



# Awareness and Knowledge of Human Papilloma Virus and Cervical Cancer in Women with High Pap Uptake

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## Abstract

This cross-sectional study explored knowledge, awareness, and health practices surrounding cervical cancer prevention and screening. Patients ( $n = 129$ ) were recruited from three community clinics of underserved populations in Dallas, Texas. Women between ages 18–65 were surveyed using a self-administered questionnaire to evaluate their knowledge, awareness, and attitudes related to pap tests, human papilloma virus (HPV), HPV vaccines, and cervical cancer. Most women reported having a pap test in the past 3–5 years (86.6%). Over half knew that there was an increased risk of cervical cancer with an HPV infection, abnormal pap test, or both (52%). However, less than half of women knew the purpose of a pap test (40%), the purpose of the HPV vaccine (48%), or the transmission mode of HPV (25%). Over half of participants first heard about a pap test from a doctor (60%), about one quarter from their mother (24%), and less than a quarter from others (16%). More than half of women were aware of HPV (55%), while less than half were aware of the HPV vaccine (48%). Overall, we found that while most women had a high uptake of pap tests, they had low knowledge of the purpose of a pap test, the HPV vaccine, and transmission mode of HPV. They also had low awareness of HPV and the HPV vaccine. Given that almost all cases of cervical cancer are due to HPV infection, future studies should aim to further explore the gap between knowledge and awareness of HPV and pap uptake.

**Keywords** Cervical cancer screening · Pap test · HPV vaccine · Community-based participatory research · Underserved

## Introduction

Cervical cancer incidence and mortality rates dropped by over 50% between 1975 and 2013 [1]. An increase in women getting regular Papanicolaou (pap) tests, the primary screening tool for cervical cancer [2], has been the largest contributor to the dramatic declines in both cervical cancer cases and deaths [3]. Between 2013 and 2015, almost three-quarters of

women in the U.S. reported getting a pap test [4]. Cervical cancer screening recommendations vary by national organizations and patient characteristics. In general, pap testing is recommended every 3–5 years among women ages 21–65 [2]. More recently, HPV testing and vaccinations have been offered as additional screening tools. The HPV vaccine is recommended for both females and males up to age 26 [5, 6]. However, implementation of the HPV vaccine series has had its challenges as many people choose not to get vaccinated and many teens do not complete the vaccine series [7, 8]. In the US, only about 60% of parents choose to vaccinate their children, including boys and girls [7]. In 2016, only 60% of teens aged 13–17 received one or more doses of the HPV vaccine [8]. Overall, only 43% of teens received the recommended three doses of the vaccine [8]. Health disparities continue to exist by race, ethnicity, income and urbanity, which contribute to higher cervical cancer rates and mortality among racial and ethnic groups [9].

Various factors may impact the higher cervical cancer morbidity and mortality risk among underrepresented minority groups. Social support has been found to be

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positively associated with pap test uptake, with social connectedness as a moderating factor between education and increased pap test compliance [10–12]. Knowledge, awareness, and mother's influence have also been shown to impact cervical cancer screening behaviors in previous studies [13–16]. Among homeless women, lack of knowledge about pap test frequency recommendations and the relationship between HPV and abnormal pap tests has been associated with a lower number of up-to-date pap tests [13]. Among Latino women, education about the low risk of side effects, consequences of persistent HPV, and sexuality-related concerns may increase HPV vaccination [14]. In another study, despite a high number of women reporting awareness of the HPV vaccine, less than half of Latina women were "extremely likely" to accept the HPV vaccine for a hypothetical daughter, and only half of those who had a daughter reported vaccinating their daughter [14]. Mothers who discuss sex, sexually transmitted diseases, and contraception with their daughters are more likely to report vaccine initiation in girls [15]. In metropolitan areas, high-income girls and girls whose mothers completed college are more likely to initiate vaccination [16]. In nonmetropolitan areas, low-income girls and girls whose mothers did not complete high school are more likely to initiate vaccination, while girls whose mothers have healthcare cost barriers are less likely to initiate vaccination [16].

Several factors have been identified that are associated with pap test and HPV vaccine uptake, but there is limited data surrounding the role that knowledge and awareness play in cervical cancer-related health behaviors in the U.S., particularly among underrepresented women. Given the racial and ethnic disparities that exist in U.S. cervical cancer incidences and deaths, we sought to evaluate cervical cancer-related health knowledge and awareness among women attending community clinics with a high number of African American and Hispanic patients in Dallas, Texas. We explored the relations between these factors and health behaviors and intentions to better define underlying causes of health disparities in cervical cancer morbidity and mortality.

The objective of this study was twofold: (1) to describe the knowledge, awareness, attitudes and perceptions of mother's influence related to cervical cancer screenings and (2) determine the influence of these factors on women's likelihood of receiving appropriately-timed pap tests.

## Methods

### Participants and Setting

In this cross-sectional study, a convenience sample of women were recruited from three community clinics in Dallas, Texas that primarily serve a low-income population.

Inclusion criteria were females ages 18–65 who were able to read and write in English or Spanish. Women were recruited by appropriately-trained front desk staff to complete a self-administered questionnaire.

### Survey

Data were obtained using an anonymous self-administered questionnaire developed by the investigators based on previous studies. The survey included thirty questions total and was divided into four categories: (1) knowledge, (2) awareness, (3) attitudes, and (4) mother's influence on cervical cancer screening. Survey questions addressed cervical cancer, pap tests, HPV vaccines, and mother's influence. For example, women were asked if they knew the purpose of a pap test, if their mother encouraged them to get a pap test, and whether they plan to talk to their daughters about getting a pap test when she is old enough. The survey also included demographic and health-related characteristics. The questionnaire was available in English and Spanish and took 10–15 min to complete. A coversheet was placed on the front of the survey, which included a concise summary of the study and self-consent.

### Data collection and Analysis

All information collected from participants was non-identifiable. Participants were asked their language preference and advised that their participation was voluntary and refusal to participate did not have any consequences on their healthcare. Upon completion, the surveys were placed in a drop box at the front desk. These boxes were picked up at the end of each week while the study was active.

Frequencies and percentages were used to report sample characteristics and questions assessing knowledge, awareness, attitudes and mother's influence on cervical cancer screening. Means and standard deviations were used to report Likert scale items (1 = strongly disagree to 5 = strongly agree). Chi square tests were used to determine whether all variables were associated with women's likelihood of receiving a pap test in the past 3–5 years. STATA software was used for descriptive analysis (Version 14.0; Stata Corporation, College Station, Texas) [17].

This study was developed as part of a community-based participatory research training program for Family Medicine residents, the Community Action Research Experience [18]. The CARE program is part of a longitudinal training pipeline designed to train medical students and Family Medicine residents in community-based participatory research methods. The Community Action Research Track (CART) is a program which provides medical students with opportunities to participate in service-learning experiences and community-based participatory research [19]. Data were collected

by two CARE residents and the study was completed by a medical student (MD/MPH).

## Ethical Approval

This study was approved as expedited by the University of Texas Southwestern Medical Center and Parkland Health and Hospital System Institutional Review Boards.

## Results

### Sample Characteristics

A total of 129 women completed the survey (52% English; 48% Spanish). Sample characteristics are provided in Table 1. The majority of women were aged 30–39 years (27.1%) and 40–49 years (27.9%) old. Most women were Hispanic (66%), had high school education or less (64%) and were raised by their mother (68%). Among women who were not born in the US (44%), 78% had been living in the US for over 10 years. Only 3% of women reported that they had no usual source of health care, while 44% reported their usual source of care as the hospital clinic. Most women never had cervical cancer (95%), an abnormal pap test (64%), or a sexually transmitted disease (64%). A majority (86.6%) of women reported having a pap test in the last 3–5 years.

### Knowledge and Awareness

Patient's knowledge of cervical cancer, pap smears and HPV vaccines, mother's influence and advice, and current health behaviors are provided in Table 2. Roughly half of women correctly identified the purpose of a pap test (40%), the purpose of the HPV vaccine (48%), the method of HPV transmission (45%), and the likelihood of developing cervical cancer with HPV and an abnormal pap test (52%). Similar results were found when evaluating women's awareness of HPV and pap tests. Over half (55%) of women had ever heard of HPV while only 48% had heard of the HPV vaccine. More women reported hearing about pap tests from their doctor (60%) compared to their mother (24%) or another person (16%).

### Attitudes

Most women reported that it was important to know their family history of cancer (94%) and if they had a daughter, they planned to talk to them about pap tests when they were old enough (61%). Fewer women reported that they would talk to their daughter about getting a HPV vaccine (34%). Among women aged 26 or younger, only nine women (20%) reported that they planned to receive a HPV vaccine

**Table 1** Sample characteristics (n = 129)

	n	%
Age (years)		
20–29	24	18.6
30–39	35	27.1
40–49	36	27.9
50 +	34	26.4
Race/ethnicity		
Hispanic	83	66.4
African American	32	25.6
Other	10	8.0
Born in the US		
No	55	44.0
Yes	70	56.0
Years living in the US (foreign-born only)		
5–10	12	21.8
Over 10	43	78.2
Raised by		
Mother	80	67.8
Other <sup>a</sup>	23	19.5
More than one caregiver reported	15	12.7
Education		
Less than HS	37	31.1
HS graduate	39	32.8
Technical school	16	13.4
Some college or more	27	22.7
Usual Source of Health Care		
There is no place	4	3.3
Private clinic	7	5.8
Hospital ER	12	9.9
Multiple places	17	14.1
Free community clinic	28	23.1
Hospital clinic	53	43.8
Ever had abnormal pap test		
No	80	64.0
Yes	43	34.4
Never had pap test	2	1.6
Ever had STD		
No	78	63.9
Yes	44	36.1
Ever had cervical cancer		
No	101	95.3
Yes	5	4.7
Pap test in the last 3–5 years		
No	17	13.4
Yes	110	86.6

Frequencies for each question may be less than 129 due to missing responses from questionnaire

<sup>a</sup>Other includes being raised by a grandmother, aunt or other

**Table 2** Patients knowledge of cervical cancer, pap smears and HPV vaccines, mother's influence and advice, and current health behaviors (n = 129)

	n	% correct/yes
<b>Knowledge</b>		
Knowledgeable of purpose of a pap smear	52	40.3
Knowledgeable of purpose of HPV vaccine	30	47.6
Knowledgeable of how women get HPV	58	45.0
Likelihood of cervical cancer with HPV and abnormal pap smear	55	51.9
<b>Awareness</b>		
Ever heard of HPV	71	55.0
Ever heard of HPV vaccine	62	48.4
First heard about pap smears from: <i>Mother</i>	31	24.0
First heard about pap smears from: <i>Doctor</i>	78	60.5
First heard about pap smears from: <i>Other</i>	20	15.5
<b>Attitudes</b>		
Important to know your family history of cancer	119	93.7
If have daughter, plan to talk about pap smears when old enough	75	60.5
If have daughter, have/will talk about HPV vaccine	38	33.9
If under 26, plan on getting HPV vaccine (n = 45)	9	20.0
<b>Mother's influence on cervical cancer screening</b>		
Mother encouraged you to get pap smear	41	33.9
Mother told you what a pap smear was for	40	33.1
Mother got pap smears regularly	42	33.6
	Mean	SD
Mother helped with my decision to get pap smears <sup>a</sup>	3.03	1.31

Frequencies for each question may be less than 129 due to missing responses from questionnaire

<sup>a</sup>Responses collected on Likert scale from 1 = strongly disagree to 5 = strongly agree

compared to 47% who did not plan to receive the HPV vaccine and 33% who did not know.

### Mother's Influence

Few women reported that their mother had an influence on whether or not they received a pap test. Roughly one-third of women reported that their mother encouraged them to get a pap test (34%), told them what a pap test was for (33%), and received pap tests themselves (34%). Women were undecided about whether their mother helped with their decision to get a pap test (*mean* = 3.03).

### Bivariate Analyses

No significant associations were observed between sociodemographic characteristics and women's likelihood of receiving a pap test. Women who reported previously having an abnormal pap test were more likely to have a pap test in the past 3–5 years compared to women who did not have an abnormal pap test ( $p = .03$ ). No significant associations were observed between women's knowledge, awareness, attitudes

and mother's influence and their likelihood of receiving a pap test (all  $p$ 's > 0.05).

### Discussion

The purpose of this study was to measure pap test uptake and evaluate whether cervical cancer-related health knowledge, awareness, attitudes, and perceptions of mother's influence were associated with pap test uptake among women attending community clinics in Dallas, Texas. Our study revealed four important findings.

First, a majority of women (86.6%) in our study received a pap test in the last 3–5 years. This result is comparable to the 2013 national data reporting that about 80% of women 21–65 years old reported having a pap test within the past 3 years [20] yet is lower than national targets (93%) [21]. In the same study, about 77% of Hispanic and 82% of African American women reported having had a pap test in the past 3 years [20].

Second, despite a high prevalence of pap testing, women had comparatively low knowledge and awareness. Women were only knowledgeable and aware about the pap test, HPV

transmission, HPV vaccine, and their connection to cervical cancer about half the time. This is similar to studies that have shown that African American and Hispanic women have inadequate knowledge and awareness of cervical cancer, HPV, and the HPV vaccine [20]. However, it has been shown that younger African American women who had a pap test in the past had slightly higher cervical cancer knowledge [20]. There is also data showing that women with a history of an abnormal pap test had significantly more knowledge regarding cervical cancer [20]. We did not find a significant association between age, race/ethnicity, knowledge, a previous abnormal pap test, or cervical cancer knowledge and pap test uptake. This could be due to sample size, variability in answering questions, and that only women attending clinic were surveyed. Women in our study were less accepting of the HPV vaccine compared to the pap test. They reported low awareness of the HPV vaccine and reported that they were unlikely to either recommend the HPV vaccine to their daughters or get vaccinated themselves. Our results differed from other studies [22, 23]. A study of primarily Spanish-speaking mothers and daughters in Southeast Texas found that prior to an evidence-based intervention, about 60% of mothers planned to get their daughters vaccinated, compared to one-third of the women that we surveyed [22]. Another study by Barnack-Tavlaris et al. found that more women were aware of the HPV vaccine and those women were more likely to say they would get vaccinated or vaccinate their daughters [23]. In their study, about 70% of women aged 18–27 years old were aware of the vaccine and almost 60% were interested in getting vaccinated, while about 80% of mothers were aware and almost 60% of those were interested in getting their daughters vaccinated [23]. On the other hand, in our study only one-fifth of those younger than 26 years old planned on getting vaccinated, and only one-third of mothers planned to advise their daughters to get the HPV vaccine. Differences here could be due to the verbiage used in the Barnack-Tavlaris study, where some women were asked if they would get their daughters vaccinated if a doctor recommended it [23]. Furthermore, about 20% of women ( $n = 24$ ) included in our study were between the ages of 20–29, and none were younger than 20 years old.

Third, we found that regardless of pap test uptake, women reported low maternal influence and were undecided about whether their mother helped with their decision to get a pap test. Our results are similar to a study by H.W. Kim who surveyed Korean women with daughters aged 13–18 and found that one-quarter had talked to their daughters about the pap test and one-third about the HPV vaccine [24]. Another study by Kindratt and Gonzalez found that stronger maternal relationships during adolescence led to increased pap testing in young adulthood [25]. Many other studies have looked at maternal influence on HPV vaccination and found a positive association between maternal

knowledge, awareness and intent to vaccinate their daughters [22, 26–28]. A study by Chao et al. found that maternal pap test behavior was consistently associated with HPV vaccine initiation among adolescent girls, indicating that maternal attitudes toward prevention influenced vaccine uptake [26]. Spencer et al. also found that maternal history of cervical cancer screening was positively associated with daughters' HPV vaccine uptake [27]. Obulaney et al. conducted an educational intervention with mother/daughter small groups and found that the intervention significantly increased not only HPV vaccine knowledge, but also the intention to vaccinate [22]. A study in Miami-Dade County found that immigrant Latinas greatly valued family support from female relatives for cervical cancer screening and treatment [28]. The differences in our study are likely due to the fact that our study assessed maternal influence from the perspectives of daughters, while many studies assessed maternal intent from the mother's perspective. Additionally, geography and mean age of participants likely played a role.

Fourth, we found that women who had an abnormal pap test previously were more likely to report having had a pap test in the past 3–5 years. A study in Sweden assessed the effects of women receiving abnormal pap test results from the perspective of 20 healthcare professionals [29]. Two clinics were included and experienced different reactions by patients; one clinic reported that women attended follow-up and were eager to take the next steps, while at the other clinic experienced the issue of women failing to follow-up [29]. One obvious difference compared to our study is the geographic location and the demographic we surveyed.

## Strengths and Limitations

Our study has several strengths and limitations. All data were self-reported and surveys were self-administered. Participants varied in which questions they answered, skipping various questions. Although we did not collect data on HPV vaccine uptake, we do not feel this affected our study given our focus was assessing knowledge, awareness, and maternal influence effects on pap test uptake specifically. However, this is another area of potential research that we believe can be explored. Lastly, we did not assess HPV vaccine uptake or history of cervical cancer.

## Conclusions

Moving forward, our data provides information that is useful for designing and implementing effective community-based interventions for cervical cancer. One such area is education regarding the interrelationships between pap tests, HPV, and HPV vaccines. One study utilized Brief Negotiated

Interviewing (BNI) as an intervention that significantly improved HPV knowledge [30]. Interventions should also utilize the patient–physician relationship. The quality of the mother–doctor or patient–doctor relationship may explain why low SES women in nonmetropolitan areas are more likely to get vaccinated [16]. The majority of women we surveyed in this study stated that they first heard about the pap tests from their doctor, placing the physician at the forefront of cervical cancer screening and prevention.

This study contributes to the literature surrounding cervical cancer screening with a focus on knowledge, awareness, attitudes, and maternal influence. Previous studies regarding cervical cancer screening behaviors have shown that social support, education, and socioeconomic factors influence pap test uptake and HPV vaccination [10–16]. Our study showed that despite high pap test uptake, women lacked knowledge and awareness about cervical cancer, HPV, and the HPV vaccine. Most women did not plan to get vaccinated or plan to vaccinate their daughters, and daughters did not report significant maternal influence. Further studies are needed to explore interventions to increase pap test and HPV vaccine uptake while targeting the identified factors that influence cervical cancer-related behaviors.

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## Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.

## References

- American Cancer Society. (2017). Cancer facts & figs. 2017. Retrieved September 27, 2018 from <https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2017/cancer-facts-and-figures-2017.pdf>.
- U.S. Preventive Services Task Force. (2018). Retrieved September 27, 2018 from *Draft recommendation statement, cervical cancer: Screening*. <https://www.uspreventiveservicestaskforce.org/Page/Document/draft-recommendation-statement/cervical-cancer-screening2>.
- Centers for Disease Control and Prevention. (2018). Cervical cancer statistics. Retrieved September 27, 2018 from <https://www.cdc.gov/cancer/cervical/statistics/index.htm>.
- Centers for Disease Control and Prevention. (2017). Pap tests. Retrieved September 27, 2018 from <https://www.cdc.gov/nchs/fastats/pap-tests.htm>.
- Centers for Disease Control and Prevention. (2016). Human papillomavirus (HPV) ACIP vaccine recommendation. Retrieved September 27, 2018 from <https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/hpv.html>.
- Human Papillomavirus Vaccination. (2017). Committee opinion no. 704. American College of Obstetricians and Gynecologists. *Obstetrics and Gynecology*, 129, 173–178.
- Centers for Disease Control and Prevention. (2018). Teen vaccination coverage publications and resources. Retrieved September 27, 2018 from <https://www.cdc.gov/hpv/infographics/vacc-coverage.html>.
- Centers for Disease Control and Prevention. (2018). HPV vaccination coverage data. Retrieved September 27, 2018 from <https://www.cdc.gov/hpv/hcp/vacc-coverage.html>.
- Centers for Disease Control and Prevention. (n.d.). United States Cancer Statistics: Data visualizations. Retrieved September 27, 2018 from <https://www.cdc.gov/cancer/cervical/statistics/race.htm> (CDC 2).
- Documet, P., Bear, T. M., Flatt, J. D., Macia, L., Trauth, J., & Ricci, E. M. (2015). The association of social support and education with breast and cervical cancer screening. *Health Education & Behavior*, 42(1), 55–64.
- Gamarra, C. J., Paz, E. P. A., & Griep, R. H. (2009). Social support and cervical and breast cancer screening in Argentinean women from a rural population. *Public Health Nursing*, 26(3), 269–276.
- Griep, R. H., & Rotenberg, L. (2009). Social support and cervical and breast cancer screening practices among nurses. *Revista Latino-Americana de Enfermagem*, 17(4), 514–521.
- Asgary, R., Alcabes, A., Feldman, R., Garland, V., Naderi, R., Ogedegbe, G., & Sckell, B. (2016). Cervical cancer screening among homeless women of New York City shelters. *Maternal and Child Health Journal*, 20(6), 1143–1150.
- Lechuga, J., Vera-Cala, L., & Martinez-Donate, A. (2016). HPV vaccine awareness, barriers, intentions, and uptake in Latina women. *Journal of Immigrant and Minority Health*, 18(1), 173–178.
- Gross, T. T., Laz, T. H., Rahman, M., & Berenson, A. B. (2015). Association between mother-child sexual communication and HPV vaccine uptake. *Preventive Medicine*, 74, 63–66.
- Monnat, S. M., Rhubarb, D. C., & Wallington, S. F. (2016). Differences in human papillomavirus vaccination among adolescent girls in metropolitan versus non-metropolitan areas: considering the moderating roles of maternal socioeconomic status and health care access. *Maternal and Child Health Journal*, 20(2), 315–325.
- STATA: StataCorp. (2015). *Stata Statistical Software: Release 14*. College Station, TX: StataCorp LP.
- Gimpel, N., Pagels, P., & Kindratt, T. (2017). Community action research experience (CARE): Training family physicians in community based participatory research. *Education for Primary Care*, 28(6), 334–339.
- Gimpel, N., Kindratt, T., Dawson, A., & Pagels, P. (2018). Community action research track: Community-based participatory research and service-learning experiences for medical students. *Perspectives on Medical Education*, 7(2), 139–143.
- Nardi, C., Sandhu, P., & Selix, N. (2016). Cervical cancer screening among minorities in the United States. *The Journal for Nurse Practitioners*, 12(10), 675–682.
- Office of Disease Prevention and Health Promotion. (2018). Healthy people 2020. Retrieved September 27, 2018 from <https://www.healthypeople.gov/2020/topics-objectives/topic/cancer/objectives>.
- Obulaney, P. A., Gilliland, I., & Cassells, H. (2016). Increasing cervical cancer and human papillomavirus prevention knowledge and HPV vaccine uptake through mother/daughter education. *Journal of Community Health Nursing*, 33(1), 54–67.
- Barnack-Tavlaris, J. L., Garcini, L. M., Macera, C. A., Brodine, S., & Klonoff, E. A. (2016). Human papillomavirus vaccination awareness and acceptability among US-born and US foreign-born

- women living in California. *Health Care for Women International*, 37(4), 444–462.
24. Kim, H. W. (2016). The health beliefs of mothers about preventing cervical cancer and their intention to recommend the Pap test to their daughters: A cross-sectional survey. *BMC Public Health*, 16(1), 370.
  25. Kindratt, T. B., & Gonzalez, J. R. (2018). Perceived maternal relationship as a predictor of pap test utilization: Results from the longitudinal study of adolescent to adult health. *Journal of Adolescent and Family Health*, 9(1), 1–23.
  26. Chao, C., Slezak, J. M., Coleman, K. J., & Jacobsen, S. J. (2009). Papanicolaou screening behavior in mothers and human papillomavirus vaccine uptake in adolescent girls. *American Journal of Public Health*, 99(6), 1137–1142.
  27. Spencer, A. M., Brabin, L., Verma, A., & Roberts, S. A. (2013). Mothers' screening histories influence daughters' vaccination uptake: an analysis of linked cervical screening and human papillomavirus vaccination records in the North West of England. *European Journal of Cancer*, 49(6), 1264–1272.
  28. Madhivanan, P., Valderrama, D., Krupp, K., & Ibanez, G. . . Culture (2016). Family and cultural influences on cervical cancer screening among immigrant Latinas in Miami-Dade County, USA. *Health & Sexuality*, 18(6), 710–722.
  29. Rask, M., Oscarsson, M., Lindell, G., & Swahnberg, K. (2016). Women with abnormal Pap smear result: A qualitative study of Swedish healthcare professionals' experiences. *European Journal of Cancer Care*, 25(6), 980–991.
  30. Joseph, N. P., Bernstein, J., Pelton, S., Belizaire, M., Goff, G., Horanieh, N., & Freund, K. M. (2016). Brief client-centered motivational and behavioral intervention to promote HPV vaccination in a hard-to-reach population: A pilot randomized controlled trial. *Clinical Pediatrics*, 55(9), 851–859.