of all parents trusted family members and friends for vaccine advice "some or "a lot." Controlling for sociodemographic characteristics and reason for the healthcare visit, perceived high exposure to anti-HPV vaccine viewpoints and low exposure to pro-HPV vaccine viewpoints were both associated with HPV vaccine refusal (AOR=1.5, 95% CI=1.01, 2.3, and AOR=1.7, 95% CI=1.2, 2.6, respectively).

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Conclusions—Social processes may be associated with HPV vaccine refusal among African American parents. Interventions designed to educate African American parents about HPV vaccine to increase uptake should consider leveraging vaccine advice networks for greater impact.

Keywords

Human papillomavirus vaccines; African Americans; social values; social conformity; adolescent health; health knowledge; attitudes; practice

Human papillomavirus (HPV) infection causes virtually all cases of cervical cancer in females, and is also associated with other anogenital and oropharyngeal cancers, and genitals warts in males and females.[1–3] Approximately 9 in 10 new cases of cancer caused by HPV infection could be prevented through vaccination.[4,5] In the United States, HPV vaccine is licensed for administration between the ages of 9–45 years old as a 2 or 3 dose series (depending on age of initiation), and is recommended for routine administration to children ages 11–12 years old.[1,6,7] National adolescent HPV vaccination series initiation and completion rates are suboptimal at 65.5% and 48.6%, respectively.[8]

Multiple studies have found HPV vaccination acceptance to be associated with friends and family encouraging vaccination.[9–12] According to the Theory of Planned Behavior, social contacts can influence parents' health behavior directly by telling them what they should do or indirectly by sharing their opinions. From these social cues, parents develop their perceptions of what behaviors are considered typical and acceptable among peers (i.e., social norms), and may behave consistent with the norms to avoid potential disapproval from peers.[13,14] Social network analysis examines an individual's ties with friends, family members, and acquaintances for patterns and how these relationship influence behaviors.[15] Characteristics of an individual's social network, including size, demographic composition, and density (i.e., interconnectedness) have been shown to be associated with exposure to social norms regarding a variety of health behaviors, including adherence to the early childhood vaccination schedule.[16–18]

It may be particularly important to understand the role of social influences on HPV vaccination decision-making among African American parents since African Americans often have misgivings about the trustworthiness of the medical establishment given their collective long-standing disparities in care and unethical treatment by medical authorities.[19–22] In the U.S., HPV vaccination series completion rates among African American adolescents (50.2%) are between those of whites (44.7%) and Hispanics (56.4%).[8] However, African Americans continue to have the highest prevalence of high-risk genital and oral HPV infection,[23] and African American women have a 30% higher incidence of cervical cancer and twice the cervical cancer death rate of white women.[24]

The goal of this study was to examine the characteristics of social networks for HPV vaccine advice among a sample of African American parents. Specifically, the aims were to describe: 1) the composition of parents' vaccine advice networks; 2) parental trust in the recommendations of their vaccine advice networks, 3) subjective exposure to anti- and pro-HPV vaccine viewpoints from network members; and 4) the association of trust in vaccine

advice network members and subjective exposure to anti- and pro-HPV vaccine viewpoints from network members with parental HPV vaccine refusal.

Methods

This study protocol was approved by the Children's National Medical Center Institutional Review Board.

Participants and Setting

Study procedures are described in detail in a prior publication.[25] Briefly, this study's analyses include 353 participants who were recruited from pediatric and adolescent health centers associated with an academic hospital in Washington, DC from 2013–2014, and who could name at least one person who provided them with vaccine advice—i.e., had at least one member in his or her vaccine advice network. The health centers that served as recruitment sites receive roughly 40,000 annual encounters from patients who are 78% African American, and 85% publicly insured.

All participants were self-identified African American, English-speaking parents or legal guardians (hereafter referred to as "parents") of children 10–12 years old who had not previously received HPV vaccine and were offered vaccination at that healthcare visit. Children ages 10–12 years are routinely offered the HPV vaccination at these health centers. Prior to the start of the study, healthcare providers were given an overview of the study and informed of best practices regarding immunization delivery recommendations (including offering HPV vaccination at every eligible visit).[26] Vaccination delivery workflow at the recruitment sites is for healthcare providers to preview health center and DC Immunization Information System registry records to pre-order indicated vaccinations prior to the encounter, announce to parents which vaccinations have been ordered, and then remove any refused vaccination order per parental request after discussion. Parents were excluded if their child had a medical contraindication to HPV vaccination (including history of anaphylactic allergy to any vaccine component or yeast, or moderate to severe acute illness).[27]

Survey

Research staff previewed appointment schedules for children meeting age criteria, and then obtained informed consent from eligible, interested parents. The survey was administered to parents while they waited for their child's healthcare visit. After the visit, the child's medical record was reviewed to determine vaccination status. Parents were asked how much they trusted (1) family members, (2) friends, and (3) "other people in your community such as other parents in your neighborhood, at your church, or child's school" for vaccine advice. Response options for each of these 3 items were "not at all," "some" and "a lot." To identify members of parents' vaccine advice network, parents were asked to name friends, family members and other social contacts who provided them with at least "a little" advice about vaccines. To determine network density, the number of actual ties among network members (i.e., social contacts who knew each other) was divided by the number of potential ties between all members.[28]

To assess perceived HPV vaccine viewpoints among network members, parents were asked about the proportion of their social contacts that held various HPV vaccine viewpoints, and provided various types of suggestions. Items were designed to reflect common sentiments among African American parents about HPV vaccine as identified in prior studies.[11,19,29,30] Response options for the items were “none,” “a few,” “about half,” “most,” and “all.” Perceived exposure to each of the five anti-HPV vaccine viewpoints was considered high if “about half” or more of a parent’s network adhered to the negative viewpoint or provided the cue not to vaccinate. Perceived exposure to each of the two pro-HPV vaccine viewpoints was considered low if fewer than “about half” of his/her network adhered to the positive viewpoint.

Statistical Analysis

All analyses were performed in Stata, version 13.1 (StataCorp, College Station, TX). Initial bivariate statistics were derived using Wilcoxon rank-sum tests, chi-square and Fisher’s exact tests. Exploratory factor analysis was used to identify and generate summary, composite scale scores to assess three constructs: 1) parental trust in social contacts for vaccine advice, 2) high perceived exposure to anti-HPV vaccine viewpoints, and 3) low perceived exposure to pro-HPV vaccine viewpoints, using the Kaiser criterion for factor retention of eigenvalue of the correlation matrix >1.[31] Factor analysis used complete case analysis after affirmation that missing data met two criteria: they were rare (0% for most variables, and <3% for any given variable) and likely at random (none of the 5 participants with any missing data were outliers in terms of any of the sociodemographic or network characteristics). Construct scales were tested for internal reliability using Cronbach’s α. The three items assessing trust in various types of social contacts loaded onto a single factor with an internal reliability estimate (Cronbach’s α) of 0.78. The network belief items loaded onto two factors; the five items assessing exposure to anti-HPV vaccine viewpoints loaded onto one factor (Cronbach’s α =0.79), and the two items assessing lack of exposure to pro-HPV vaccine viewpoints loaded onto a second factor (Cronbach’s α= 0.52).

Among parents who had ever specifically discussed HPV vaccine with others, a multivariate logistic regression model was created to examine the association of parental trust in social contacts for vaccine advice, and exposure to anti- and pro-HPV vaccine viewpoints with the outcome, HPV vaccine refusal. The model was adjusted for child’s age, child’s sex, parental history of vaccine refusal or delay, and reason for the visit (well vs. acute complaint). Pearson correlation coefficients were calculated to assess for collinearity of variables and were found to be low (0 to |0.28|).

Results

Of the 353 parents included in these analyses, 192 (54.4%) consented for their children to receive HPV vaccination that day. Parents were mostly in their 30s and overwhelmingly female (Table 1). Slightly over half were educated beyond high school. At the start of the healthcare visit, 72.2% of the participants’ children were up to date with all other age-appropriate immunizations. Parents who refused HPV vaccine that day were more likely to have refused other vaccines in the past (p=.01). The age distribution of the children of

vaccine acceptors and refusers were different (p<.001). Roughly two thirds of acceptors' children were 11 years old; whereas, the ages of refusers' children were more evenly distributed. Parents of girls had higher rates of HPV vaccine refusal than parents of boys (p<.05), as did parents who brought their children to be seen for an acute complaint rather than for a well visit (p<.001).

Characteristics of parents' vaccine advice networks

Overall, the vaccine advice networks of participants were small, dense, family-centric, and homophilous (i.e., made up of people similar to the participants) (Table 1). On average, parents had 2 to 3 people who provided them with vaccine advice. While only 29.2% named a spouse or significant other as one of his/her vaccine advisors, 87% named a (non-spouse/ significant other) family member, and 45.6% named a friend. On average, participants' vaccine advisors were similar to the participants themselves in that they were also majority female, African American, and parents. Vaccine advisors tended to be slightly older than participants—on average, 66.7% of participants' vaccine advice network members were over 40 years old, compared with the average age of participants of 37 years old. Among the 345 parents who reported at least 2 vaccine advisors, 76% reported that every member of his or her vaccine advice network knew every other member. The sociodemographic characteristics of participants' vaccine advice network did not differ between vaccine acceptors and refusers.

Parental trust in social contacts for vaccine advice

The percentage of parents who trusted social contacts for vaccine advice was overall very high with slightly over 80% of all parents trusting family members, and over 80% trusting friends "some" or "a lot" for vaccine advice (Table 2). The percentage trusting other people in the community for vaccine advice was also fairly high with approximately 60% of both vaccine acceptors and refusers trusting these other community members at least "some." In bivariate analysis, a higher percentage of vaccine refusers as compared with acceptors reported no trust at all in friends (p<.05). Fewer than half of the participants (41.6%) had ever discussed HPV vaccine specifically with social contacts. A larger percentage of vaccine refusers (49.7%) than acceptors (34.9%) had ever discussed HPV vaccine (p<.01). When limiting analysis to only the 147 parents who had ever discussed HPV vaccine with social contacts, and adjusting for covariates (parents' exposure to anti- and pro-HPV vaccine viewpoints, child's age, child's sex, parental history of vaccine delay or refusal, and reason for the visit), trust in social contacts for vaccine advice was not significantly associated with HPV vaccine refusal (adjusted odds ratio (AOR)=0.7, 95% confidence interval (CI)= 0.47, 1.1).

Subjective exposure to HPV vaccine viewpoints of network members

Amongst the subgroup of 147 participants who had ever discussed HPV vaccine with social contacts, over half reported that these contacts had said negative things about HPV vaccine to them in the last 6 months (Table 3). Nearly 1 in 4 who had discussed HPV vaccine with social contacts said that half or more of their friends and family members were strongly against HPV vaccine, and 15% reported that half or more of all their friends and family members discouraged them from getting their child vaccinated. Perceived exposure to pro-

HPV vaccine viewpoints was fairly low overall with fewer than half of parents reporting that a belief that HPV vaccine is good at protecting children against cervical cancer or genital warts was the norm for their network. In multivariate analysis, both high exposure to anti-HPV vaccine viewpoints and low exposure to pro-HPV vaccine viewpoints were associated higher rates of HPV vaccine refusal (AOR=1.5, 95% CI=1.01, 2.3, and AOR=1.7, 95% CI=1.2, 2.6, respectively).

Discussion

This study of a sample of African American parents found that the majority of participants —both HPV vaccine acceptors and refusers—trusted social contacts for vaccine advice. Nonetheless, parents had very few contacts who actually advised them on vaccination matters. Vaccine advisors were typically limited to family members despite the fact that a high percentage of parents also felt friends and community members were other trustworthy sources of vaccine information. Among the parents who reported having discussed HPV vaccine with network members, the predominant views of these family and friends were associated with parental vaccination decisions.

Social priming theory posits that recent social experiences affect a person's subsequent perceptions, judgments, decisions and actions.[32] The current study supports this theory given that vaccine refusal was greater among parents exposed to anti-HPV vaccination viewpoints despite that all parents received a healthcare provider recommendation for vaccination. Most studies of HPV vaccine educational interventions have focused on the impact of medical advice on parental HPV vaccine decision-making.[33,34] However, randomized, interventional trials to improve healthcare provider counseling skills have thus far shown no to modest impact on changing parental attitudes towards vaccines.[33,35] It may be that healthcare provider counseling interventions should be preceded by social interventions for greater impact. The American Academy of Pediatrics has developed online resources to assist healthcare providers with developing social media accounts to share pro-vaccination messages from other parents and in formats beyond the healthcare encounter (www.aap.org/en-us/about-the-aap/aap-press-room/social-media-toolkit).

The authors believe this to be the first study to examine parental social networks for HPV vaccine advice, and their association with HPV vaccine refusal. The only other study to date to describe characteristics of parents' vaccine advice networks was focused on parents of children aged ≤18 months.[17] In that study, Brunson found that perceived exposure to negative norms was also associated with deviance from the recommended vaccination schedule. Also similar to the findings of the current study, Brunson found that respondents' vaccine advice networks were very homophilous in terms of race and sex. However, in the Brunson study, the majority of both participants and advisors were white, while all participants in the current study were African American. This set of findings highlights the importance of carefully considering dissemination plans for vaccine educational materials since these studies suggest that information may not transmit readily between groups of parents with different backgrounds. In Brunson's study, approximately 95%−96% of the participants had an advice network. In ours, only 88% of participants had a vaccine advice network, and those that did had smaller networks, consisting of ~3 contacts, as opposed to

~5–7 contacts as in Brunson's study (although healthcare providers were included in that study's tally of network members). The difference in average network size between the two studies might be attributable to variations in the sociodemographic characteristics of the two studies' sample populations including differences in race, and educational attainment (the current study's sample had lower educational attainment than Brunson's sample) and child's age. Because having a smaller network decreases a parent's exposure to a variety of opinions, thus increasing the influence of individual network members, it may be important to tailor vaccine educational interventions for populations similar to the current study sample —African American parents of adolescents—to include educating family members, not just parents themselves.[36]

The current study was conducted among African American parents because of the high burden of HPV-associated cancer borne by African Americans. Statistical models suggest that even under theoretical conditions of high vaccine uptake among all racial groups, African Americans will remain at highest lifetime risk of HPV-associated cancer morbidity and mortality due to barriers to diagnosis and access to care.[37] In the current study, almost 40% of participants reported that half or more of their friends and family feared medical experimentation, and exposure to this viewpoint was associated with vaccine refusal. This finding suggests that to eliminate health disparities in HPV-associated disease outcomes, it is essential that HPV vaccine educational programming include African American parental input to be culturally competent to address common concerns in the community.

In this study, the characteristics of the vaccine advice networks of HPV vaccine acceptors and refusers were essentially the same—i.e., highly limited and homophilous. While the lack of variability did not permit us to examine whether network characteristics were associated with vaccine refusal in the study population, it may be a generalizable finding that African American parents have few people to turn to for vaccine advice given that other research suggesting that African Americans generally maintain fewer informal ties to experts and professionals.[38–40] Future studies could verify our findings in other African American populations and for other types of health advice, further characterize the demographic background of parental vaccine advice network members, and compare network characteristics among parents of different racial and ethnic backgrounds.

One of the limitations of this study is that all reports of network members' viewpoints came from the participants themselves rather than network members. Obtaining confirmatory reports from network members could have allowed us to determine the actual HPV vaccine viewpoints of network members rather than participants' perceptions of these viewpoints. Nonetheless, according to the Theory of Planned Behavior, it is individuals' perception of norms (rather than actual norms) that influences their behavior.[13,14] A second limitation of the study is that the study was conducted in a single, urban, academic healthcare setting among parents of children ages 10–12 years old, and thus, the current study results may not generalizable to different environments. Finally, participants were limited to parents who brought their children in for care, and it is possible that parents who don't bring their adolescents to a primary care setting are less supportive of vaccination.

This study suggests that while some African American parents may not have many social contacts who advise them about HPV vaccine, the few advisors parents do have may be influential, and that social processes should be considered in future parental educational interventions.

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Abbreviations:

HPV	Human papillomavirus
AOR	adjusted odds ratio
CI	confidence interval
IQ	median (med), interquartile

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Implications and Contributions:

This study describes social networks for HPV vaccine advice in a sample of African American parents. Most had only a few advisors who were often family. Exposures to pro- and anti-vaccine viewpoints were both associated with vaccine refusal. Results suggest vaccine messaging should aim to reach influential family members.

Table 1.

Characteristics of parents, their children, and their social network for vaccine advice

Characteristic	Overall N=353	Vaccine Acceptors N=192	Vaccine Refusers N=161
Parent's age, med [IQ range]	37 [32, 41]	37 [32, 42]	37 [33, 40]
Female parent, n (%)	332 (94.1)	179 (93.2)	153 (95.0)
Parent's educational attainment, n (%)			
≤High school graduate	160 (45.3)	96 (50)	64 (39.8)
Some college/technical school	148 (41.9)	77 (40.1)	71 (44.1)
College/technical school graduate	45 (12.8)	19 (9.9)	26 (16.2)
Parent has delayed/refused other vaccines for child in the past, n (%)*	31 (8.8)	**10 (5.2)**	**21 (13)**
Child's age, n (%)**			
10 years	74 (21.0)	**19 (9.9)**	**55 (34.2)**
11 years	182 (51.6)	**126 (65.6)**	**56 (34.8)**
12 years	97 (27.5)	**47 (24.5)**	**50 (31.1)**
Female child, n (%)*	152 (43.1)	**73 (38)**	**79 (49.1)**
Child up-to-date with all other vaccines, n (%)	255 (72.2)	135 (70.3)	120 (74.5)
Purpose of visit was health maintenance, n (%)**	321 (92.5)	**186 (97.9)**	**135 (86)**
Number of network members, med [IQ range]	3 [1,4]	3 [1,4]	2 [2,4]
Network density, med [IQ range][a]	100% [100%,100%]	100% [100%, 100%]	100% [90%,100%]
Percentage of network who are women, med [IQ range]	100% [66.7%,100%]	100% [66.7%, 100%]	100% [66.7%,100%]
Percentage of network who are African American, med [IQ range]	100% [100%,100%]	100% [100%, 100%]	100% [100%,100%]
Percentage of network who are ≥40 years old, med [IQ range]	66.7% [50%,100%]	66.7% [33.3%, 100%]	71.4% [50%,100%]
Percentage of network with children of their own, med [IQ range]	100% [100%,100%]	100% [100%, 100%]	100% [80%,100%]
Percentage of network who are family members/significant others, med [IQ range]	66.7% [33.3%,100%]	66.7% [33.3%, 100%]	66.7% [33.3%,100%]
Network includes, n (%)			
Spouse or significant other	103 (29.2)	51 (26.6)	52 (32.3)
≥1 non-spouse family member	307 (87)	166 (86.5)	141 (87.6)
≥1 friend	161 (45.6)	82 (42.7)	79 (49.1)
≥1 coworker or classmate	20 (5.7)	13 (6.8)	7 (4.4)
≥1 counselor, therapist or religious leader	7 (2)	1 (0.5)	6 (3.7)

[a]Only includes the 345 participants (190 vaccine acceptors and 155 refusers) with ≥2 members in his/her vaccine advice network.

Boldface indicates statistical significance (*p<0.05, **p<0.001). Median (med), interquartile (IQ).

Table 2.

"*How much do you trust the following sources for vaccine advice?*" n (%)

	Overall N=353	Vaccine Acceptors N=192	Vaccine Refusers N=161
Family members			
not at all	65 (18.4)	31 (16.2)	34 (21.1)
some	217 (61.5)	115 (59.9)	102 (63.4)
a lot	71 (20.1)	46 (24)	25 (15.5)
Friends			
not at all	65 (18.4)	**31 (16.2)**	**34 (21.1)**
some	244 (69.1)	**130 (67.7)**	**114 (70.8)**
a lot	44 (12.5)	**31 (16.2)**	**13 (8.1)**
Other people in your community			
not at all	131 (37.1)	65 (33.9)	66 (41)
some	200 (56.7)	113 (58.9)	87 (54)
a lot	22 (6.2)	14 (7.3)	8 (5)

Boldface indicates statistical significance ($p<0.05$).

Table 3.

Exposure to anti- and pro-HPV vaccine viewpoints, and their associations with HPV vaccine refusal

	Vaccine Acceptors N=67	Vaccine Refusers N=80	OR (95% CI)	Adjusted OR (95% CI)[a]
Measures of high exposure to anti-HPV vaccine viewpoints				
Half or more of all friends and family think that the HPV vaccine is dangerous or could cause a bad reaction	15 (22.4)	25 (31.3)		
Half or more of all friends and family worry that African Americans are being targeted for HPV vaccine while it is still somewhat experimental**[b]	**19 (28.4)**	**39 (49.4)**		
Half or more of all friends and family are strongly against HPV vaccine***	**7 (10.5)**	**28 (35)**		
Half or more of all friends and family discourage you from getting your child the HPV vaccine	10 (14.9)	12 (15)		
In the last 6 months, friends or family members have said negative things about the HPV vaccine to you*	**31 (46.3)**	**50 (62.5)**		
Overall high exposure to anti-HPV vaccine viewpoints			**1.5 (1.03, 2.1)***	**1.5 (1.01, 2.3)***
Measures of low exposure to pro-HPV vaccine viewpoints				
Fewer than half of all friends and family think that people who refuse the HPV vaccine are at risk for getting cervical cancer or genital warts*[b]	**31 (46.3)**	**50 (65.8)**		
Fewer than half of all friends and family think HPV vaccine is good at protecting children against cervical cancer or genital warts**[b]	**15 (22.4)**	**38 (48.7)**		
Overall low exposure to pro-HPV vaccine viewpoints			**1.7 (1.2, 2.5)****	**1.7 (1.2, 2.6)****

[a]Model includes: high exposure to anti-HPV vaccine viewpoints, low exposure to pro-HPV vaccine viewpoints, trust in social contacts for vaccine advice, child's age, child's sex, parental history of vaccine refusal or delay, and reason for the healthcare visit. Model building included the subset of 147 parents who have ever discussed HPV vaccine with social contacts.

[b]N is less than 147 due to missing values.

Boldface indicates statistical significance (*p<0.05, **p<0.01, ***p<0.001).