

Testing a Multicomponent Intervention to Increase Pap Uptake and HPV Vaccination Knowledge and Acceptability among Black Women

Kimlin Ashing^{1*}, Camille Ragin², Ndifreke Etim^{1,3}

¹City of Hope Beckman Research Institute – Division of Health Equities, 1500 E Duarte Rd, Duarte, CA 91030, USA. ²Fox Chase Cancer Center, Philadelphia, PA 19111 ³Claremont Graduate University, School of Global Health

*Corresponding Author: Email: kashing@coh.org

ABSTRACT

Women were recruited from two socioeconomically and ethnically similar regions to participate in the intervention. Regions were assigned to one of two conditions: print only or print plus media-based social marketing. Baseline and follow-up data were collected and analyzed using univariate and bivariate statistical approaches. There was a statistically significant relationship between intervention condition and reporting a Pap test at follow up ($p = .013$). Compared to women in the print only condition, women in the print plus media-based social marketing condition reported significantly increased Pap testing. Across both conditions, intention to receive Pap testing was high. In the print only condition, 37 out of 40 (92.5%) participants reported intention to receive Pap screening within two years, while 47 out of 57 (82.5%) participants in the print and media condition reported intention to have a test within two years. HPV knowledge increased among all participants with no differences across intervention condition. The print only group reported no change in Pap test completion at follow up. However, the enhanced trial condition showed a 25% increase in Pap testing from baseline to follow-up. Therefore, in both intervention conditions, HPV knowledge and HPV acceptability significantly increased from baseline to follow-up among all participants. This study suggests a multicomponent media-based social marketing strategy may be useful in promoting Pap testing and knowledge about HPV among Black women.

KEYWORDS: Kindly add.

Citation: Ashing K et al (2020) Testing a Multicomponent Intervention to Increase Pap Uptake and HPV Vaccination Knowledge and Acceptability among Black Women. Research Reports doi:10.9777/chd.2020.1006

INTRODUCTION

Black women in the United States suffer the greatest cervical cancer disparity. Blacks have the highest cervical cancer incidence – 41% higher than white women – and are twice as likely to die from the disease than their white counterparts (DeSantis et al., 2016). Although Pap test and human papillomavirus vaccination (HPV) offer the potential to prevent and even eradicate cervical cancer, Black women continue to be disproportionately burdened. Therefore, the reduction and elimination of persistent and troubling HPV-related cancer disparity among Black women ought to be prioritized.

The current guidelines for cervical cancer screening recommend women begin Pap testing at age 21 and continue screening every three years until age 29. From age 30-65, women can continue screening every three years or at five year intervals if their Pap test also includes an HPV test and there is no past positive screening result. The guideline for HPV is the two vaccine series administered 6 to 12 months apart for individuals starting the series before age 15, and the three vaccine series for teens and young adults 15 to 26 years old. The second dose of the three vaccine series is administered 1-2 months after initiation and the third dose at 6 months (Centers for Disease Control and Prevention, 2016). Despite the recommendations, Pap-testing and HPV uptake among Blacks fall short of Healthy People 2020 goals of 93% and 85%, respectively. Blacks' HPV vaccination coverage is 37.4%, which is lower than the national coverage of 44.8%, and their Pap testing rate is 74% (Arnett et al., 2016). Low HPV vaccine uptake and underutilization of Pap screening in this population may be partly a function of lack of knowledge (Ashing et al., 2017; Blackman et al., 2013; Galbraith et al., 2016), absence of medical homes, and non-

recommendation by providers of these cancer prevention and control strategies (Centers for Disease Control and Prevention, 2016; Galbraith et al., 2016). Blacks' knowledge of HPV and Pap testing lags behind non-Hispanic Whites (Ashing et al., 2017), and Blacks are less likely to have a medical home or utilize primary care (Arnett et al., 2016).

Many of the barriers to uptake in this population will need broader social and policy level interventions, but issues such as acceptability and lack of knowledge can be successfully addressed at the community and individual level. For example, an educational intervention among African American college students reported a statistically significant increase in participants' knowledge post-intervention and high participant affirmation of intention to get regular Pap smears (94%) and the HPV vaccine (87%) (Staples et al., 2018). Other strategies that have proved efficacious in increasing Pap test uptake and knowledge and acceptability of HPV among minorities include access-enhancing programs, community interventions, approaches directed at individuals, culturally and ethnically tailored materials, and mass media campaigns (Chan et al., 2015; Han et al., 2011).

Mass media have been used extensively in social marketing campaigns for various types of health behavior change (Hall et al., 2015; Wakefield et al., 2010). This form of intervention offers a cost-effective way to reach large, dispersed populations and is particularly useful in realizing episodic or one-time behaviors. In the context of cervical cancer prevention, the evidence suggests combining mass media and social marketing with other types of tailored interventions such as reminder letters results in increases in Pap screening (Wakefield et al., 2010). In one intervention, researchers used social marketing

that combined radio public service announcements, doctor's recommendation, posters, and brochures targeting parents and providers to increase HPVV among preteen boys (Cates et al., 2014). Social marketing is a program planning and implementation process that applies commercial marketing concepts and techniques to promote voluntary attitude and behavior change (Nowak et al., 2015).

While these strategies have proven efficacious, only a few interventions have attempted to increase HPVV acceptability (Galbraith et al., 2016), and even fewer simultaneously attempt to increase Pap uptake and HPVV knowledge and acceptability among African American women. Within the Black culture, women, including grandmothers, play a central role in health decision-making (Kennedy et al., 2007). Therefore, targeting women of all ages for the intervention seems an efficient approach to increase Pap testing among women and concurrently influence HPVV acceptability and uptake within families.

The purpose of this study was to assess the efficacy of a multicomponent trial intervention to increase Pap testing and HPVV knowledge and acceptability among African American women in two California counties.

METHODS

This behavioral trial was conducted in collaboration with community partners to enhance cultural and community relevance. We readily gained community buy-in because of the documented elevated cervical cancer prevalence and mortality in California. Our community partners formed an active advisory council made up of health leaders from community-based health organizations. The advisory council guided the overall trial including the recruitment and intervention protocol. They also advised on best

platforms for the intervention, hosted health fairs, and posted fliers at their community sites. The intervention strategies were informed by an effective Pap testing media campaign conducted by the Los Angeles County Office of Women's Health (Stone-Francisco et al., 2003). Thus, our intervention integrated a community engaged approach and a social marketing intervention to increase Pap testing and HPVV knowledge and acceptability.

Setting

The study was conducted across sub-urban cities within the San Gabriel Valley area of Los Angeles County, which served as the mailed intervention region; and sub-urban cities in Riverside County, which served as the enhanced intervention region. The targeted regions, each of which was treated as a cluster, have similar demographics including ethnicity (40% Latino, 5% Black); median age (36.4); median household income (\$65,744); high school graduation rate (about 70%); and number of foreign born residents (about 35%). These regions are approximately 55 miles apart. The distance reduces the likelihood of intervention contamination.

Participants

Inclusion Criteria and Justification. African American women 18 years or older living in these two socioeconomically and ethnically similar regions were invited to participate in the study. Women were excluded if they had any type of cancer diagnosis history because the medical characteristics (e.g. disease progression, prognosis) and perceptions (e.g. health care seeking behaviors) are significantly different for these women. Additionally, women with other major medical conditions (e.g. stroke and degenerative illness) who are likely to present with distinct medical and quality of life issues were excluded.

Procedures

Participant Recruitment and Enrollment. We used a multi-method recruitment approach that combined passive strategies – posting fliers at community centers and health clinics – and active strategies – distributing invitation fliers via community health networks, and direct participant invitation at various community cultural and health events. Study advertisements included contact details for the research team. Recruitment, enrollment and participation followed all Institutional Review Board (IRB) and other regulatory procedures. All participants signed an informed consent form to participate in the study.

We send pre-intervention study packets to all women who expressed an interest in participating. The packets contained a letter of invitation that described the study; an informed consent form; the questionnaire; and a self addressed, stamped envelope. Three weeks after initial mailing, a research assistant (RA) made a follow-up telephone call if no response was received. When a call was received from a potential participant and/or when the RA called, the RA described the study, reviewed the consent form, and answered any questions regarding the study. The preferred method of survey completion was mail; however, potential participants who were slow to respond were given the choice of completing the survey by mail or by telephone. The telephonic means of data collection allowed for the inclusion of women with low literacy. Additionally, participants recruited at community events were given the choice to return the completed survey the same day or to return the survey via mail. Recruitment and enrollment were conducted over a three-month period. Study participants were provided with a \$20 gift card.

Trial Intervention Conditions. This trial was informed by the social marketing approaches and

materials from the CDC; NIH; and a successful social marketing CCA prevention initiative launched by the Los Angeles County Department of Public Health, Office of Women’s Health (The Multiethnic Cervical Cancer Prevention and Education Initiative). The County’s Multiethnic initiative resulted in 17,747 CCA screenings, 10% of which were abnormal.

Our social marketing strategy used traditional media outlets (e.g., local TV and radio, ethnic newspapers, and circulars) and direct mailing to deliver the intervention. The study was titled “End Stigma, End Fear, and End Cervical Cancer”. Each study region was assigned to one of two intervention conditions: 1) The enhanced intervention using traditional media plus direct mailing of printed materials with Pap test and HPV resources and 2) Direct mailing of printed materials with Pap test and HPV resources, only.

Women in the enhanced intervention region were exposed to public service announcements (PSAs) on public access TV and radio, and printed information posted in community circulars and newspapers distributed in the targeted region. PSAs, developed by the study team in collaboration with community partners, were aired each day at 11a.m. and 8p.m. for three months. This schedule was intended to increase exposure while reducing cost. The intervention content included information about Pap Testing, HPV and HPV resources, and health clinics and facilities that offered free or low-cost Pap testing and HPV resources.

At three months post intervention (6 months post baseline), we mailed post-intervention packets that contained a “thank you” letter, the questionnaire, and a self-addressed, stamped envelope to all enrolled participants. Two follow-up phone calls were made to encourage participants to return the questionnaires.

Measure

Participants were assessed at two time points: baseline and post-intervention. Participants completed a self-report assessment comprised of standardized measures (e.g., MOS social support), items drawn from related studies, and new items generated from the lead author's previous research with multiethnic samples (Ashing et al., 2017; Blackman et al., 2013; Lim and Ashing-Giwa, 2011; Ragin et al., 2017). The questionnaire included items that queried medical history, Pap test completion, HPV knowledge, HPV vaccine attitude, stigma, life stress, health care utilization, quality of health care, sexual practices, and demographic variables. One item queried Pap test intention and completion (When do you plan to have your next pap test?); three items queried Pap test knowledge (e.g. Can Pap test find abnormal cervical cancer cells early?); three items queried HPV knowledge (e.g. Do you think you can get HPV through sexual contact? Can HPV cause certain cancers?); and three items queried HPV vaccine acceptability (e.g. Would you/have you ever recommended that a relative or friend get the HPV vaccine?). The questionnaire took about 35-45 minutes to be completed.

Outcome measures

Primary outcome measures in the analysis were knowledge and beliefs about pap testing and HPV vaccine, intention to receive Pap test, Pap test completion, and HPVV acceptability. Pap test knowledge was examined using three questions that examined participants' knowledge about the benefit of regular pap tests, where to get more information about PAP testing, and where to refer someone to receive the Pap test. Pap test acceptability items asked about their perceptions of the cost and safety of Pap test, and willingness to recommend Pap testing to a friend. Pap test completion was assessed by asking participants if they intend to receive a pap test within the next

year. HPV vaccine knowledge was examined using two questions that examined participants' knowledge of ever hearing of HPV vaccine to prevent cervical cancer and knowledge that you can get HPV through sexual contact. HPV vaccine acceptability was measured from participants' responses to three items that asked participants if they would recommend HPV vaccine to a relative or friend, if the vaccine cost too much, and if they believed the HPV vaccine is safe. The items for knowledge and acceptability were summed to obtain a composite score measuring knowledge and acceptability of HPV vaccine and pap test.

Data Analysis

Data analysis was conducted using SPSS version 24. An alpha level of .05 was chosen for all statistical tests. To check for differences between experimental conditions at baseline, t-tests were used for scales and chi-square tests or Fishers Exact Tests were performed for categorical data as needed. Chi-square test was used to examine if there was a relationship between plan to receive the Pap test within two years between intervention groups. Analysis was conducted separately for those who had reported having had a Pap test and those who did not report a Pap test at baseline. Repeated measure ANOVA was used to examine changes in HPV vaccine knowledge and acceptability between intervention groups from pretest to posttest.

RESULTS

The study sample consisted of 141 participants aged 18 years and above, with a mean age of 46.13 ($SD= 14.09$). Overall, 35.8% of participants were between 40-54 years old; 49.3% had some college/Associate degree education; 61% reported having private insurance; 44% had over \$45K yearly income; 27% lived with a partner and children; and 42% were partnered. Our analysis showed a significant difference in educational

status between intervention conditions ($\chi^2 (2) = 9.77, p = .008$). Those in the enhanced intervention condition were more likely to report having a college degree or more (49.1%) compared to the direct mailing only condition (24.1%). There were no significant differences mean age ($t = -0.61, p = .541$), marital status ($\chi^2 (1) = 0.002, p = .963$), income ($\chi^2 (2) = 0.09, p = .954$) or having private insurance ($\chi^2 (1) = 3.39, p = .066$). For the enhanced intervention delivery, we used of multiple channels – radio, TV, newspapers, and circulars. Eight-seven percent of the enhanced intervention trial participant indicated that they were exposed to at least two of the intervention condition.

Pap test knowledge and completion

There was no overall significant increase in knowledge from baseline to follow up ($p = .956$); and no significant difference between groups in Pap knowledge at follow up ($p = .632$). Fisher's exact test was used to examine the relationship between trial conditions and Pap testing completion at follow up among 44 African American women who did not report having had a Pap test. There was a significant relationship between intervention group and reporting a Pap test at follow up, ($p = .013$). None of the participants in the print only group reported a pap test at follow up. However, the enhanced trial condition showed a 25% increase in Pap testing from baseline to follow-up with 4 out of 16 participants in the enhanced intervention reported having had a pap test at follow up.

Intent to receive Pap test in the future

Chi-square tests and Fisher's Exact tests were used to compare demographic, knowledge and beliefs

for those who reported an intention to test within two years and those who did not. There were no significant difference between both groups at $p < .05$ level. For those who did not report a Pap test at baseline, there was a non-significant trend when comparing the relationship between intervention group condition and intention to have a Pap test within two years ($\chi^2 (1) = 2.45, p = .107$). In the print only condition, 9 out of 28 (32%) participants reported an intention to receive Pap screening within two years, while 9 out of 16 (56%) of participants in the enhanced intervention condition reported an intention to have a test within two years.

Among those who had reported a Pap test at baseline, there was a significant relationship between intervention trial group and intention to have a Pap test within two years ($\chi^2 (1) = 19.83, p < .001$). In the print only group, 28 out of 56 (50%) participants reported an intention to receive Pap screening within two years, while 38 out of 41 (92.6%) of participants in the print and media group reported an intention to have a test within two years.

HPV Vaccine knowledge

A mixed-design repeated-measure ANOVA revealed no significant effect of the enhanced intervention group ($F(1, 95) = 1.57, p = .213$) or time-by-group interaction ($F(1, 95) = 0.18, p = .674$) on HPV knowledge. However, there was a significant effect of time on HPV knowledge, $F(1, 95) = 5.79, p = .018, \eta^2 = .06$. This indicates both intervention conditions showed increases on HPV knowledge. Therefore, in both intervention conditions, HPV knowledge significantly increased from baseline to follow-up among all participants.

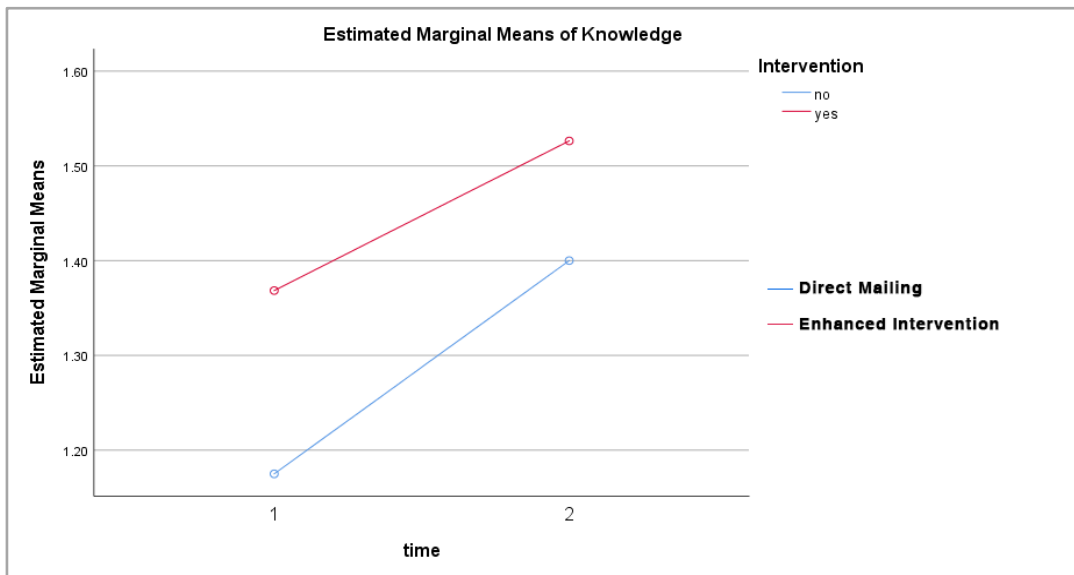


Figure 1. Results of mixed-design repeated-measure ANOVA showing change in HPV knowledge between groups

HPV Vaccine Acceptability

There was no significant effect of enhanced intervention condition on HPV acceptability $F(1, 95) = 0.51, p < .478$. Similarly, no time-by-intervention interaction was found ($P = .497, \eta^2 = 0.005$). However, there was a statistically significant effect of time on HPV acceptability, $F(1, 95) = 53.37, p < .001, \eta^2 = 0.36$. Both intervention conditions improved on HPV acceptability. Follow-up

univariate analyses using paired t-test confirmed significant increases in acceptability between the pretest and posttest for both the direct mailing condition ($t = -4.64, p < .001$), and the enhanced intervention condition ($t = -5.95, p < .001$). Therefore, in both trial conditions, HPV acceptability significantly increased from baseline to follow-up.

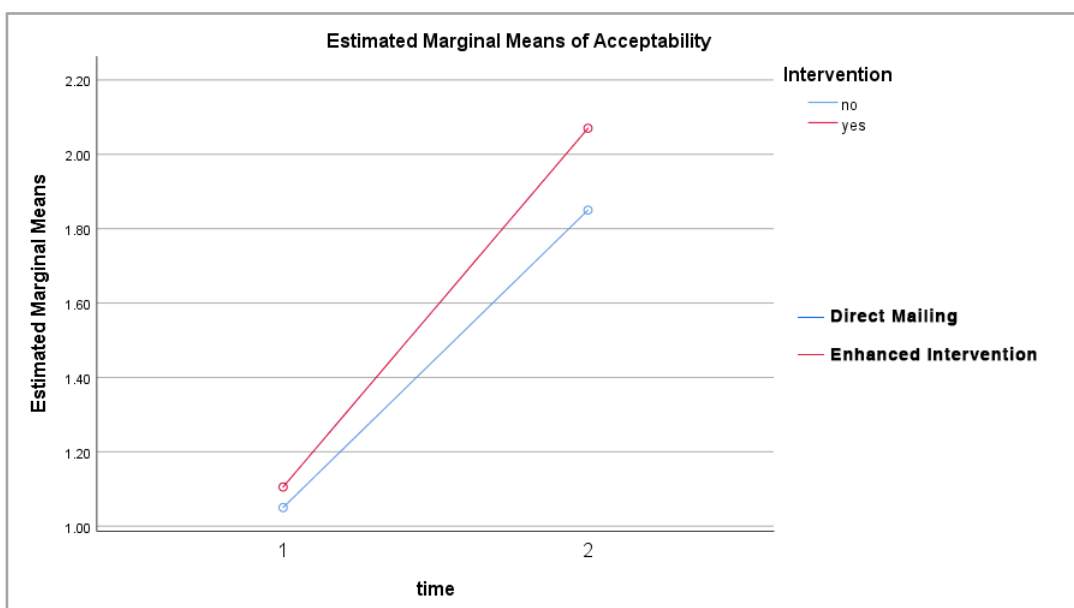


Figure 2. Results of paired t-test showing increase in HPV Acceptability from baseline to follow-up.

Table 1. Mean and standard deviations for HPV knowledge and acceptability.

	Print only		Print and media	
	Baseline	Follow up	Baseline	Follow up
HPV Knowledge	1.18 (0.12)	1.40 (0.11)	1.37 (0.10)	1.53 (0.09)
HPV Acceptability	1.05 (0.18)	1.85 (0.17)	1.11 (0.15)	1.07 (0.14)

DISCUSSION

HPV vaccination and early detection through Pap screening are critical to cervical cancer prevention and control, but only 39% of African American women receive an early cervical cancer diagnosis compared to 48% of non-Hispanic whites (Ashing et al., 2017). African American women also have a poorer prognosis and higher mortality than their white counterparts. In addition, despite this greater HPV related cancer burden, African Americans have unacceptably low HPVV. There is an urgent need to reduce cervical cancer disparities among African Americans by implementing and disseminating interventions that increase knowledge and timely uptake of HPV vaccination and Pap testing.

The results of this study suggest a multicomponent approach has the potential to increase Pap testing in this population. At follow up, more participants in enhanced intervention reported having a Pap test than participants assigned to the direct mailing condition. Adding the enhanced media-based social marketing component, therefore, increased the effectiveness of the intervention in boosting Pap test uptake. This finding adds to the growing evidence in support of interventions that use multiple strategies versus a single-focus approach (Han et al., 2011). It also suggests there is utility in fusing media, community-based approaches, and social marketing strategies in

interventions to increase Pap testing among African American women.

In African American populations, mass media and in particular Black media have been identified as an effective health promotion communication tool (Hall et al., 2015). The Centers for Disease Control (CDC), for example, used radio advertisements and small media to enhance the reach and impact of the agency's African American Women and Mass Media (AAMM) campaign (Hall et al., 2015). Evaluation of the AAMM showed the program reached target audience and resulted in increased awareness of breast cancer screening services. Based on the preliminary results of our study, it is worth exploring further how adding a social marketing component can make media interventions even more appealing to African American women and reduce barriers to Pap uptake.

The added benefit of the enhanced intervention was not realized for HPVV outcomes. Specifically, regarding HPVV knowledge and acceptability, adding the social marketing component did not result in statistically significant differences across trial conditions. Comparison of baseline and follow up results shows, overall, the trial was effective in significantly increasing African American/Black women's knowledge and acceptability of HPVV. Therefore, among African Americans in our sample, targeted, media-based social marketing

did not provide added value in reducing HPVV hesitance and improving HPVV. This finding is a little surprising. Considering the success of social marketing in health promotion (Stead et al., 2007), we anticipated the enhanced intervention would show greater efficacy in increasing HPVV knowledge and acceptability.

As this study focused on HPVV acceptability relevant to adolescent vaccination, it is plausible that cultural factors relevant to sexual beliefs and practices may be potent barriers. Therefore, research to increase HPVV among Blacks may need to closely attend to and address cultural and health system factors.

LIMITATIONS AND CONCLUSION

The findings reported here should be interpreted within the limitations of this study. First, the study relied on self-report. However, the responses and scores on the outcome measures seem reasonable and realistic. It would be useful for future studies to also include objective measures, such as medical chart reviews for Pap testing and HPVV, as complements for subjective assessments. For the enhanced intervention delivery, we used multiple channels – radio, TV, newspapers, and circulars. Eight-seven percent of the enhanced intervention trial participant indicated that they were exposed to at least two of the intervention condition. However, we did not measure frequency and duration of exposure. Also, our media channels were limited to local outlets, only. This may have limited the impact compared to using larger outlets with broader foothold in African American/Black markets. However, utilizing larger media outlets would have disseminate the enhanced intervention to women in regions assigned to the direct mailing condition.

Despite the limitations, this study makes an important contribution to the small but growing

research on intervention strategies to increase Pap and HPVV. Overall, this study suggests a multicomponent, media-based social marketing strategy that is informed by the community may be useful in promoting Pap testing and providing information about HPVV. Both the direct mail of the printed resources and the enhanced approach showed the potential to significantly boost knowledge and acceptability of HPVV among African American women.

In summary, studies targeting women for both HPVV and Pap testing improvements are critical since women are often the health decision-makers for themselves and adolescents within families. There is need for greater understanding of multi-level (including health systems and providers) and multi-channel best practices targeting behavior change to increase Pap testing and HPVV. Further, since the vaccine is now approved for individuals 9-45 years old, giving an opportunity for HPV-related cancer prevention among youth to middle-adulthood, future studies will need to develop and disseminate effective strategies for targeting African Americans/Blacks and other groups to vaccinate their adolescents and themselves.

Acknowledgement

This research received funding from the City of Hope Excellence Award, and did not receive any support from funding agencies in the public or commercial sectors. The authors wish to thank the participants for the study for sharing their experiences. We thank Dr Lenna Dawkins-Moulton for her assistance in formatting this manuscript for submission.

Conflicts of interest

The authors declare that they have no conflict of interest.

Authors' contributions

Kimlin Ashing led the overall study and writing. Camille Ragin and Ndifreke Etim contributed to the conceptualization and writing. Dr Etim contributed to the data analyses.

REFERENCES

- Arnett, M. J., Thorpe, R. J., Gaskin, D. J., Bowie, J. V., and LaVeist, T. A. (2016). Race, medical mistrust, and segregation in primary care as usual source of care: findings from the exploring health disparities in integrated communities study. *J. Urban Health* 93, 456-467.
- Ashing, K. T., Carrington, A., Ragin, C., and 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, 1341-1347.
- Blackman, E., Thurman, N., Halliday, D., Butler, R., Francis, D., Joseph, M., Thompson, J., Akers, A., Andraos-Selim, C., Bondzi, C., and Taioli, E. (2013). Multicenter study of human papillomavirus and the human papillomavirus vaccine: knowledge and attitudes among people of African descent. *Infect. Dis. Obstet. Gynecol.* 2013, 1-9.
- Cates, J. R., Diehl, S. J., Crandell, J. L., and Coyne-Beasley, T. (2014). Intervention effects from a social marketing campaign to promote HPV vaccination in preteen boys. *Vaccine* 32, 4171-4178.
- Centers for Disease Control and Prevention. (2016). HPV Vaccine Recommendation, <https://www.cdc.gov/vaccines/vpd/hpv/hcp/recommendations.html>.
- Chan, D. N., and So, W. K. (2015). A systematic review of randomised controlled trials examining the effectiveness of breast and cervical cancer screening interventions for ethnic minority women. *Eur. J. Oncol. Nurs.* 19, 536-553.
- DeSantis, C. E., Siegel, R. L., Sauer, A. G., Miller, K. D., Fedewa, S. A., Alcaraz, K. I., and Jemal, A. (2016). Cancer statistics for African Americans, 2016: progress and opportunities in reducing racial disparities. *CA: Cancer J. Clin.* 66, 290-308.
- Galbraith, K. V., Lechuga, J., Jenerette, C. M., Moore, L. A. D., Palmer, M. H., and Hamilton, J. B. (2016). Parental acceptance and uptake of the HPV vaccine among African-Americans and Latinos in the United States: A literature review. *Soc. Sci. Med.* 159, 116-126.
- Hall, I. J., Johnson-Turbes, A., Berkowitz, Z., and Zavahir, Y. (2015). The African American Women and Mass Media (AAMM) campaign in Georgia: quantifying community response to a CDC pilot campaign. *Cancer Causes Control* 26, 787-794.
- Han, H. R., Kim, J., Lee, J. E., Hedlin, H. K., Song, H., Song, Y., and Kim, M. T. (2011). Interventions that increase use of Pap tests among ethnic minority women: a meta-analysis. *Psychooncology*, 20, 341-351.
- Kennedy, B. M., Ard, J. D., Harrison Jr, L., Conish, B. K., Kennedy, E., Levy, E. J., and Brantley, P. J. (2007). Cultural characteristics of African Americans: implications for the design of trials that target behavior and health promotion programs. *Ethn. Dis.* 17, 548-554.
- Lim, J. W., and Ashing-Giwa, K. T. (2011). Examining the effect of minority status and neighborhood characteristics on cervical cancer survival outcomes. *Gynecol. Oncol.* 121, 87-93.
- Nowak, G. J., Gellin, B. G., MacDonald, N. E., and Butler, R. (2015). Addressing vaccine hesitancy: the potential value of commercial and social marketing principles and practices. *Vaccine* 33, 4204-4211.
- Ragin, C., Blackman, E., Roberts, R., Butler, R., Gatherer, S., Halliday, D., and Ashing, K. (2017). Cancer in populations of African ancestry: Studies of the African Caribbean Cancer Consortium. *Cancer Causes Control* 28, 1173-1176.
- Staples, J. N., Wong, M. S., and Rimel, B. J. (2018). An educational intervention to improve human papillomavirus (HPV) and cervical cancer knowledge among African American college students. *Gynecol. Oncol.* 149, 101-105.
- Stead, M., Gordon, R., Angus, K., and McDermott, L. (2007). A systematic review of social marketing effectiveness. *Health Educ.* 107, 126-191.
- Stone-Francisco, S., Gonzaga, G., and Samuels, S.E. (2003). Los Angeles County Office of Women's Health Cervical Cancer Prevention and Education Initiative: Analysis of Mass Media Campaign and Hotline, Final Report, http://publichealth.lacounty.gov/owh/docs/finalrpt_ccpei.pdf.
- Wakefield, M. A., Loken, B., and Hornik, R. C. (2010). Use of mass media campaigns to change health behaviour. *Lancet* 376, 1261-1271.