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PERCEIVED DISCRIMINATION FROM PROVIDERS ON LATINA MOTHERS' DECISION-MAKING ON HPV VACCINATION INITIATION AND COMPLETION IN HOUSTON, TX

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DECISION-MAKING ON HPV VACCINATION INITIATION
AND COMPLETION IN HOUSTON, TX

by

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2019

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by

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HOUSTON, TX

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Background: Human papillomavirus (HPV) is one of the most common sexually transmitted infections (STI) in the United States (US). Certain HPV strains have the potential to develop into cervical, anal, penile, vulvar, and throat cancers. Latinos in the U.S. have the highest rates of cervical and penile cancers compared to non-Hispanic Whites. Despite the availability of HPV9v, uptake of the vaccine is suboptimal in the Latino community. Previous research has found factors such as provider recommendation and communication are important in HPV vaccine series initiation and completion. Discrimination in the medical setting is linked to poorer health outcomes and delayed receipt of preventative health services. Little is known about the effect of perceived discrimination in the medical setting and HPV vaccination uptake.

Aims: (1) Assess factors associated with initiation and completion of the HPV vaccine series among Latino children using the Aday-Andersen model; (2) Determine whether maternal perceived discrimination plays a role in HPV vaccine initiation; (3) Determine whether maternal perceived discrimination plays a role in HPV vaccine completion.

Methods: Data from parent study *Por Amor a Ellos* were used for binomial regression analysis. The sub-sample used for analysis included 166 Latina mothers with a child aged 10-17, who answered items pertaining to perceived discrimination, offer of HPV vaccine by medical provider, marital status, acculturation, self-efficacy to initiate the HPV vaccine series, and perceived child health.

Results: Latina mothers who were married were more likely to initiate the HPV vaccine series at follow-up (odds ratio [OR]: 0.233, 95% confidence interval [CI]: 0.088-0.615). Perceived discrimination was not associated with HPV vaccine series initiation, but was associated with HPV vaccine series completion (OR: 1.120, 95% CI: 1.007-1.247). Having the HPV vaccine offered by a doctor or nurse was related to HPV vaccine series initiation, but did not reach significance.

Conclusion: More information is needed to determine if perceived discrimination in the medical setting plays a role in HPV vaccination uptake. Further research should explore the relationship between perceived discrimination and mother's relationship with their child's provider.

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BACKGROUND

Human Papillomavirus

Human papillomavirus (HPV) is one of the most common sexually transmitted infections (STI) in the United States (US). According to the Centers for Disease Control and Prevention (CDC), over 79 million Americans are estimated to be infected, with an estimated 14 million infected every year (Centers for Disease Control and Prevention, 2017). HPV infections often go away on their own, but some strains can persist in the body, developing into pre-cancerous lesions, cancers and genital warts. An estimated 30,000 people in the US develop HPV-related cancers every year, which includes cervical, mouth, throat, penile, anal, vaginal, and vulvar cancers (Centers for Disease Control and Prevention, 2016b).

HPV Vaccine

The first HPV vaccine, which targeted four HPV types, was released in 2006 (Lechuga, Vera-Cala, & Martinez-Donate, 2016). As of now, the US Food and Drug Administration has approved three HPV vaccines: Gardasil (quadrivalent), Gardasil 9 (nonavalent), and Cervarix (bivalent) (Centers for Disease Control and Prevention, 2016a). All three vaccines protect against the two types of HPV known to cause approximately 70% of cervical cancers: 16 & 18, however HPV9v includes additional HPV types and protects against almost all cervical cancers (Petrosky et al., 2015). HPV9v is currently the only HPV vaccine in use in the US (Centers for Disease Control and Prevention, 2016c).

However, despite the availability of the HPV vaccine and its potential to reduce the incidence of HPV-related cancers, disparities remain. The highest rates of cervical cancer occur among Latina women in the US compared to non-Hispanic White women, and Latino

men have higher rates of penile cancer compared to non-Hispanic White men (Aragones, Genoff, Gonzalez, Shuk, & Gany, 2016; Joseph et al., 2008). Despite the availability of the HPV vaccine, vaccine initiation among Latino girls and boys is low. In 2013, 55% of Latina girls aged 13-17 reported having initiated HPV vaccination, but only 38% had completed the series (Aragones et al., 2016; Centers for Disease Control and Prevention, 2013b, 2013a). In comparison, in 2013 34% of Latino boys ages 13-17 had reported initiation, and only 14% reported completion (Aragones et al., 2016; Centers for Disease Control and Prevention, 2013b). Completion rates among Latino girls and boys are well below the Healthy People 2020 goal of 80% (U.S. Department of Health and Human Services, 2014).

Factors Associated with Vaccination among Latinos

Previous research on HPV vaccine uptake among Latino parents has recognized a number of factors contributing to the decision to vaccinate, including child's perceived susceptibility to HPV (Barnack, Reddy, & Swain, 2010; Galbraith et al., 2016; Lechuga et al., 2016); knowledge, awareness, and beliefs about HPV and the HPV vaccine (Allen et al., 2010; Galbraith et al., 2016); sexual and gender norms (Galbraith et al., 2016; Lechuga et al., 2016); mother-daughter communication (Morales-Campos, Markham, Peskin, & Fernandez, 2013); fears and concerns about the vaccine's safety (Galbraith et al., 2016; Lechuga et al., 2016; Morales-Campos et al., 2013); and provider recommendation (Barnack et al., 2010; Galbraith et al., 2016; Lechuga et al., 2016). The actual uptake of the HPV vaccine, however, is not associated with knowledge and awareness of HPV and the HPV vaccine series. Research has shown provider recommendation (Aragones et al., 2016; Dempsey, Abraham,

Dalton, & Ruffin, 2009; Galbraith et al., 2016) and child's perceived susceptibility to HPV infection (Dempsey et al., 2009) contribute to the uptake of the HPV vaccine series.

Factors associated with HPV completion vary. Polonijo & Carpiano (2013) found that mothers of Black and Latino children who reported higher levels of education were more likely to complete the HPV vaccine series. Mothers describe vaccine affordability, information about the vaccine, transportation, ease of scheduling, keeping appointments, and bringing their child's vaccination card to appointments as facilitators to complete the vaccine series (Roncancio, Ward, Carmack, Munoz, & Cribbs, 2017). While Albright et al. (2017) note lack of knowledge about the HPV vaccine series is a barrier to completing the series, Morales-Campos & Parra-Medina (2017) found that HPV and HPV vaccine knowledge and vaccine self-efficacy were not associated with either initiation or completion.

Factors associated with low uptake of the HPV vaccine series for Latino children may include the perceived risks posed by HPV infection and medical provider influence. Prior research on Latinos and HPV vaccination have focused on Latino culture and nuances in beliefs, knowledge, and acceptability of the HPV vaccine. Because HPV vaccination is framed as a protective measure against a sexually transmitted infection, some Latina mothers may be hesitant to vaccinate their children out of concern their children will become sexually active.

Latino Children & Health Care Utilization

Latino children are less likely to have a usual source of care, less likely to be insured, less likely to have one or more preventive care visits, and less likely to visit a doctor (Flores, 2009; Langellier, Chen, Vargas-Bustamante, Inkelas, & Ortega, 2016). Langellier et al.

(2016) noted SES explained 20% to 30% of disparities in usual source of care, delayed care, and doctors' visits between Latino and non-Latino White children. Compared to Black children, SES accounted for 40% to 50% of disparities in emergency room use and preventive care in Latino children (Langellier et al., 2016).

Studies looking at child healthcare utilization have found some parental factors are associated with access to care. Specifically, parental language use (Flores, Abreu, & Tomany-Korman, 2005; Ortega, McKenna, Langellier, Alcalá, & Roby, 2018); time in the U.S. (Durden, 2007); and documentation status (Durden, 2007; Granados, Puvvula, Berman, & Dowling, 2001; Hamilton, Hummer, You, & Padilla, 2006; Huang, Yu, & Ledsky, 2006) are associated with lower utilization of health services of Latino children. Parents themselves cite similar factors like language, but also mention other factors such as waiting times, transportation, and inability to pay (Flores, Abreu, Olivar, & Kastner, 1998).

Disparities in healthcare utilization by Latino children have focused on structural factors such as SES and documentation status, clinical factors such as cost of care and time to receive services, and on parental factors such as language and length of stay in the U.S. Language barriers cited by parents, and health providers, are related to limited English proficiency and understanding, which can result in lower rates of compliance, dissatisfaction of service, and poor understanding of a diagnoses/condition (Betancourt, Green, Carrillo, & Ananeh-Firempong, 2003; Flores et al., 1998). Becerra and colleagues (2015) noted Latinos who spoke and understood little English were more likely to report feelings of discrimination based on their accent, as well as race/ethnicity and ability to pay.

In regards to the HPV vaccine, provider communication about the vaccine to the parents is either limited, or rich, in information (Goff, Mazor, Corey, & Blake, 2010; Holman et al., 2014; Hughes, Jones, Feemster, & Fiks, 2011). Latino parents who are limited in their understanding of English may be at a disadvantage, then, if they are considering vaccinating their child against HPV. There has been a shift toward looking at the role of health services utilization, particularly among providers. Racial and ethnic disparities remain in health services utilization, and since the early 2000s, the research on disparities in health services utilization has focused on the influence of perceived discrimination (Nelson, 2003).

Perceived Discrimination

To understand perceived discrimination and access to care, we used Krieger's Ecosocial theory. Ecosocial theory focuses on why and how social conditions produce current health statuses for groups of people (Krieger, 1999). Krieger states that discrimination is a socially-constructed phenomenon sanctioned by society through ideology, and is expressed in the interactions of individual-to-individual and individuals-to-institutions (Krieger, 1999). Ecosocial theory offers three methods to quantify the effects of discrimination: indirectly at the individual level, directly at the individual level, and in relation to the institution, at the population level (Krieger, 1999).

In order to look at discrimination at the individual level, controlling for known risk factors (such as age, SES, insurance, etc) can help discern whether any remaining differences in health outcomes are due to discrimination. Because discrimination is not limited to a single occurrence, but is rather a continuous experience that includes minor, and major, events, it is important to narrow the scope of discrimination of *who* and *where* the

discriminatory event took place. The next section discusses the impact discrimination from providers and healthcare facilities have on healthcare utilization.

Perceived Discrimination & Health Care Utilization

Perceived discrimination in healthcare can affect receipt of preventive care services. Benjamins & Whitman note those who perceived higher levels of discrimination were more likely to report an unmet health care need (2014). Perceived discrimination has been linked to fewer breast and cervical cancer screenings (Jacobs et al., 2014). Discrimination also affects satisfaction of care, which influences how often an individual seeks care. Sorkin and colleagues (2010) found that patient's perceptions of discrimination were negatively linked to patient's rating of healthcare. Keller et al. found that higher levels of discrimination were linked to higher odds of going without care (OR = 2.7) (2010).

To date, there has been little research on how health services utilization and perceived discrimination impact the initiation and completion of HPV vaccination among Latino youth. To determine what role perceived discrimination plays in HPV vaccine series initiation and completion, the next section will detail the model of health services, and the possible factors that will be analyzed within the model.

The Andersen Model

The Andersen Model of Health Services attempts to demonstrate predictors of health services use. The original model, developed in the late 1960s, posited that three sets of factors—predisposing, enabling, and need—affected whether individuals access medical care services (Andersen, 1968). This behavioral model has been useful in determining whether disparities are attributable to racial/ethnic differences and other factors (Mikuls, Mudano,

Pulley, & Saag, 2003). As one of the models used in equitable health services research, Andersen notes the concept of mutability, wherein variables must have the potential of explaining health services utilization to change policies (1995). The model used in this study is a variation of the original Andersen model, the Aday-Andersen model. The Aday-Andersen model added the healthcare organizational system as a determinant to an individual's use of services. The model also elaborated measurements of the use of health services, expanding the definition to include type of health service sought, the location of where the health service is located, and the purpose of the health service (Andersen, 1995).

Predisposing Factors

Predisposing factors can be broken down into three categories: demographics, social factors, and health beliefs. Demographic factors can serve as one factor associated with the need for health services, as they can indicate the likelihood an individual will require health services (Andersen, Davidson, & Baumeister, 2013). However, demographics are judged to have a small influence in policy making when it comes to making behavioral changes as one cannot alter an individual's demographics to change health service utilization (Andersen, 1995). Social factors determine an individual's status in their community, as well as their ability to cope with problems and to command resources to deal with said problems (Andersen et al., 2013). Social factors traditionally have been measured through education, occupation, and ethnicity. Expanded measures have included social networks (e.g., presence of family and friends), and affiliations of religious and community organizations. Like demographics, social factors are also rated as having low influence, as ethnicity/race is not feasible to change and other factors, like education and income, are not viable policy changes

(Andersen, 1995). Health beliefs refer to the individual's attitudes, values, and knowledge about health and health services that can influence their perception of need and use of health services (Andersen, 1968; Andersen et al., 2013). Health behaviors are ranked with medium influence, as they are able to be changed and can influence behavioral change (Andersen, 1995).

Acculturation has been shown to impact health. Negative and mixed effects of acculturation are found often in certain health behaviors (e.g., increased substance use, smoking, less exercise), chronic conditions (e.g., diabetes, hypertension), and health outcomes (e.g., low birthweights, teen pregnancy); whereas, positive and mixed effects of acculturation correspond more with health care use and access (Lara, Gamboa, Kahramanian, Morales, & Hayes Bautista, 2005). Earlier research on immunization rates of Latino children have shown there is a negative to mixed effect due to acculturation (Anderson, Wood, & Sherbourne, 1997; Findley, Irigoyen, & Schulman, 1999; Moore, Fenlon, & Hepworth, 1996; Prislín, Suarez, Simpsón, & Dyer, 1998). While acculturation can be negatively associated with some health behaviors (Abraído-Lanza, White, & Vásquez, 2004), Gerend et al. found that acculturation is positively linked to HPV vaccination (2013).

Socio-economic status (SES) has been shown to be a strong predictor of morbidity and mortality (Marmot & Wilkinson, 2006). One component of SES is marital status, which has been linked to better health outcomes, such as decreased smoking and substance use, and increased fruit and vegetable consumption, for both persons involved (Lillard & Panis, 1996; Liu, Reczek, & Brown, 2013; Umberson, Donnelly, & Pollitt, 2018). Wisk, Allchin, & Witt (2014) found that parents of children eligible for the HPV vaccine who were married were

more likely to be aware of the HPV vaccine. Luman and colleagues (2003) noted that mothers who were divorced, separated, or widowed were more likely to have children who were under vaccinated. Little has been done to understand the relationship of marital status and HPV vaccine initiation or completion.

Self-efficacy refers to the confidence an individual has on their ability to perform a behavior (Kelder, Hoelscher, & Perry, 2015). Latina mothers' intentions to vaccinate their child and their belief that they can do so have been studied many times. Dempsey et al. noted Latina mothers who chose to vaccinate their daughters cited their own control over daughter's health, stating they are in a position to protect their daughter before sexual activity began (Dempsey et al., 2009). Adolescents also agree their parents have the final decision on whether they will be vaccinated when they go to the doctor (Gowda, Schaffer, Dombkowski, & Dempsey, 2012).

Enabling Factors

Social support is a form of enabling factor, as the amount of support (e.g., emotional, informational) an individual receives from their social network can influence whether or not an individual seeks health services (Andersen et al., 2013). Provider-parent relationships may fall under social support, as the amount of trust and support a parent receives from their provider can influence their decision to pursue a behavior or not. Recommendations from health professionals have shown to be a strong predictor of HPV vaccination uptake (Gamble, Klosky, Parra, & Randolph, 2010; Wentzell, Flores, Salmerón, & Bastani, 2016). If a parent does not feel trust or support from their child's provider, then this too may influence their decision to act on a behavior. Previous studies have determined feelings of perceived

discrimination from providers are related to poorer provider-patient communication (Perez, Sribney, & Rodríguez, 2009; Sheppard et al., 2014); delayed breast and cervical cancer screenings (Jacobs et al., 2014); and, not following recommendations from medical providers (Casagrande, Gary, LaVeist, Gaskin, & Cooper, 2007; Facione & Facione, 2007). Overall, enabling factors play a large role when it comes to influencing health services utilization (Andersen, 1995; Manning, Newhouse, Duan, Keeler, & Leibowitz, 1987).

Individual Need Factors

Perceived need is described as how an individual views his or her own general health and functional status, as well as how that individual experiences and emotionally responds to symptoms of illness, pain and worry about his or her health condition. Perceived need is treated as a social phenomenon that is largely explained by the severity and discomfort of an individual's symptoms, predisposing characteristics, demographic characteristics, and health beliefs. The Andersen Model posits perceived needs help researchers understand the process of seeking care and adherence to medical treatment (Andersen et al., 2013). Although not considered an important influence in utilization, need has entered a low influence level when it comes to utilization. Perceived need fluctuates based on an individual's changes in income, health insurance, health education, etc. (Andersen, 1995).

Perceived health of the child may limit mothers from seeking medical assistance if it is not necessary. Mothers make decisions regarding their child's health based on how they react to their child's illnesses. Previous research has shown maternal decision making regarding infants' care was based on changing assessment criteria, since the more time a mother spends with her infant, the more experience she gains, and the more she can discern

her child's needs (Pridham, 1989; Pridham, Chang, & Chiu, 1994). Gowda et al.'s qualitative study among providers, parents, and adolescents and HPV vaccine uptake noted that many parents did not take their child to annual preventive visits (2012). In Yeganaeh et al.'s study, 89% of Latino children were reported to have a primary physician, but only 69% were reported as having regular visits (2010).

Health Outcome: Initiating and Completing the HPV vaccine series

Personal health practices are performed by individuals and can influence their health. The process to measure an individual's health practices can relate to counseling and education, and even the quality of provider-patient communication. Over time, the Aday-Andersen model has been implemented to look at specific health behaviors and services. Though the original model aimed to predict the difference in health services use among types of services, it has become increasingly used in detecting differences in utilization among specific illnesses and diseases.

Public Health Significance

While there is intention to vaccinate against HPV, Latinos are still lagging behind in initiation and completion. Previous research on factors associated with vaccination initiation have identified provider recommendations and perceived risk with vaccine uptake (Lechuga et al., 2016; Gowda et al., 2012; Dempsey et al., 2009; Albright et al., 2017; Wentzell et al., 2016). Previous research on delayed receipt of preventative health services have cited perceived discrimination from health providers as a factor. As adult Latinos bear the greatest disparities in cervical and penile cancers, compared to Non-Hispanic Whites, it is important to understand what facilitates and hinders their access to the HPV vaccine as children. By

focusing on the receipt of the HPV vaccine as a health service that is accessed by mothers, and not a behavior, this study adds to the literature a new method of understanding the access to and receipt of HPV vaccination in the Latino community.

Specific Aims

AIM 1: Assess factors associated with initiation and completion of the HPV vaccine series among Latino children using the Aday-Andersen model.

AIM 2: Determine whether maternal perceived discrimination plays a role in HPV vaccine initiation.

AIM 3: Determine whether maternal perceived discrimination plays a role in HPV vaccine completion.

METHODS

Participants and Procedures

The parent study, *Por Amor a Ellos*, included 340 women (mean age = 39.24, SD = 0.39) who identified as Hispanic or Latino, whose first language was Spanish, and had an adolescent child between the ages of 10 and 17 years. Participants were recruited using both passive and active recruitment strategies in community sites (e.g., community centers, health fairs, laundromats). Participants were assessed for eligibility and those who met the inclusion criteria and agreed to participate provided informed consent, were enrolled in the study, and completed the baseline survey. Baseline surveys were completed on-site by data collectors who read the survey to participants; participants were given a numerical ID to deidentify their responses. Participants were contacted six months after their initial assessment to

complete a follow-up survey and a medical record review was conducted to verify their child's vaccination status. All procedures were approved by the University of Texas Health Science Center at Houston's (UTHealth) Committee for the Protection of Human Subjects (CPHS) (#HSC-SPH-19-0040). Women who did not complete the discrimination scale ($n = 174$) were excluded from the current analysis. Therefore, the final sample retained for analysis in the current study consists of 166 women (mean age = 39.29, $SD = 7.82$).

Measures

The measures used in this study came from the parent study *Por Amor a Ellos*, a larger study aimed at identifying factors associated with Latino mothers' decisions to have their adolescents vaccinated against HPV. The larger study included questions such as health technology use, HPV and HPV vaccine knowledge, constructs associated with the Integrative Model (e.g., behavioral beliefs, control beliefs, normative beliefs, motivation to comply, generalized intention), social norms, information sources, alternative medicine use, parent-child communication, social networks, religion, and mothers' Pap/HPV/cancer medical history. The current study used the following measures exclusively in Spanish.

Predisposing Factors

Proxy Acculturation Scale-3. Acculturation was measured using the Proxy Acculturation Scale-3 (PAS-3), developed by Cruz, Marshall, Bowling, & Villaveces (2008), the Cronbach's alpha for this sample was .79. The PAS-3 measures acculturation on a proxy scale of three items: (1) proportion of life spent in the US (determined as the number of years lived in the US divided by age), (2) language spoken at home (scored as 0 if it is Spanish/ mostly Spanish, and 2 if it is Equally Spanish and English or Mostly English), and (3)

language used in the survey (scored as 0 if Spanish, 2 if English). These items were totaled together for each participant.

Marital Status. Maternal marital status was a categorical variable measured with six responses options: “married”, “living with partner”, “divorced”, “widow”, “separated”, “never married”. Responses were recoded into a dichotomous variable, with 1 being “married” and 2 being “not married”.

Self-Efficacy. Self-efficacy was measured by one statement: “If I wanted to, I am sure I can give my child the first dose of the HPV vaccine in the next three months.” Mothers were prompted to answer on a scale of 1 to 5, 1 being “Strongly disagree” and 5 being “Strongly agree”.

Enabling Factors

Perceived Discrimination. Perceived discrimination in the healthcare setting is measured with 7 questions using a 7-item race-based discrimination subscale, which was adapted from Bird and colleagues’ study of race- and SES-based discrimination in HIV treatment (Bird, Bogart, & Delahanty, 2004). An example question is “I feel like doctors or nurses don’t listen to what I tell them.” Response options were “Never”, “Almost Never”, “Sometimes”, “Almost Always”, and “Always”. Items were totaled for each participant.

HPV Offer. Mothers were asked “At any time has a doctor or a nurse ever asked you if you wanted to give your child the HPV vaccine?” Mothers were prompted to answer “No”, “Yes”, or “I don’t know”. Mothers who answered “I don’t know” were recoded as “No”.

Individual Need

Perceived Child Health. In this study, individual need was operationalized as mother's perception of their child's health. Child's perceived health was measured with one question, "In general, how would you describe your child's health?" Response options were "Bad", "Regular", "Good", "Very good", or "Excellent".

Health Outcome

HPV vaccination status. Child's HPV vaccination status was collected 6-months post-baseline via medical records review. If medical records were not found in the child's named clinic, the child's HPV vaccination status was collected from parental self-report and the participant was asked for the clinic their child had visited to receive the vaccine. The additional clinic was then contacted to verify the child's HPV vaccination status. Children who had at least one HPV vaccine, but less than three, were coded as having initiated the HPV vaccine series. Children who had all three HPV vaccines were coded as having completed the HPV vaccine series, since at the time of data collection, three doses were recommended for all vaccine eligible individuals.

Data Analysis

All data analyses were conducted using SPSS version 25.0 (Chicago, IL). Means, standard deviations, skewness, and kurtosis indices were examined for each variable. The analysis of this study relied on binomial logistic regressions. Binomial logistic regressions are part of the larger statistical group of tests known as Generalized Linear Models (GLM). These tests integrate continuous, ordinal, or dichotomous dependent variables. Binomial

regressions allow for models describing how multiple independent variables can predict a single, dichotomous dependent variable.

RESULTS

Descriptive statistics

The mean age of participants was 32.29 (SD = 7.28). Approximately 68.1% of participants were born in Mexico, 25.9% were born in Central America & the Caribbean (El Salvador, Honduras, Guatemala, and Cuba), and 6% were born in the United States. Mothers' and children's demographic variables are presented in Tables 1 and 2, respectively.

HPV Vaccine Initiation

A binomial logistic regression was performed to ascertain the effects of marital status, acculturation, perceived behavioral control, perceived discrimination, HPV vaccine offer, and perceived child health on the likelihood that participants have initiated the HPV vaccine series. Linearity of the continuous variables with respect to the logit of the dependent variable was assessed via the Box-Tidwell (1962) procedure. Based on this assessment, all continuous independent variables were found to be linearly related to the logit of the dependent variable.

The logistic regression model was statistically significant, $\chi^2(6) = 14.171$, $p = 0.028$. The model explained 23.8% (Nagelkerke R²) of the variance in HPV vaccine series initiation and correctly classified 65.3% of cases. Sensitivity was 61.8%, specificity was 68.4%, positive predictive value was 63.64% and negative predictive value was 66.67%. Of the six predictor variables only one was statistically significant: marital status (see Table 3). Married

mothers had 4.06 times higher odds to initiate the HPV vaccine series for their child than non-married mothers.

HPV Vaccine Series Completion

A binomial logistic regression was performed to ascertain the effects of marital status, acculturation, perceived behavioral control, perceived discrimination, HPV vaccine offer, and perceived child health on the likelihood that participants have completed the HPV vaccine series. Linearity of the continuous variables with respect to the logit of the dependent variable was assessed via the Box-Tidwell (1962) procedure. Based on this assessment, all continuous independent variables were found to be linearly related to the logit of the dependent variable.

The logistic regression model was statistically significant, $\chi^2(6) = 13.365$, $p = 0.038$. The model explained 33.7% (Nagelkerke R²) of the variance in HPV vaccine series initiation and correctly classified 93.1% of cases. Sensitivity was 50.0%, specificity was 93.1%, positive predictive value was 80% and negative predictive value was 94%. Of the six predictor variables, only perceived discrimination was significant (see Table 4). Mothers who reported higher perceived discrimination scores had 1.160 times higher odds of completing the HPV vaccine series for their child than mothers who reported lower scores of perceived discrimination.

DISCUSSION

This study addressed three research aims: *(1) Assess factors associated with initiation and completion of the HPV vaccine series among Latino children using the Aday-Andersen*

model. Results from the study revealed there are certain factors that are unique to *only* initiation and *only* completion of the HPV vaccine series. In HPV vaccine series initiation, Latina mothers who were married are more likely to initiate the HPV vaccine series for their children than Latina mothers who are not married. In HPV vaccine series completion, Latina mothers who scored higher on the perceived discrimination scale are more likely to complete the HPV vaccine series than those with lower scores. While offering the HPV vaccine did not reach significance in either the initiation or completion model, it did approach significance in the initiation model.

(2) *Determine whether maternal perceived discrimination plays a role in HPV vaccine initiation.* Perceived discrimination was **not** a factor in HPV vaccine series initiation. There is limited research on the nature of racial/ethnic discrimination and childhood immunization. Chu and colleagues (2004) posit immunization patterns of children is related to children's health service use patterns; meaning, children who do not have regular access to care receive a fragmented form of health care, which can make receipt of vaccines difficult. However, over 80% of children in this study were reported to have a regular source of care (Table 2), and nearly 65% reported going to the doctor for one preventative visit (Table 2). Further exacerbating infrequent access to care is lack of trust for healthcare providers and the healthcare system, which may deter mothers from seeking care (Chu et al., 2004; Zhao & Luman, 2010). In this sample, perhaps it wasn't so much racial/ethnic discrimination that influenced initiation of the HPV vaccine series, but perhaps it was the lack of trust from providers, or even poor communication by providers about the vaccine.

Marital status can influence an individual's health via social control. Marriage among two individuals creates a social tie wherein both individuals are constant figures in the others' lives. Social ties can influence a person's behavior through regulating health behaviors directly or indirectly (Umberson, 1992). In some instances, this regulation of behavior can contribute to greater self-efficacy, as an increase in knowledge about health issues creates the likelihood an individual can engage in preventive behaviors and reduce risky ones (Ross & Mirowsky, 2003; Umberson, Crosnoe, & Reczek, 2010). Women are more likely to engage in health behavior controlling efforts, as women are socialized to (1) monitor and safeguard their own bodies, and (2) nurture the needs of others around them (Umberson, 1992). When married, women take on the responsibilities of running the household, which includes making decisions on health (Depner & Verbrugge, 1980).

Mothers are primary decision-makers when it comes to their child's health. In a 2001 study looking at the processes involved in maternal decision-making, the main contributing factors are (1) perceived degree of seriousness of health issue, (2) attitudes of health care providers, (3) previous experiences with illnesses, and (4) social support the mother feels (Gross & Howard, 2001). When looking at the literature for HPV vaccine initiation, Latina mothers often cite similar concerns. Galbraith and colleague's (2016) literature review of parental acceptance and HPV vaccine uptake and completion, the decision to vaccinate a child was less associated with knowledge about the vaccine, but was more associated with a physician's recommendation and perceived vaccine effectiveness.

Because of the overarching control married mothers have on their household's health and wellbeing, perhaps their self-efficacy to vaccinate their children against HPV is higher

than other mothers. While the self-efficacy measure in this study did not reach significance in either model, 86.2% of mothers reported they either “agreed” or “strongly agreed” to the statement: “If I wanted to, I am sure I can give my child the first dose of the HPV vaccine in the next three months.” However, because mothers are, in general, the main decision-makers when it comes to their child’s health, marital status of the mother wouldn’t affect their decision-making. It could, however, affect who they rely on for advice to make these decisions. Further research on self-efficacy to vaccinate children and household make-up is needed to further determine if there is an association.

In this study, more than half (69.9%) of all mothers in the subsample reported they had not received an offer to vaccinate their child against HPV. These mothers were associated with lower odds of initiating the HPV vaccine in the initiation model ([OR=0.348]; CI 95% [0.120-1.009]). These lower odds could be due to recall bias; mothers may have been offered the HPV vaccine for their child, but at the time of the baseline survey they could not remember or responded they had never received an offer when in fact they did. It is difficult to verify they were given an offer to vaccinate as clinics and providers were not asked to verify if they had offered the vaccine to the mothers. While provider recommendation is associated with initiation of the vaccine series, this recommendation may also depend on the relationship mothers have with their child’s providers.

The relationship between Latinos and medical providers is one that is based on respect and deference to power. Zea and colleagues (1994) noted the relationship between medical providers and Latinos with disabilities is based on a hierarchy, wherein the provider has the knowledge to care and treat the patient, and is seen as the authority figure. The

interaction with patient and provider in the Latino culture depends on other factors such as sympathy (e.g., politeness) and personalism (e.g., warm, personal relationships). Flores and colleagues (2000) noted lack awareness of these cultural norms among pediatricians can result in greater dissatisfaction of the care received. In HPV vaccination research, Latino parents have reported they are willing to comply with vaccinating their child *if* the provider recommends the vaccine (Albright et al., 2017; Aragonés et al., 2016; Dempsey et al., 2009). Further research should focus on training providers to offer clear, direct recommendations rather than remaining neutral or letting parents decide for themselves.

(3) Determine whether maternal perceived discrimination plays a role in HPV vaccine completion. Perceived discrimination **was** a factor in HPV vaccine series completion. This study found that perceived racial and ethnic discrimination was significantly related to completing the HPV vaccination series. This result was unexpected. Previous studies have shown greater perception of discrimination leads to less receipt of healthcare services (Casagrande et al., 2007). Because self-efficacy scores were high among mothers in this sample, it's could possible these mothers perhaps felt more in control about what they can do to improve their child's health. This greater, perceived control about their decision-making perhaps overcomes whatever feelings about the discrimination they may face in their child's healthcare setting. However, discrimination has been cited as a barrier for Latinas when it comes to receiving mammograms and other preventive healthcare services (Burgess, Ding, Hargreaves, Ryn, & Phelan, 2008; Otero-Sabogal et al., 2004). It is possible that Latina mothers are more likely to overlook this discrimination if it means providing care for their children.

In a study looking at perceptions of discrimination and receipt of care for seriously-ill children, Mexican-American parents reported discrimination from nurses and physicians based on their income status, language barriers, ethnicity (compared to Non-Hispanic Whites), and physical appearance (Davies, Larson, Contro, & Cabrera, 2011). These reports of discrimination are similar to the responses of this study's sample (See Figure 2). While the majority of participants reported no discrimination from their child's medical visit, those who did reported discrimination based on their ability to speak English, their race/ethnicity, and their ability to pay for their child's medical visit.

Dovidio & Fiske's study on biases in clinical interactions and health care disparities (2012) placed Latinos and undocumented immigrants in a larger population that is characteristically seen as "low warmth, low-competent" when it comes to their healthcare. Because this group has negative emotions attached to them, health care providers often act accordingly (e.g., ignoring patients' concerns, perceived as cold). While not all healthcare providers actively act on their biases, they may unconsciously act in a biased way with patients, such as disregarding their concerns. In turn, Latina mothers who report higher levels of discrimination may have pediatricians or have encountered pediatric staff that may act on these biases. This behavior can help explain poor provider-patient communication and relationships; discrimination is associated with satisfaction of care and patient-provider communication. In a sample of urban Latina immigrants, over 42% reported experiencing discrimination from their healthcare provider (Sheppard et al., 2014). Latinas who reported good communication with their provider were 71% less likely to report a discriminatory experience.

Something to consider is the intersection of discrimination Latina mothers face: discrimination by race/ethnicity, and discrimination by gender. Mothers do not want to be seen as less competent or unable to take care of their child. Gross & Howard found that mothers reported that if they felt the staff at their child's health care provider treated them as over- or under-reacting, it would affect how often they sought them for help (2001). In a qualitative study looking at new mothers and their intention to vaccinate their infant, mothers who did and didn't intend to vaccinate both cited trust and satisfaction from their pediatrician (Benin, Wisler-Scher, Colson, Shapiro, & Holmboe, 2006). The element of trust and satisfaction in patient-provider relationships is a recurring theme in health decision-making. This study did not look at perceived discrimination in terms of mother's ability to make decisions for their child's health. However, it is suggested that future studies look at how mothers feel about their providers and their perceptions of their providers. If provider recommendation is important, then it is important to tailor future interventions and studies to focus on provider interactions. Further, it is important to look at all health provider staff, not just physicians. Because physician time is limited, many mothers and caregivers may spend more time with nurses and physician assistants.

However, this study did not analyze the relationship between mothers and medical providers. By analyzing mother-provider relationship, it could have provided more insight on the impact of provider recommendation based on how well the provider is received by the mother. There is the possibility to analyze whether perceived discrimination and mother's satisfaction with their child's provider is related. This study did not ask participants about the demographic make-up of their providers. Previous research has reported minority providers

are more likely than white providers to provide care to communities of color (Betancourt et al., 2003). Determining whether having a Latino provider meant an increase in HPV series initiation/completion could have had a larger impact than race/ethnic discrimination in the healthcare setting.

The discrimination scale used in this study could have also resulted in the unexpected result of HPV series completion. The prompt read to mothers before they answered the scale asked mothers to answer how *often* each item in the scale occurred when they take their child to receive medical care. Recall bias about discriminatory incidents may have prevented better reports for the scale's items. Determining the source of the discrimination by physician, nurse, physician assistant, wait staff, etc. would better elucidate *where* in the healthcare system mothers perceive this discrimination the most. Some items in the scale used asks if doctors or nurses are involved, but discrimination in the healthcare setting can come from support staff outside of medical providers. If the discrimination came from the front desk, then perhaps that form of discrimination wouldn't deter mothers from seeking care for their child as it would discrimination from a provider (whose recommendations and care are already known to influence mothers' decision-making.)

Another limitation of this study was the small sample size. Only 166 mothers answered the discrimination scale, and few of those mothers reported initiating (n=62) or completing (n=15) the HPV vaccine series. Future studies should be conducted with a larger sample to assure that the study has sufficient power, and that the results can be generalized to the greater population in the U.S. By increasing the sample size, however, future research

must be able to commit to verifying vaccination records so that the outcome variables of initiation and completion are accurate for analysis.

CONCLUSION

This study is one of few studies that examines the association between perceived discrimination, HPV vaccine initiation and completion among Latino children in Houston, TX. The study found that the association between HPV vaccine initiation and perceived discrimination was not significant when combined with the predisposing factor of marital status. The study found that the association between HPV vaccine completion and perceived discrimination was significant when considering all other factors. More work is needed to look at how marital status and household make-up reflects child's receipt of preventive care, and how discrimination is felt and reported on in preventive care access. Further studies should devote time to study the relationship between mother-provider relationships and communication when it comes to HPV vaccination. Intervention development to improve HPV initiation and completion may consider looking at clinics' and providers' procedures and messages regarding offering and recommending the HPV vaccine to parents of eligible children. Developing evaluations of these procedures would inform public health professionals and health administrators of barriers and facilitators to improve adherence to the procedure. For Latina mothers in Texas, better data collection pertaining to satisfaction with their healthcare provider can help tailor efforts to improve HPV vaccine initiation and completion rates in Latino communities.

Table 1. Demographic characteristics of study participants (N=166).

Variable	Frequency	%	M	SD
Age in years			39.29	0.57
<30	11	6.8		
30 - 39	76	47.1		
40 - 49	58	36		
>50	17	10.5		
Education				
Some elementary	16	9.7		
Elementary	17	10.3		
Some 6th, 7th, 8th grade	31	18.8		
Finished 8th grade	16	9.7		
Some high school	28	17		
High school graduate	35	21.2		
Some college	10	6.1		
Bachelor's	8	4.8		
No education reported	4	2.4		
Marital Status				
Married	81	49.4		
Not married	83	50.6		
Employment				
Employed	43	25.9		
Not Employed	123	74.1		
Country of Origin				
Foreign Born	156	94		
U.S. Born	10	6		
Years Spent in US			15.71	8.78
1 - 10	33	20.6		
11 - 20	93	49.3		
21 - 30	20	23.2		
31 - 40	5	3.6		
40+	5	3.1		

Table 2. Demographic characteristics of study participants' children

Variable	Frequency	%	M	SD
Child Education				
3rd grade	1	1.2		
4th grade	10	12.2		
5th grade	26	31.7		
6th grade	16	19.5		
7th grade	13	15.9		
8th grade	5	6.1		
9th grade	4	4.9		
10th grade	3	3.7		
11th grade	3	3.7		
Not in school	1	1.2		
Child Health Insurance				
No Insurance	31	18.7		
Medicaid	104	62.7		
Medicare	3	1.8		
CHIP	8	4.8		
Private Insurance	6	3.6		
Indigent/County Health Insurance	13	7.8		
Other - Obamacare	1	0.6		
Regular Place of Care				
No	30	18.2		
Yes	135	81.8		
Sick Visits				
0	62	37.8	2.96	3.10
1	31	18.9		
2	28	17.1		
3	20	12.2		
4	11	6.7		
5	4	2.4		
6	1	0.6		
8	1	0.6		
10	2	1.2		
12+	4	2.4		

Table 2. Demographic characteristics of study participants' children, continued

Variable	Frequency	%	M	SD
Preventive Visit			2.36	2.18
0	29	17.7		
1	106	64.6		
2	20	12.2		
3	3	1.8		
4	1	0.6		
8	1	0.6		
12+	4	2.4		

Table 3. Logistic regression predicting likelihood of HPV vaccine initiation based on marital status, acculturation, self-efficacy, perceived discrimination, HPV vaccine offer, and perceived child health status

	<i>B</i>	SE	Wald	<i>df</i>	<i>p</i>	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Marital Status	-1.458	0.496	8.642	1	0.003	0.233	0.088	0.615
Acculturation	-2.073	1.469	1.992	1	0.158	0.126	0.007	2.239
Self-Efficacy	-0.067	0.270	0.062	1	0.804	0.935	0.551	1.586
Perceived Discrimination	0.008	0.042	0.031	1	0.859	1.008	0.927	1.095
HPV Vaccine Offer	-1.054	0.543	3.776	1	0.052	0.348	0.120	1.009
Perceived Child Health	-0.048	0.303	0.026	1	0.873	0.953	0.526	1.726
Constant	2.669	2.008	1.766	1	0.184	14.427		

Table 4. Logistic regression predicting likelihood of HPV vaccine series completion based on marital status, acculturation, self-efficacy, perceived discrimination, HPV vaccine offer, and perceived child health status

	<i>B</i>	SE	Wald	<i>df</i>	<i>p</i>	Odds Ratio	95% CI for Odds Ratio	
							Lower	Upper
Marital Status	-0.320	0.769	0.173	1	0.677	0.726	0.161	3.275
Acculturation	-0.034	2.124	0.000	1	0.987	0.966	0.015	62.113
Self-Efficacy	0.300	0.454	0.437	1	0.509	1.350	0.555	3.284
Perceived Discrimination	0.114	0.055	4.334	1	0.037	1.120	1.007	1.247
HPV Vaccine Offer	-0.101	0.790	0.016	1	0.899	0.904	0.192	4.257
Perceived Child Health	-0.522	0.424	1.515	1	0.218	0.593	0.258	1.363
Constant	-2.401	3.000	0.640	1	0.424	0.091		

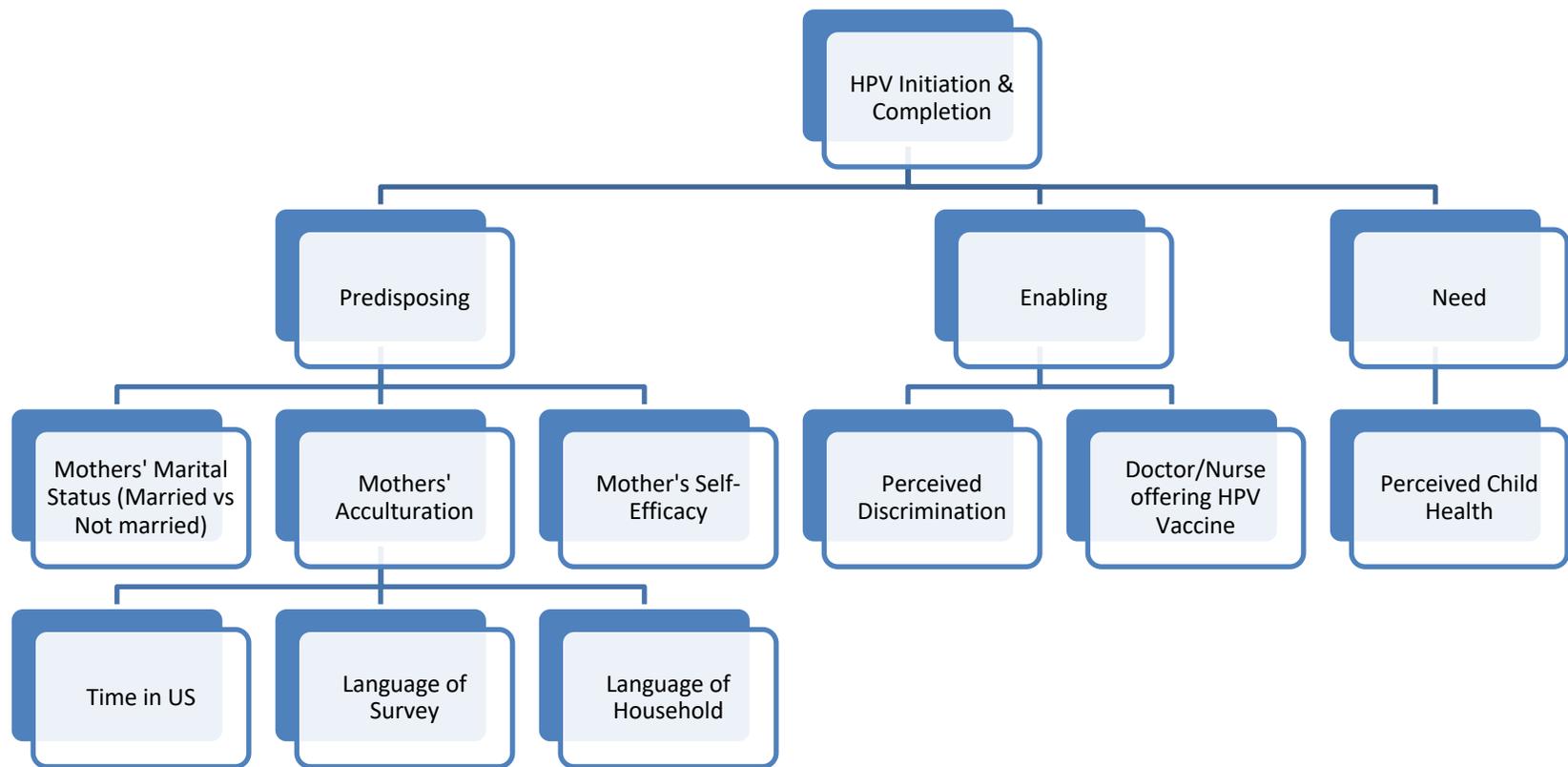


Figure 1. Aday-Andersen model used in this study

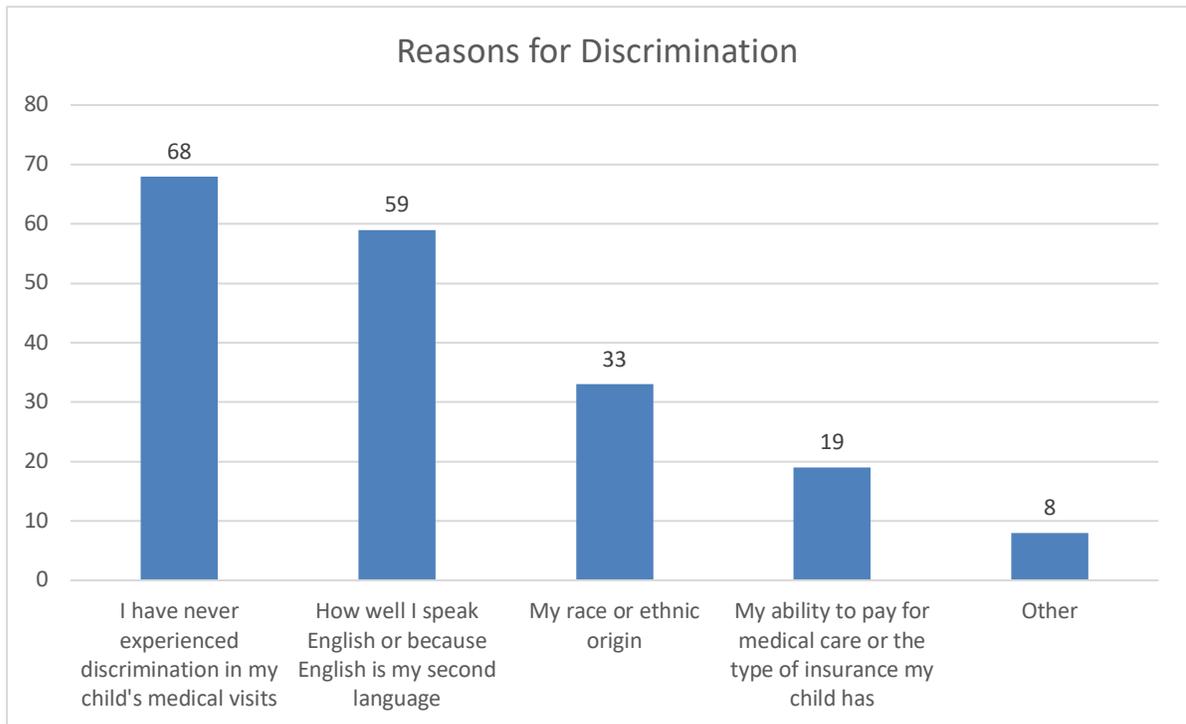


Figure 2. Reasons for discrimination

Totals do not sum to 166 as mothers could choose multiple reasons. Three mothers clarified their discrimination based on how well they spoke English was due to ‘idiosyncrasies of language’, ‘accents’, and ‘inability to express myself’. One mother clarified she felt discriminated against because her child had Medicaid. Eight mothers gave different reasons as to why they felt discriminated against: their child’s behavior at the clinic (n=2), lazy clinic staff (n=1), their own lack of enthusiasm/feeling tired (n=1), lack of reasoning on the physician’s part (n=1), appearance (n=1), and no specific reason/everyone is different (n=2).

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