

2018

The Effect of Race on Parents' Intent to Vaccinate Their Children Against Human Papillomavirus

Ariana L. Ruiz Aguilar
University of Central Florida



Part of the [Pediatric Nursing Commons](#)

Find similar works at: <https://stars.library.ucf.edu/honorsthesis>

University of Central Florida Libraries <http://library.ucf.edu>

This Open Access is brought to you for free and open access by the UCF Theses and Dissertations at STARS. It has been accepted for inclusion in Honors Undergraduate Theses by an authorized administrator of STARS. For more information, please contact STARS@ucf.edu.

Recommended Citation

Ruiz Aguilar, Ariana L., "The Effect of Race on Parents' Intent to Vaccinate Their Children Against Human Papillomavirus" (2018). *Honors Undergraduate Theses*. 304.

<https://stars.library.ucf.edu/honorsthesis/304>

THE EFFECT OF RACE ON PARENTS' INTENT TO VACCINATE THEIR
CHILDREN AGAINST HUMAN PAPILLOMAVIRUS

by

ARIANA RUIZ AGUILAR

A thesis submitted in partial fulfillment of the requirements
for the Honors in the Major Program in Nursing
in the College of Nursing
and in The Burnett Honors College
at the University of Central Florida
Orlando, Florida

Spring Term 2018

Thesis Chair: Josie A. Weiss, PhD, RN, FNP-BC, PNP-BC

Abstract

Human papillomavirus (HPV) is a sexually transmitted disease that often presents as genital warts, but may also lead to cancers, including those of the vagina, penis, mouth and tonsils. Despite three vaccines being currently available to prevent HPV, the HPV vaccine retains a low national average vaccination rate when compared to the Tetanus-Diphtheria-Pertussis (Tdap) vaccine. Considering the need for improvement it is important to identify factors that may be contributing to this low national immunization rate, one of them being parental race. The purpose of this literature review is to identify whether race affects parents' intent to vaccinate their children against HPV. A database search of CINAHL Plus with Full Text, MEDLINE, and PsycINFO was conducted and a total of 13 articles were reviewed based on the relevance to the purpose of the literature review. While racial differences were noted, there were other factors that also affect a parent's intent to vaccinate their children against HPV. There is more research to be done when looking at how race may independently affect a parent's intent to vaccinate their children against HPV.

Keywords: Human Papillomavirus, Race, Parents, Vaccination

Table of Contents

| | |
|--|----|
| Introduction..... | 1 |
| Background..... | 2 |
| Significance..... | 5 |
| Problem..... | 6 |
| Purpose..... | 7 |
| Methods..... | 8 |
| Results..... | 9 |
| Racial Differences..... | 9 |
| Race Alone Cannot Explain These Differences..... | 12 |
| Reasons for Lack of Vaccination..... | 13 |
| Reasons for Vaccination..... | 14 |
| Discussion..... | 16 |
| Racial Differences..... | 16 |
| Race Alone Cannot Explain These Differences..... | 18 |
| Reasons for Lack of Vaccination..... | 19 |
| Reasons for Vaccination..... | 20 |
| Nursing Implications..... | 21 |
| Conclusion..... | 22 |
| Appendix A: Figures..... | 23 |
| Appendix B: Tables..... | 25 |
| References..... | 35 |

Introduction

Human papillomavirus (HPV) is a sexually transmitted disease that has been shown to put those who are infected by it at a greater risk for developing different types of cancers, namely cervical cancer (Centers for Disease Control and Prevention, 2016). There are currently three vaccines available to protect against HPV including, Gardasil, Gardasil 9 and Cervarix (Centers for Disease Control and Prevention, 2016). As of 2017, the Centers for Disease Control and Prevention (CDC) recommend that an HPV vaccine be given to all boys and girls between the ages of 11 and 12, in a series of two injections, the second vaccine being given six months after the first (2017). Despite the known benefits, many parents do not have their children vaccinated against HPV.

Background

For as long as humans have lived, they have experienced infections. For example, the bubonic plague, yellow fever, tuberculosis, etc. have caused widespread illnesses. Due to these and other diseases, many scientists have looked for ways to prevent or cure illnesses. Edward Jenner was the first person to develop a vaccine, which was for smallpox, in 1796 (Stern & Markel, 2005). From there on, more vaccines were developed such as those for polio, tuberculosis, flu, etc. (History of Vaccines, n.d). Despite the research showing the effectiveness of vaccines, there have always been those opposed to receiving them. For example, in the Jacobson v. Massachusetts case, Jacobson declined the mandatory smallpox vaccine and was fined \$5 (Mariner, Annas & Glantz, 2005). When Jacobson appealed to the Supreme Court in 1902, the Supreme Court upheld that the state had the power over health when it benefitted the health of the public (Mariner, Annas & Glantz, 2005). As of today, the government respects the liberty of individuals as stated by the 14th amendment and therefore may not force vaccinations without reasonable cause (Mariner, Annas & Glantz, 2005). Mariner, Annas and Glantz state that today a law mandating vaccination to prevent an epidemic or highly contagious diseases, such as those prevented by required school immunization, would probably still be upheld (2005). Vaccines that do not meet these criteria, such as the human papilloma virus, are not required.

There are more than 100 strands of human papilloma virus (HPV), a sexually transmitted disease (World Health Organization, 2016). HPV often presents as genital warts, but can also lead to cancers, including those of the vagina, penis, mouth and tonsils (Centers for Disease Control and Prevention, 2016). In 1983, Harald zur Hausen and his team were able to correlate HPV 16 and 18 to cervical cancer; the most prevalent of the HPV caused cancers (Kim, 2017).

Once scientists knew that HPV caused cervical cancer, vaccines were developed to protect people from these strains.

The genital warts caused by HPV will often disappear spontaneously; therefore, people usually do not need antiviral therapy for these (Centers for Disease Control and Prevention, 2017). Despite this, if they do not go away, treatment is directed towards removing the warts as well as removing any precancerous lesions the HPV may have caused (Centers for Disease Control and Prevention, 2017).

Despite the lack of cure for HPV, methods of prevention are available. Gardasil was the first vaccine to be approved by the FDA for HPV prevention in 2006 and next came Cervarix in 2009 (History of Vaccines, n.d). These vaccines contain a protein from certain HPV strains and thereby cannot cause HPV (History of Vaccines, n.d). However, these vaccines are not indicated for everyone. Cervarix is only indicated for females and only protects against 2 strains of HPV (Centers for Disease Control and Prevention, 2016). Meanwhile Gardasil and Gardasil 9 can be given to both females and males and protects against 4 and 9 strains of HPV respectively (Centers for Disease Control and Prevention, 2016). Furthermore the CDC states that HPV vaccines should be avoided for those with moderate or severe acute illnesses, pregnant women and people with certain allergies. Those with a hypersensitivity to yeast should avoid Gardasil and Gardasil 9, and those with a hypersensitivity to latex should avoid Cervarix (Centers for Disease Control and Prevention, 2016). Currently, three vaccines are available to prevent many different types of HPV, including some types that can cause different types of cancers (National Cancer Institute, 2016). These vaccines are now recommended for all boys and girls between the ages of 11 and 12, given in two rounds, the second dose given 6-12 months after the first one

(Centers for Disease Control and Prevention, 2017). If a vaccine is missed, catch-up vaccines can be given to males up to age 21 and to females up to age 26 (Centers for Disease Control and Prevention, 2017). HPV vaccines initiated during ages 15 and 26 require a three round series instead of two (Meites, Kempe & Markowitz, 2016).

Significance

The CDC states that there are approximately 79 million Americans currently infected with HPV and an estimated 14 million people become infected annually (2017). Moreover, approximately 39,800 HPV-associated cancers occur in the United States every year, the most prevalent of these being cervical cancer (Centers for Disease Control and Prevention, 2017). These figures indicate the prevalence of HPV and the importance of vaccinating against it before children are exposed to HPV. We must take into consideration that these numbers only represent the United States, yet HPV is a global disease that can affect anyone. Therefore, identifying factors that may affect parents' decisions to vaccinate their children are important in order to globally raise HPV vaccination rates.

The quality-adjusted life-year (QALY) is used to measure "health effectiveness for cost-effectiveness analysis" (Weinstein, Torrance & McGuire, 2009, p. S5). Chesson, Ekwueme, Saraiya and Markowitz, explained that, "the estimated cost per QALY gained by adding vaccination of 12-year old girls to existing cervical cancer screening was \$3,906-\$14,723" (2008, p. 246). According to their calculations, since the cost of treating HPV related problems is significant, by preventing HPV, there would be less treatment costs and more QALYs saved (Chesson, Ekwueme, Saraiya & Markowitz, 2008). According to the researchers' projections money would be saved and lives improved if all 12-year-old girls were vaccinated against HPV because cervical cancer would be prevented.

Problem

Despite the effectiveness of these vaccines, according to the Centers for Disease Control and Prevention (CDC), HPV vaccination rates are still low when compared to other vaccine rates (2016). The CDC states that national HPV coverage is 63% in adolescent girls and 50% in adolescent boys, compared to a national high Tetanus-Diphtheria-Pertussis (Tdap) vaccination rate of 86% (2016). This shows that there is plenty of room for improvement of our national HPV vaccination rates. There is no clear understanding as to why HPV vaccination rates are low in comparison to other vaccines. Perhaps examining parental race and intent to vaccinate their children against HPV could give us a better understanding about the low HPV vaccination rates.

Recently we have seen an increase in the number of parents with “vaccine hesitancy” which is described as delaying or refusing immunizations despite their availability (McKee & Bohannon, 2016). Currently, some mandatory vaccines are needed to be enrolled in schools but, there are exemptions. All 50 states allow for medical exemptions; 30 states allow exemptions for religious reasons, and 18 states allow exemptions for philosophical reasons (McKee & Bohannon, 2016). In addition to these exemptions, there are some other reasons parents may refuse or delay immunizations, such as safety concerns or a desire for additional information from healthcare providers (McKee & Bohannon, 2016). Furthermore, little research has been done to determine the effect of race on parents’ intent to vaccinate.

Purpose

The purpose of this literature review is to gain a better understanding of reasons that parents do not have their children vaccinated against HPV and to determine if race is a factor. Gaining a clearer understanding, may improve HPV vaccination rates, which may have national health and economic benefits. Additionally, a better understanding of barriers to vaccination may help guide new research in this area.

Methods

An integrated literature review was done using CINAHL Plus with Full Text, MEDLINE, and PsycINFO. Key search terms included immuniz* or vaccine*, AND parent* or mother* or father*, AND HPV or human papillomavirus, AND race or ethnicity. Articles were limited to the English language, peer-reviewed, full text available and published between 2012 and 2017. Inclusion criteria required the data analyzed to include the parents' race and their intent to immunize or acceptance of the human papillomavirus vaccine for their children.

Results

Upon review of the articles found through the search, a total of 12 articles were included in this literature review. The findings in these articles suggest that while there are racial differences in parents' intent to vaccinate their children against HPV, there are also other factors that help parents reach their decision of whether or not to vaccinate.

Racial Differences

The United States Census Bureau defines race as “a person’s self-identification with one or more social groups”, while ethnicity “determines whether a person is of Hispanic origin or not” (2017, page 1). Racial choices include “White”, “Black or African American”, “American Indian or Alaskan Native”, “Asian”, and “Native Hawaiian or Other Pacific Islander”, while ethnicity choices include “Hispanic or Latino” and “Not Hispanic or Latino” (2017, page 1). Through the racial choices provided, a Hispanic or Latino person can identify with any race because race describes self-identification. Meanwhile, ethnicity provides an opportunity to identify as Hispanic or Latino based on Spanish or Latin origins. Many of the articles reviewed used non-Hispanic white, non-Hispanic black and Hispanic to avoid confusion when identifying race of parents in their studies.

In one study with 23,722 parents participating (60% identifying non-Hispanic white, 16% identifying non-Hispanic black, 17% identifying Hispanic), the researchers analyzed factors associated with parental reasons for their lack of intent to vaccinate their daughters against HPV (Cheruvu, Bhatta, & Drinkard, 2017). In this study the no-intent group proportions were as follows: 62% non-Hispanic white, 15.3% non-Hispanic black, and 15.2% Hispanic (Cheruvu et al., 2017). The findings indicate that parents identifying as Hispanic and non-Hispanic black

were significantly less likely to report no-intent to vaccinate in comparison to parents identifying as non-Hispanic white (Cheruvu et al., 2017).

In another study, Lu et al. considered the vaccination rate of 9,554 male adolescents (54.3% identifying as non-Hispanic white, 14.1% identifying as non-Hispanic black, 22.8% identifying as Hispanic, 0.9% identifying as American Indian/Alaskan Native, 3.1% identifying as Asian) using 2013 NIS-Teen data (2015). When analyzing HPV vaccination coverage with equal to or more than one dose, they found that Hispanic and non-Hispanic blacks were more likely to have received at least one HPV vaccination when compared to non-Hispanic whites (Lu et al., 2015). Furthermore, the study also found that Hispanic and non-Hispanic black adolescent males were significantly more likely to have received 3 doses of the HPV vaccine in comparison to non-Hispanic white adolescent males.

Barnack-Tavlaris, Garcini, Macera, Brodine, and Klonoff used data from the 2007 California Health Interview Survey (CHIS) to analyze parents' awareness and acceptability of the HPV vaccine (2016). Their sample included 2,994 mothers whose daughters were eligible to receive the HPV vaccine (Barnack-Tavlaris et al., 2016). The study found that Asian women were less likely to be interested in vaccinating their daughters in comparison to Latina and white mothers (Barnack-Tavlaris et al., 2016).

Furthermore, Spencer, Roberts, Brabin, Patnick, and Verma, conducted a study using records of mother's cervical screening and HPV vaccination of their daughters. Their sample included 540,977 records in which 93% of mothers identified as white, 1% as mixed, 4% as Asian, and 1% as black (2014). The records were divided for the vaccination portion of the study into two groups, the routine group, which included girls aged 12-13, and the catch-up group,

which included girls aged 14-16 (Spencer et al., 2014). The researchers concluded that girls living in regions with a higher concentration of Asians, and blacks were less likely to begin vaccination at age 12 to 13, and those with a higher concentration of the black group in their region were also less likely to begin vaccination at age 14 to 16 (Spencer et al., 2014). No ethnic differences were noticed in the routine group when looking at vaccination completion (Spencer et al., 2014).

Additionally, Cuff et al. studied HPV vaccination uptake in Virginia, five years after a statewide mandate to have all girls entering the sixth grade vaccinated against HPV (2016). These researchers used the University of Virginia Clinical Data Repository from January to December of 2014 to determine HPV vaccine uptake (Cuff et al., 2016). Their sample included 908 11-12 year old girls, in which 74.6% identified as non-Hispanic white, 16.1% identified as African American and 9.3% identified as any other race or ethnicity (Cuff et al., 2016). The researchers found that non-Hispanic white girls were 25% less likely to initiate vaccination, in contrast to African American girls, who were 35% more likely to initiate vaccination (Cuff et al., 2016).

A study conducted by Polonijo and Carpiano used the 2008, 2009 and 2010 NIS-Teen to determine HPV uptake (2013). The study had a sample of 41,358 11-13 year old adolescents and their parents, of which 60.7% identified as non-Hispanic white, 17.6% identified as Hispanic, and 14.8% identified as non-Hispanic black (Polonijo, & Carpiano, 2013). The researchers found that non-Hispanic black adolescents were 22% less likely to have begun HPV vaccination compared to non-Hispanic white adolescents (Polonijo, & Carpiano, 2013). Furthermore, Hispanic adolescents in 2010 were significantly more likely than non-Hispanic white adolescents

to have begun HPV vaccination (Polonijo, & Carpiano, 2013). When evaluating completion of the HPV vaccine series, non-Hispanic black and Hispanic adolescents were 34% and 13% respectively, less likely to have completed the HPV vaccine series in comparison to non-Hispanic white adolescents (Polonijo & Carpiano, 2013).

Finally, a study was conducted using the 2014 NIS-Teen data with a sample of 10,354 adolescents' parents (Mohammed, Vivian, Loux, & Arnold, 2017). In this study, non-Hispanic black and Hispanic races were more likely to begin vaccination of their boys against HPV when compared to non-Hispanic whites (Mohammed et al., 2017). Hispanic parents of adolescent girls were more likely to begin vaccination in comparison to non-Hispanic white parents (Mohammed et al., 2017). Furthermore, non-Hispanic white parents compared to any other race were more likely to report that they were “not sure/don't know” if they would vaccinate their children within the next 12 months (Mohammed et al., 2017).

Race Alone Cannot Explain These Differences

In addition to racial differences in parents' intent to vaccinate their children against HPV, in the articles reviewed, there are also differences based on other socio-demographic factors. For example, Getrich et al. analyzed the decision-making of mothers from two different neighborhoods. These authors found differences in the mothers from the different sites despite most mothers identifying as Hispanic at both (2014). Mothers from site one were from a less socially advantaged neighborhood and had overall less education, while mothers from site two had more education and came from a more affluent neighborhood (Getrich et al., 2014). The researchers found that mothers from site one relied more on the health providers' recommendation and preferred a strong directive from their clinician (Getrich et al., 2014).

Mothers from site two preferred to discuss HPV vaccination more with clinicians yet did not see their recommendations as determinative (Getrich et al., 2014).

Lu et al. found other characteristics associated with less likelihood of HPV vaccination initiation, including having a mother with a high school education or more, a higher family income, and having a mother whose age was equal to or greater than 45 (2015). Barnack-Tavlaris et al. found that in addition to being an Asian mother, having a higher education and income were also correlated with being less likely to be interested in vaccinating their daughters against HPV (2016). Similarly, Mohammed et al. found that in unvaccinated boys and girls, having a mother with a high school diploma or less was associated with a greater intent to vaccinate against HPV (2017). Additionally, mothers with some college education had a higher intent to vaccinate their sons and lower intent to vaccinate their daughters against HPV when compared to mothers with a college education (Mohammed et al., 2017). In contrast to the findings above, Polonijo and Carpiano found that as maternal education and household income decreased, there was a lower chance of HPV vaccination initiation (2013).

Reasons for Lack of Vaccination

Reasons for lack of vaccination were studied in many of the articles. One of the reasons for lack of vaccination identified in the articles was parents' lack of knowledge about the vaccine. For example, Cheruvu et al. found that, black non-Hispanic and Hispanic parents were more likely to report a lack of vaccine knowledge as a reason for lack of intent to vaccinate (2017). Greenfield et al. looked at Somali, Eritrean and Hispanic mothers' Tdap, Meningococcal vaccine (MCV4), and HPV vaccine knowledge and intent (2015). Of those parents who had heard of Tdap or MCV4, 77% had their children vaccinated against it, while only 48% of those

parents who had heard of the HPV vaccine had their children vaccinated (Greenfield et al., 2015). Furthermore, Greenfield et al. identified that all three ethnic groups studied (Hispanic, Somali, and Eritrean) cited a lack of knowledge or awareness of the HPV vaccine as a reason for lack of intent to vaccinate their children against HPV (2015).

Another reason often cited by parents as to their lack of HPV vaccination intent was safety concerns about the vaccine. In one study, the 2-1-1 helpline was used to identify parents and assess their HPV knowledge and perceptions about HPV and the HPV vaccine (Savas, Fernandez, Jobe, & Carmack, 2012). Savas et al., assessed the HPV vaccine uptake in Hispanic and non-Hispanic black parents and the factors affecting those decisions (2012). These authors found that in the non-Hispanic black parents the belief that the vaccine may cause future health problems for their daughters was negatively correlated with HPV vaccine uptake (2012). Similarly, Cuff et al. found that the most common reason a parent chose not to vaccinate was safety concerns, with 41% of parents choosing not to vaccinate citing this reason (2016).

Reasons for Vaccination

Many of the studies reviewed also reported reasons parents chose to vaccinate their children against HPV. Savas et al. identified four factors that were positively associated with Hispanic parents' choice to vaccinate their daughters. The factors were, having heard of the HPV vaccine, belief that the vaccine was more effective before the start of sexual activity, having discussed the vaccine with the health care provider and having been offered the vaccine by a doctor or nurse (2012). Furthermore, the researchers also identified four factors that were positively correlated with the vaccination of non-Hispanic black parents' daughters. These factors include, a perceived efficacy that the vaccine would prevent cervical cancer, perceived

risk of daughter getting HPV, discussion of the vaccine with their health provider and having been offered the vaccine by a doctor or nurse (Savas et al., 2012).

Another factor that determined some parents' vaccination of their son included the consideration of their sons' future partners. For example, Schuler, DeSousa, and Coyne-Beasley found that 79% and 78% of non-Hispanic white and non-Hispanic black parents respectively, reported that female partner protection would likely affect their decision to vaccinate their sons against HPV (2014). Furthermore, Polonijo, Carpiano, Reiter, and Brewer found that Hispanic parents also placed importance on HPV vaccination for the benefit of their sons' future partners (2016).

Discussion

Overall, findings indicate that there are racial differences in parents' intent to vaccinate their children against HPV. However, based on the articles analyzed other socio-demographic factors, in addition to race, also impact their intent. There were also other themes investigated in this literature review, including reasons for or against vaccination to prevent HPV.

Racial Differences

The findings in the articles analyzed can lead us to the conclusion that there are racial differences regarding intent and decisions to immunize against HPV. Parents identifying as Hispanic were consistently likely to report intent and initiation of HPV vaccination for their children in many of the articles (Cheruvu et al., 2017; Lu et al., 2015; Polonijo, & Carpiano, 2013; Mohammed et al., 2017). Next most likely to report intent and initiation of vaccinating their children against HPV were parents who identified as non-Hispanic black (Cheruvu et al., 2017; Lu et al., 2015; Polonijo, & Carpiano, 2013; Mohammed et al., 2017; Cuff et al., 2016). Furthermore, parents identifying as non-Hispanic white were consistently less likely to vaccinate their children against HPV in comparison to parents identifying as Hispanic or non-Hispanic black (Cheruvu et al., 2017; Lu et al., 2015; Mohammed et al., 2017; Cuff et al., 2016). The exception to this is seen in the research conducted by Polonijo, & Carpiano, in which they concluded that non-Hispanic black adolescents were 22% less likely to have begun HPV vaccination in comparison to non-Hispanic white adolescents (2013). The research conducted by Polonijo, & Carpiano used the NIS-Teen data that many other studies also used and had similar samples as other studies; therefore, it was unclear how the researchers' findings were consistently different when compared to the rest. The analysis of Asian parents was not as

prominent, since they were only mentioned in two articles. This included the results by Barnack-Tavlaris et al., and Spencer et al., which concluded that Asian women were less likely be interested in vaccinating their daughters against HPV when compared to Latina and non-Hispanic white mothers and that girls living in regions with a higher concentration of Asians were less likely to begin the HPV vaccines respectively (2016; 2014). It is important to mention that Asian parents may have been included in other studies but identified as non-Hispanic white, or non-Hispanic black.

It is important to note that some of these researchers reported parents' intent such as that of Cheruvu et al., and Barnack-Tavlaris et al. (2017; 2016). Intent is what they intend to do; it is not necessarily what they actually do. Despite this, findings from other studies mirrored what parents of each race had intended to do in actual vaccination uptake and therefore support the results of the studies analyzing parent intent (Lu et al., 2015; Polonijo, & Carpiano, 2013; Mohammed et al., 2017; Cuff et al., 2016).

It is also important to consider that some of these studies reported the race of the adolescents and not the parents (Lu et al., 2015; Cuff et al., 2016; Polonijo, & Carpiano, 2013; Mohammed et al., 2017). We can only infer that the parents are of the same race as their children. We can also only infer that the parents determine the adolescents' HPV vaccination or lack of vaccination since parental consent is needed to receive the vaccine.

It was also noted that most studies consisted of the mother being the parent surveyed or interviewed (Cheruvu et al., 2017; Lu et al., 2015; Barnack-Tavlaris et al., 2016; Polnijo, & Carpiano, 2013; Mohammed et al., 2017). Thereby, it cannot be conclusively said that the results

of these articles mirror the parental intent of all races to vaccinate their children against HPV because not many fathers were included.

Race Alone Cannot Explain These Differences

While there were racial differences in parents' intent to vaccinate their children against HPV and vaccination uptake, no researchers studied race independently. The studies consisted of parents with different educational levels and incomes and therefore the researchers also analyzed these factors.

Overall, it was found that mothers with higher education were less likely to intend to or initiate vaccination for their children against HPV (Getrich et al., 2014; Lu et al., Barnack-Tavlaris et al., 2016; Mohammed et al., 2017). This may be because as we continue to educate ourselves we begin to do our own research and find our own answers rather than solely relying on the expertise of others. If this is the case, these parents are less likely to solely rely on health care provider recommendations as seen in the mothers with greater education in the research conducted by Getrich et al. (2014). The exception to this pattern was described in the article by Polonijo and Carpiano, in which the authors concluded that as maternal education decreased, there was a lower chance of HPV vaccination initiation (2013).

Also, in this literature review, a greater family income was associated with lower vaccination uptake and parent vaccination intent (Getrich et al., 2014; Lu et al., Barnack-Tavlaris et al., 2016). Again, usually a higher income is due to having higher education and having a job that provides the family a better income. Again the exception to this pattern was found in the article by Polonijo and Carpiano, which concluded that as household income decreased there was a lower chance of HPV vaccination initiation (2013). This may be due to a lack of funds or

insurance coverage in lower income families to pay for the vaccines, rather than because that is what those parents want to have for the children.

Reasons for Lack of Vaccination

It is interesting to see that despite the race of parents the reasons for lack of vaccination overlapped between races. One of the main reasons reported for a lack of vaccination intent by parents was lack of knowledge about HPV itself and the HPV vaccine. For example, Cheruvu et al. found that both non-Hispanic black and Hispanic race was associated with a high chance of reporting lack of knowledge as a reason for no-intent in vaccinating their children against HPV (2017). Furthermore, in the article by Greenfield et al., all minorities studied, reported lack of knowledge as a reason for not vaccinating their children against HPV (2015). The fact that all minorities reported this reason for lack of vaccination shows that we need to improve education about HPV and HPV vaccination, because these minorities may not have the same educational resources readily available to them as non-Hispanic white identifying parents.

Another reason for lack of vaccination reported by all races was safety concerns about the vaccine. Savas et al. found that non-Hispanic black parents were concerned about future health problems in their daughters caused by the vaccine (2012). Furthermore, according to Cuff et al., taking all races into account, the most common reason for lack of vaccination was safety concerns about the vaccine (2016). It is important to note that the FDA has approved HPV vaccination since 2006, yet there are still safety concerns (History of Vaccines, n.d). This again highlights the importance of provider education addressing these parental concerns.

Reasons for Vaccination

While reasons for lack of vaccinating children were similar despite race, the reasons for vaccinating their children seemed to differ and overlap in different races. For example, both Hispanic and non-Hispanic black parents were more likely to vaccinate their children against HPV if they had previously discussed vaccination with their health care providers and they had been offered the vaccine by a doctor or nurse (Savas et al., 2012). Despite these similarities they differed on other factors. Hispanic parents placed importance on having heard of the HPV vaccine and believing that the vaccine was more effective before the start of sexual activity, leading to higher vaccination intent (Savas et al., 2012). Meanwhile, non-Hispanic black parents were affected by their perceptions of the effectiveness of the vaccine and their daughters' chances of getting HPV (Savas et al., 2012). Similarly both non-Hispanic black and Hispanic parents placed more importance on HPV vaccination for the benefit of the sons' future or current partners and an overall healthier community in comparison to non-Hispanic white parents (Polonijo, Carpiano, Reiter, & Brewer, 2016). Furthermore, non-Hispanic white parents are more likely to vaccinate their children for their own children's benefit (Polonijo, Carpiano, Reiter, & Brewer, 2016). These factors are important to take into account and address when discussing and educating parents about HPV vaccination because this can determine whether or not children are vaccinated.

Nursing Implications

Research concerning race as a factor that may affect parents' decision to vaccinate their children against HPV has nursing implications. Nurses are educators to their patients and their families (American Nurses Association, n.d.). It is the job of nurses to teach parents of patients who are able to receive the HPV vaccination, what HPV is and why HPV vaccination is important. Throughout the literature review the most common reason parents had no-intent to or chose not to vaccinate their children against HPV was lack of knowledge (Cheruvu et al., 2017; Greenfield et al., 2015). We are able to address this lack of knowledge with brochures and information that is easily accessible to us and may not be to parents. It is also important to consider race when educating parents on this subject as beliefs, factors in their decision-making, and learning styles may differ. For example, in one study the authors concluded that Hispanic parents exposed to HPV specific material were more likely to begin HPV vaccination for their children in comparison to Hispanic parents who received general material (Tiro et al., 2015). Further research is needed to better understand how each race best responds to educational material and teaching style in order to educate most effectively.

Conclusion

HPV is a sexually transmitted disease that may lead to different types of cancers, such as that of the cervix, penis, mouth and tonsils (Centers for Disease Control and Prevention, 2016). Currently, there are three vaccines available to the public for the prevention of HPV (Centers for Disease Control and Prevention, 2016). Despite the availability of the HPV vaccines, the national HPV coverage is low when compared to the national high Tdap coverage (Centers for Disease Control and Prevention, 2016). Factors affecting parental intent to vaccinate their children against HPV must be studied in order to improve the HPV national coverage rates. Research shows that there are racial differences in parental intent to vaccinate their children against HPV. Despite this, race is not the only factor that comes into play when parents are deciding whether or not to vaccinate their children against the HPV. Some of the other factors that affected parental intent to vaccinate their children against HPV included, maternal education and household income. Furthermore, the literature review also highlighted reasons parents cite for declining or accepting their children's vaccination. Thereby, nurses must do their best to take into account the parent as a whole (looking at all factors) when educating them about HPV and the vaccines available for its prevention.

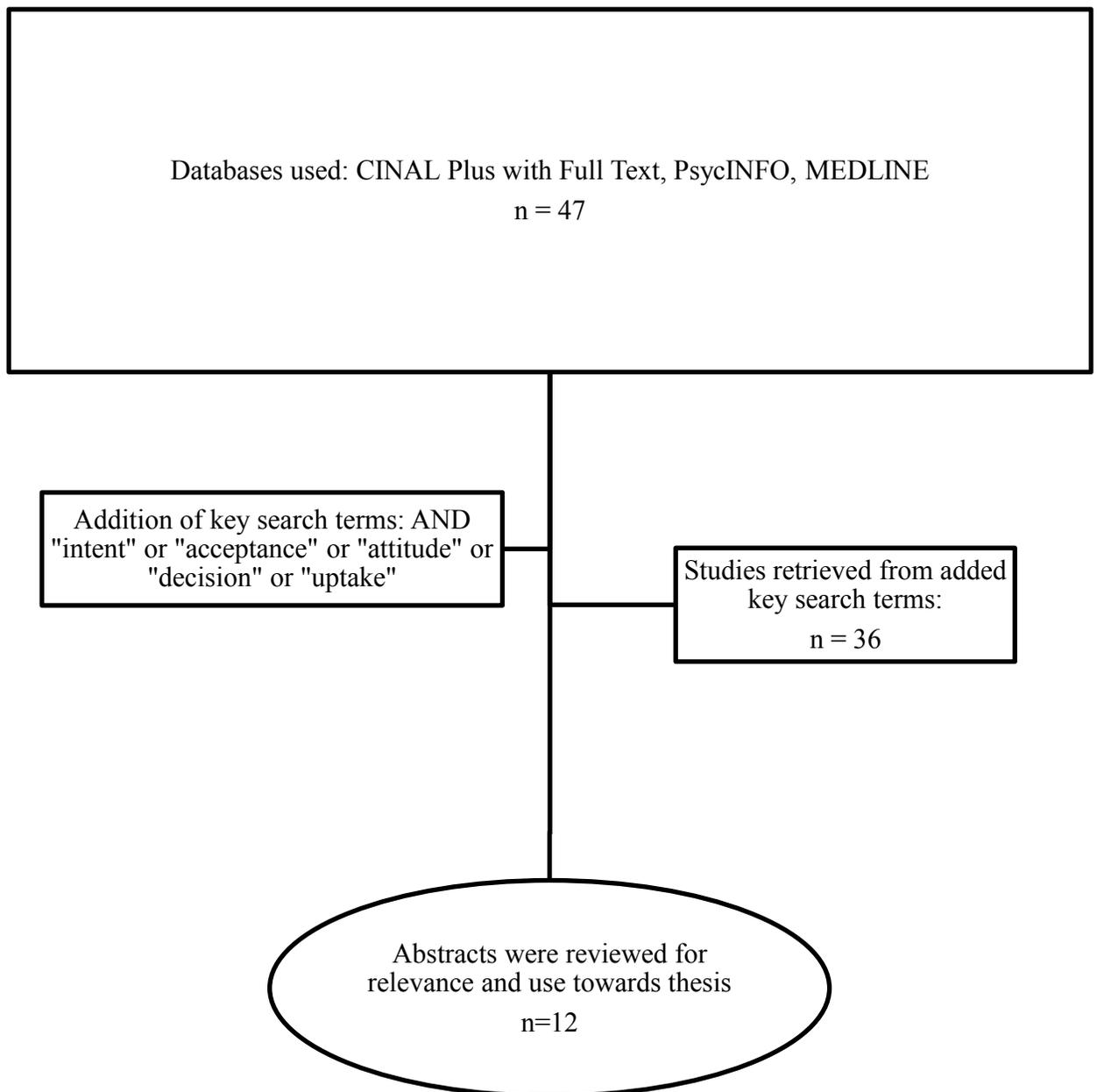
Appendix A: Figures

Appendix A: Figures

Figure 1

Key search terms: “immuniz*” or “vaccine*” AND “parent*” or “mother*” or “father*” AND “hpv” or “human papillomavirus” AND “race” or “ethnicity”

Limiters: Published date: 01/01/2012 – 12/31/2017, Scholarly (Peer Reviewed) Journals, Full Text, English Language



Appendix B: Tables

Appendix B: Tables

Table 1

| Article Citation | Sample size/data collection method | Participants characteristic | Key Findings |
|--|--|---|---|
| <p>Barnack-Tavlaris, J.L., Garcini, L.M., Macera, C.A., Brodine, S., & Klonoff, E.A. (2016). Human papillomavirus vaccination awareness and acceptability among U.S.-born and U.S. foreign-born women living in California. <i>Health Care For Women International</i>, 37(4), 444-462. doi:10.1080/07399332.2014.954702</p> | <p>N= 2,994 mothers</p> <ul style="list-style-type: none"> • Analyzed data from 2007 CHIS <p>Phone interviews also used</p> | <ul style="list-style-type: none"> • White was 62% • Asian was 12% Hispanic was 26% | <ul style="list-style-type: none"> • Awareness <ul style="list-style-type: none"> ○ White mothers were more likely to be aware of HPV vaccination ○ Latin and Asian mothers were less likely to be aware of HPV vaccination • Acceptability <ul style="list-style-type: none"> ○ Asian mothers were less likely to be interested in vaccinating their daughters <ul style="list-style-type: none"> ▪ Also lower interest in vaccinating their children if mother had high school degree or higher, higher income, or married |
| <p>Cheruvu, V.K., Bhatta, M.P., & Drinkard, L.N. (2017). Factors associated with parental reasons for "no-intent" to vaccinate female</p> | <p>N=23, 722 unvaccinated females parents</p> <ul style="list-style-type: none"> • Data from 2008-2012 NIS-Teen surveys | <ul style="list-style-type: none"> • White, non-Hispanic was 60% • Black non-Hispanic was 16% • Hispanic was 17% • Other 8% | <ul style="list-style-type: none"> • Parents who identified as Hispanic were significantly less likely to report no-intent <ul style="list-style-type: none"> ○ Compared to white non-Hispanics • Black non-Hispanic parents were more likely to report "Socio-cultural Barriers" as a reason for no-intent than white non-Hispanic parents • Black non-Hispanic and Hispanic parents were more likely to report "Lack of Knowledge about |

| | | | |
|--|---|---|---|
| <p>adolescents with human papillomavirus vaccine: National immunization survey - teen 2008-2012. <i>BMC Pediatrics</i>, 17, 1-11. doi:10.1186/s12887-017-0804-1</p> | | | <p>the Vaccine” as a reason for no-intent</p> <ul style="list-style-type: none"> • Concluded that race/ethnicity can be associated with one or more barriers to receive the HPV vaccine |
| <p>Cuff, R.D., Buchanan, T., Pelkofski, E., Korte, J., Modesitt, S.P., & Pierce, J.Y. (2016). Rates of human papillomavirus vaccine uptake amongst girls five years after introduction of statewide mandate in Virginia. <i>American Journal Of Obstetrics & Gynecology</i>, 214(6), 752.e1-752.e6. doi:10.1016/j.ajog.2016.03.022</p> | <p>N= 908</p> <ul style="list-style-type: none"> • Methods <ul style="list-style-type: none"> • Used University of Virginia Clinical Data Repository to find all girls ages 11-12 who sought well-child care visits from January-December 2014 • Mailed those who were eligible and a week later called to do a phone questionnaire | <ul style="list-style-type: none"> • 74.6% identified as non-Hispanic white • 16.1% identified as African American • 9.3% identified as other race | <ul style="list-style-type: none"> • White girls were around 25% less likely to initiate vaccination • African American girls were 35% more likely to initiate vaccination • Parents <ul style="list-style-type: none"> ○ Only 14% believed HPV vaccine was required for their child ○ 35% said their child doesn't need the HPV vaccine • Overall lack of improved HPV vaccine uptake in Virginia <ul style="list-style-type: none"> ▪ Most common reason why a parent chose not to vaccinate was safety concerns (41%) |
| <p>Getrich, C.M., Broidy, L.M., Kleyman, E.,</p> | <p>N= 10 mothers</p> <ul style="list-style-type: none"> • Mixed-mode surveys and semi-structured | <ul style="list-style-type: none"> • Site 1 <ul style="list-style-type: none"> ○ Four interviews at | <ul style="list-style-type: none"> • Despite mothers being primarily Hispanic at both sites their was a difference in their decision-making |

| | | | |
|---|---|--|---|
| <p>Helitzer, D.L., Kong, A.S., & Sussman, A.L. (2014). Different models of HPV vaccine decision-making among adolescent girls, parents, and health-care clinicians in New Mexico. <i>Ethnicity & Health, 19</i>(1), 47-63. doi:10.1080/13557858.2013.857767</p> | <p>interviews</p> | <p>conducted in Spanish</p> <ul style="list-style-type: none"> ○ Four of six mother born in Mexico ○ Parental education lower than Site 2 <ul style="list-style-type: none"> • Site 2 <ul style="list-style-type: none"> ○ All interviews at conducted in English <p>One foreign born participant</p> | <ul style="list-style-type: none"> ○ Those from Site 1 (less socially advantaged neighborhood and less education) relied more on the clinicians recommendations and preferred a strong directive from their clinician ○ Mothers from Site 2 preferred to discuss more with clinicians and the clinicians recommendations were not seen as determinative <ul style="list-style-type: none"> • Findings suggest that race alone can't explain differences in decision-making |
| <p>Greenfield, L.S., Page, L.C., Kay, M., Li-Vollmer, M., Breuner, C.C., & Duchin, J.S. (2015). Strategies for increasing adolescent immunizations in diverse ethnic communities. <i>Journal Of Adolescent Health, 56</i>, S47-53. doi:10.1016/j.jadohealth.2014.10.274</p> | <p>N=157</p> <ul style="list-style-type: none"> • Methods <ul style="list-style-type: none"> ○ Chose locations of Burien, SeaTac and Tukwila due to their ethnic diversity | <ul style="list-style-type: none"> • Participants <ul style="list-style-type: none"> ○ 55 Somali mothers ○ 50 Eritrean mothers ○ 52 Hispanic mothers | <ul style="list-style-type: none"> • Vaccine knowledge <ul style="list-style-type: none"> ○ Hispanic parents had the greatest likelihood of having heard of any of the 3 • Vaccination <ul style="list-style-type: none"> ○ Of those who had heard of Tdap or MCV4 77% had their children vaccinated <ul style="list-style-type: none"> ▪ In comparison only 48% of those who had heard of HPV vaccine had vaccinated their children against it • Vaccine intent <ul style="list-style-type: none"> ○ Unvaccinated reasons <ul style="list-style-type: none"> ▪ Hispanic <ul style="list-style-type: none"> • Lack of knowledge of disease and its complications |

| | | | |
|--|---|--|--|
| | | | <ul style="list-style-type: none"> • Most don't believe children are at risk • Worry vaccine could result in early initiation of sexual activity ▪ Somali <ul style="list-style-type: none"> • No awareness of HPV vaccine, disease and its complications ▪ Eritrean <ul style="list-style-type: none"> • Minimal awareness of HPV vaccine, disease and its complications |
| Lu, P., Yankey, D., Jeyarajah, J., O'Halloran, A., Elam-Evans, L. D., Smith, P.J., & ... Dunne, E. F. (2015). HPV vaccination coverage of male adolescents in the United States. <i>Pediatrics</i> , 136(5), 839-849. doi:10.1542/peds.2015-1631 | N= 9,554 male adolescent aged 13-17 parents <ul style="list-style-type: none"> • 2013 NIS-Teen survey Phone interviews also conducted | <ul style="list-style-type: none"> • Non-Hispanic white was 54% • Non-Hispanic black was 14% • Hispanic was 23% • American Indian /Alaskan Native was 1% • Asian was 3% Other was 5% | <ul style="list-style-type: none"> • There were racial/ethnic disparities in HPV vaccination <ul style="list-style-type: none"> ○ Hispanics and non-Hispanic Blacks had higher vaccine uptake in comparison to non-Hispanic Whites • Mentioned race of adolescents but no mention of parents <ul style="list-style-type: none"> ○ One could infer that the race of the adolescents is the same as the parents but we can't be sure |
| Mohammed, K. A., Vivian, E., Loux, T.M., & Arnold, | N= Parents of 10,354 adolescents <ul style="list-style-type: none"> • NIS-Teen 2014 survey | <ul style="list-style-type: none"> • Non-Hispanic white <ul style="list-style-type: none"> ○ 7,183 • Non-Hispanic black | <ul style="list-style-type: none"> ○ Unvaccinated boys intent <ul style="list-style-type: none"> ▪ Intent to vaccinate was higher among non-Hispanic black |

| | | | |
|--|---|--|---|
| <p>L.D. (2017). Factors associated with parents' intent to vaccinate adolescents for human papillomavirus: Findings from the 2014 national immunization survey-teen. <i>Preventing Chronic Disease, 14</i> (E45), 1-12. doi:10.5888/pcd14.160314</p> | <p>and survey</p> | <ul style="list-style-type: none"> ○ 881 • Hispanic <ul style="list-style-type: none"> ○ 1,306 • Non-Hispanic other <ul style="list-style-type: none"> ○ 982 | <p>and Hispanic ethnicity than non-Hispanic white</p> <ul style="list-style-type: none"> ▪ Higher in adolescents with mothers with less than high school diploma or high school diploma than those with college degrees ▪ Mothers with some college education were more likely to intend to vaccinate their sons and less likely to intend to vaccinate their daughters ○ Unvaccinated girls intent <ul style="list-style-type: none"> ▪ Higher intent in those of Hispanic race compare with non-Hispanic whites ▪ Higher in mothers with less than high school diploma when compared to college graduate mothers ○ Not sure/Don't know parents <ul style="list-style-type: none"> ▪ More likely to have sons, be non-Hispanic whites, live in the South, live above the poverty line, have a college graduate mothers and not have a recommendation for HPV before |
| <p>Polonijo, A.N., & Carpiano, R.M. (2013). Social inequalities in adolescent human papillomavirus (hpv) vaccination: A test of fundamental cause</p> | <p>N=28222</p> <ul style="list-style-type: none"> • Used NIS-Teen to collect data over 3 years <ul style="list-style-type: none"> ○ Gave survey to parent/guardian of adolescents aged 13-17 | <ul style="list-style-type: none"> • White <ul style="list-style-type: none"> ○ 5,917 • Hispanic <ul style="list-style-type: none"> ○ 5197 • Black <ul style="list-style-type: none"> ○ 4797 • Other <ul style="list-style-type: none"> ○ 3142 | <ul style="list-style-type: none"> • Knowledge <ul style="list-style-type: none"> ○ All minority groups had about 55% lower odds of having heard about the HPV vaccine in comparison to Whites ○ HPV vaccine knowledge was 73% lower for moms who hadn't finished high school ○ 58% lower for moms with a high school degree |

| | | | |
|---|----------------|------|--|
| <p>theory. <i>Social Science & Medicine</i>, 82, 115-125. doi:10.1016/j.socscimed.2012.12.020</p> | | | <ul style="list-style-type: none"> ▪ In comparison to moms with at least a bachelor's degree ○ Health professional recommendation <ul style="list-style-type: none"> ▪ Odds were 27% lower for Black adolescents to have received a health professional recommendation in comparison to White adolescents ▪ Odds were 14% lower for Hispanic adolescents to have received a health professional recommendation in comparison to White adolescents ○ HPV vaccine uptake <ul style="list-style-type: none"> ▪ In comparison to White adolescents, Black adolescents were 22% less likely to initiate HPV vaccination <ul style="list-style-type: none"> • 34% less likely to complete HPV vaccination in comparison to White adolescents ▪ Hispanic adolescents had no significant differences in vaccine initiation when compared to White adolescents <ul style="list-style-type: none"> • 13% less likely to complete HPV vaccination in comparison to White adolescents |
| Polonijo, A.N., | N= 518 parents | Race | • Black parents versus white parents possessed |

| | | | |
|--|---|--|--|
| <p>Carpiano, R.M., Reiter, P.L., & Brewer, N.T. (2016). Socioeconomic and racial-ethnic disparities in prosocial health attitudes: The case of human papillomavirus (hpv) vaccination for adolescent males. <i>Journal Of Health And Social Behavior, 57</i>(3), 390-406. doi:10.1177/0022146516660344</p> | <ul style="list-style-type: none"> • Data from University of North Carolina HPV Immunization in Sons Study • Survey | <ul style="list-style-type: none"> • Non-Hispanic white <ul style="list-style-type: none"> ○ 355 • Non-Hispanic black <ul style="list-style-type: none"> ○ 61 • Hispanic <ul style="list-style-type: none"> ○ 76 • Other <ul style="list-style-type: none"> 26 | <p>more positive individualistic attitudes toward HPV vaccination</p> <p>Black and Hispanic parents place greater importance on HPV vaccination for the benefit of their sons' future partners versus white parents</p> |
| <p>Savas, L.S., Fernandez, M.E., Jobe, D., & Carmack, C.C. (2012). Human papillomavirus vaccine: 2-1-1 helplines and minority parent decision-making. <i>American Journal Of Preventive Medicine, 43</i>(6), S490-6. doi:10.1016/j.amepre.2012.09.003</p> | <p>N=99</p> <ul style="list-style-type: none"> • 2-1-1 helpline was used to find eligible participants • Used survey to assess HPV knowledge and perceptions • Through interview used parent report to identify HPV vaccine uptake | <ul style="list-style-type: none"> • Hispanic 47% <ul style="list-style-type: none"> ○ 31% of daughters had received at least one HPV vaccine • Black 43% <ul style="list-style-type: none"> ○ 26% of daughters had received at least one HPV vaccine • Non-Hispanic white 3.4% • Other 7% | <ul style="list-style-type: none"> • Hispanics <ul style="list-style-type: none"> ○ Four factors were positively associated with daughter's vaccination <ul style="list-style-type: none"> ▪ Heard of HPV vaccine, belief that vaccine was most effective before onset of sexual activity, having discussed vaccine with their doctor and having been offered the vaccine by a doctor or nurse • Blacks <ul style="list-style-type: none"> ○ Four factors were positively associated with daughter's vaccination <ul style="list-style-type: none"> ▪ Perceived efficacy that vaccine would prevent cervical cancer, perceived |

| | | | |
|---|--|--|---|
| | | | <p>susceptibility of daughter getting HPV, whether they'd discussed the vaccine with their daughter's doctor and whether they'd been offered the vaccine by a doctor/nurse</p> <ul style="list-style-type: none"> ○ Belief that vaccine could cause future health problems for their daughter were negatively associated with vaccine uptake |
| <p>Schuler, C.L., DeSousa, N.S., & Coyne-Beasley, T. (2014). Parents' decisions about hpv vaccine for sons: The importance of protecting sons' future female partners. <i>Journal Of Community Health: The Publication For Health Promotion And Disease Prevention</i>, 39(5), 842-848. doi:10.1007/s10900-014-9859-1</p> | <p>N= 246</p> <ul style="list-style-type: none"> • Survey | <p>Race</p> <ul style="list-style-type: none"> • White <ul style="list-style-type: none"> ○ 127 • Black <ul style="list-style-type: none"> ○ 99 • Other <ul style="list-style-type: none"> ○ 20 | <ul style="list-style-type: none"> • 79% of White parents indicated female partner protection would likely affect their decision to vaccinate their sons against HPV • 78% of Black parents indicated female partner protection would likely affect their decision to vaccinate their sons against HPV |

| | | | |
|--|--|--|--|
| <p>Spencer, A.M., Roberts, S.A., Brabin, L., Patnick, J., & Verma, A. (2014). Sociodemographic factors predicting mother's cervical screening and daughter's hpv vaccination uptake. <i>Journal Of Epidemiology & Community Health</i>, 68(6), 571-577. doi:10.1136/jech-2013-202629</p> | <p>N=540,977</p> <ul style="list-style-type: none"> • Information from a previous study was used to obtain records of mother-daughter records of cervical screening of the mothers and HPV vaccination of the daughters | <ul style="list-style-type: none"> • White <ul style="list-style-type: none"> ○ 93% • Mixed <ul style="list-style-type: none"> ○ 1% • Asian <ul style="list-style-type: none"> ○ 4% • Black <ul style="list-style-type: none"> ○ 1% • Other <ul style="list-style-type: none"> 1% | <ul style="list-style-type: none"> • Vaccine initiation <ul style="list-style-type: none"> ○ Girls living in areas with high proportions of Asians in the routine group and Black and Other in the routine and catch-up groups <ul style="list-style-type: none"> ▪ Less likely to initiate vaccination ○ Mothers did not cite reasons for lack of HPV vaccination initiation in this study • Vaccine completion <ul style="list-style-type: none"> ○ In the catch-up group, Mixed and Other groups were less likely to complete vaccination <ul style="list-style-type: none"> ▪ Again no reasoning provided in this study ○ No ethnic differences noted in the routine group in regard to HPV vaccine completion |
|--|--|--|--|

References

- American Nurses Association (n.d.). What nurses do. Retrieved from <http://www.nursingworld.org/EspeciallyForYou/What-is-Nursing/Tools-You-Need/RNsAPNs.html>
- Barnack-Tavlaris, J.L., Garcini, L.M., Macera, C.A., Brodine, S., & Klonoff, E.A. (2016). Human papillomavirus vaccination awareness and acceptability among U.S.-born and U.S. foreign-born women living in California. *Health Care For Women International*, 37(4), 444-462. doi:10.1080/07399332.2014.954702
- Centers for Disease Control and Prevention. (2017, March 14). Genital hpv infection- Fact sheet. *The Centers for Disease Control and Prevention*. Retrieved from <https://www.cdc.gov/std/hpv/stdfact-hpv.htm>
- Centers for Disease Control and Prevention. (2017, March 6). Hpv- Associated cancer statistics. *The Centers for Disease Control and Prevention*. Retrieved from <https://www.cdc.gov/cancer/hpv/statistics/>
- Centers for Disease Control and Prevention. (2016, August 25). Hpv vaccine coverage maps- Infographic. *The Centers for Disease Control and Prevention*. Retrieved from <https://www.cdc.gov/hpv/infographics/vacc-coverage.html>
- Centers for Disease Control and Prevention. (2016, December 20). Hpv vaccine information for clinicians. *The Centers for Disease Control and Prevention*. Retrieved from <https://www.cdc.gov/hpv/hcp/need-to-know.pdf>
- Centers for Disease Control and Prevention. (2017, January 25). Human papillomavirus (hpv)

- infection. *The Centers for Disease Control and Prevention*. Retrieved from <https://www.cdc.gov/std/tg2015/hpv.htm>
- Centers for Disease Control and Prevention. (2016, December 20). What is hpv?. *The Centers for Disease Control and Prevention*. Retrieved from <https://www.cdc.gov/hpv/parents/whatishpv.html>
- Cheruvu, V.K., Bhatta, M.P., & Drinkard, L.N. (2017). Factors associated with parental reasons for "no-intent" to vaccinate female adolescents with human papillomavirus vaccine: National immunization survey - teen 2008-2012. *BMC Pediatrics*, *17*, 1-11. doi:10.1186/s12887-017-0804-1
- Chesson, H.W., Ekwueme, D.U., Saraiya, M. & Markowitz, L.E. (2008). Cost-effectiveness of human papillomavirus vaccination in the united states. *Emerging Infectious Diseases* *14*(2), 244-251. doi: 10.3201/eid1402.070499
- Cuff, R.D., Buchanan, T., Pelkofski, E., Korte, J., Modesitt, S.P., & Pierce, J.Y. (2016). Rates of human papillomavirus vaccine uptake amongst girls five years after introduction of statewide mandate in Virginia. *American Journal Of Obstetrics & Gynecology*, *214*(6), 752.e1-752.e6. doi:10.1016/j.ajog.2016.03.022
- Getrich, C.M., Broidy, L.M., Kleymann, E., Helitzer, D.L., Kong, A.S., & Sussman, A.L. (2014). Different models of HPV vaccine decision-making among adolescent girls, parents, and health-care clinicians in New Mexico. *Ethnicity & Health*, *19*(1), 47-63. doi:10.1080/13557858.2013.857767
- Greenfield, L.S., Page, L.C., Kay, M., Li-Vollmer, M., Breuner, C.C., & Duchin, J.S. (2015).

- Strategies for increasing adolescent immunizations in diverse ethnic communities. *Journal Of Adolescent Health*, 56, S47-53.
doi:10.1016/j.jadohealth.2014.10.274
- History of Vaccines. (n.d.) All timelines overview. *The History of Vaccines*. Retrieved from <https://www.historyofvaccines.org/timeline>
- History of Vaccines. (n.d.) Human papillomavirus infection. *The History of Vaccines*. Retrieved from <https://www.historyofvaccines.org/content/articles/human-papillomavirus-infection>
- Kim, G. (2017). Harald zur hausen’s experiments on human papillomavirus causing cervical cancer (1976-1987). *The Embryo Project Encyclopedia*. Retrieved from <https://embryo.asu.edu/pages/harald-zur-hausens-experiments-human-papillomavirus-causing-cervical-cancer-1976-1987>
- Lu, P., Yankey, D., Jeyarajah, J., O'Halloran, A., Elam-Evans, L. D., Smith, P.J., & ... Dunne, E. F. (2015). HPV vaccination coverage of male adolescents in the United States. *Pediatrics*, 136(5), 839-849. doi:10.1542/peds.2015-1631
- Mariner, W.K., Annas, G.J. & Glantz, L.H. (2005). Jacobson v massachusetts: It’s not your great-great grandfather’s public health law. *American Journal of Public Health* 95(4), 581-590. doi: 10.2105/AJPH.2004.055160
- McKee, C. & Bohannon, K. (2016). Exploring the reasons behind parental refusal of vaccines. *The Journal of Pediatric Pharmacology and Therapeutics* 21(2), 104-109. doi: 10.5863/1551-6776-21.2.104
- Meites, E., Kempe, A. & Markowitz, L.E. (2016). Use of a 2-dose schedule for human

- papillomavirus vaccination- Updated recommendations of the advisory committee on immunization practices. *Morbidity and Mortality Weekly Report (MMWR)* 65(49), 1405-1408. doi: <http://dx.doi.org/10.15585/mmwr.mm6549a5>
- Mohammed, K. A., Vivian, E., Loux, T.M., & Arnold, L.D. (2017). Factors associated with national immunization survey-teen. *Preventing Chronic Disease*, 14 (E45), 1-12. doi:10.5888/pcd14.160314
- National Cancer Institute. (2016, November 2). Human papillomavirus (hpv) vaccines. *The National Cancer Institute*. Retrieved from <https://www.cancer.gov/about-cancer/causes-prevention/risk/infectious-agents/hpv-vaccine-fact-sheet#q5>
- Polonijo, A.N., & Carpiano, R.M. (2013). Social inequalities in adolescent human papillomavirus (hpv) vaccination: A test of fundamental cause theory. *Social Science & Medicine*, 82, 115-125. doi:10.1016/j.socscimed.2012.12.020
- Polonijo, A.N., Carpiano, R.M., Reiter, P.L., & Brewer, N.T. (2016). Socioeconomic and racial-ethnic disparities in prosocial health attitudes: The case of human papillomavirus (hpv) vaccination for adolescent males. *Journal Of Health And Social Behavior*, 57(3), 390-406. doi:10.1177/0022146516660344
- Savas, L.S., Fernandez, M.E., Jobe, D., & Carmack, C.C. (2012). Human papillomavirus vaccine: 2-1-1 helplines and minority parent decision-making. *American Journal Of Preventive Medicine*, 43(6), S490-6. doi:10.1016/j.amepre.2012.09.003
- Schuler, C.L., DeSousa, N.S., & Coyne-Beasley, T. (2014). Parents' decisions about hpv vaccine

- for sons: The importance of protecting sons' future female partners. *Journal Of Community Health: The Publication For Health Promotion And Disease Prevention*, 39(5), 842-848. doi:10.1007/s10900-014-9859-1
- Spencer, A.M., Roberts, S.A., Brabin, L., Patnick, J., & Verma, A. (2014). Sociodemographic factors predicting mother's cervical screening and daughter's hpv vaccination uptake. *Journal Of Epidemiology & Community Health*, 68(6), 571-577. doi:10.1136/jech-2013-202629
- Stern, A.M. & Markel, H. (2005). The history of vaccines and immunizations: Familiar patterns, new challenges. *Health Affairs* 24(3), 611-621. doi: 10.1377/hlthaff.24.3.611
- Tiro, J.A., Sanders, J.M., Pruitt, S.L., Stevens, C.F., Sugg Skinner, C., Bishop, W.P., & ... Persaud, D. (2015). Promoting hpv vaccination in safety-net clinics: A randomized trial. *Pediatrics*, 136(5), 850-859. doi:10.1542/peds.2015-1563
- United States Census Bureau (2017). Race and ethnicity. Retrieved from <https://www.census.gov/mso/www/training/pdf/race-ethnicity-onepager.pdf>
- Weinstein, M.C., Torrance, G. & McGuire, A. (2009). Qalys: The basics. *International Society for Pharmacoeconomics and Outcomes Research (ISOR)* 12(1), S5-S9. doi: 10.1111/j.1524-4733.2009.00515.x.
- World Health Organization. (2016). Human papillomavirus (hpv) and cervical cancer. *World Health Organization*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs380/en/>