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Analysis of Parental Attitudes of Adolescent Vaccinations in the Retail Health Care Setting

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Abstract

Background: The tetanus-diphtheria-acellular pertussis, meningococcal, and human papillomavirus vaccines have been recommended for adolescents since 2005. Retail health clinics can increase the delivery of vaccinations by reaching patients outside the traditional healthcare system.

Objectives: To measure parental attitudes of adolescent vaccinations utilizing the Vaccine Confidence Scale (VCS) and assess reasons parents decided to vaccinate or not. Attitudes were compared to previous studies. Our long-term purpose was to develop targeted interventions to increase adolescent vaccinations.

Methodology: A descriptive survey design measured the parental attitudes of adolescent vaccinations from total VCS scores and subscale scores of benefits, harms, and trust. A qualitative question assessed the reasons parents decided to vaccinate or not through the constant comparative technique.

Results: 93 parents responded to the survey. The total mean VCS score was 7.56 $\pm$ 1.86 with subscale scores of 7.78 $\pm$ 2.22 for benefits, 5.89 $\pm$ 2.47 harms, and 8.43 $\pm$ 2.08 trust. Our total, benefit, and trust scores were slightly lower with a higher harm subscale score than national averages. The majority of parents (n=25, 58.14%) vaccinated to prevent disease while others (n=5, 11.63%) did not vaccinate due to lack of knowledge.

Conclusions: Study findings reflected our local differences in parental attitudes of adolescent vaccination compared to national studies with lower total, benefit, and trust scores and higher harm score. We recommend addressing parental concerns with provider education, engaging local schools, screening for vaccinations, providing evidence-based information, and utilizing the state's immunization registry to increase adolescent vaccination rates in our community.

Background

Since 2005, the tetanus-diphtheria-acellular pertussis (Tdap), meningococcal vaccine (MCV4) and human papillomavirus (HPV) vaccine have been recommended for adolescents as part of their routine health care (Szilagyi et al., 2013). The age of adolescence is a critical time for health promotion and education, and adolescent patients are often behind on their routine vaccinations (Morris, Wang, Wang, Peddecord, & Sawyer, 2015). Retail health clinics have become viable options to help increase the promotion and delivery of vaccinations through their ability to reach patients outside the traditional health care system (Uscher-Pines, Harris, Burns, & Mehrotra, 2012).

Major retail health clinics provide a variety of services including health promotion, vaccinations, evaluation and treatment of minor illnesses, and management of chronic conditions. A study by the Robert Wood Johnson Foundation found that families utilize retail health clinics for a variety of reasons with 58.6% finding the hours more convenient, 38.7% due to lower cost, and 24.6% had no usual source of care. Additionally, 30.7% of the insured population and 76.2% of the uninsured population found that retail health clinics had a lower cost than other health care settings (Bachrach, Frohlich, Garcimonde, & Nevitt, 2015). To date, our retail clinics have protocols to engage parents and adolescents with the national recommendations for routine vaccinations. However, there is a lack of current data on parental attitudes of adolescent vaccinations in the retail health setting.

Problem Statement

In Tennessee, some adolescent vaccination rates are lower than national averages and goals. Healthy People 2020 has set the national goal of 80% for adolescents 13 to 15 years old to complete their adolescent vaccinations of Tdap, MCV4, and HPV series (Office of Disease

Prevention and Health Promotion [ODPHP], 2018a). The current Tdap rate in Tennessee is 90.2% which is above the national average of 88.0, yet outpaced by 19 other states (ODPHP, 2018b). The MCV4 rate for Tennessee is 78.7% and below the national average of 81.8% (ODPHP, 2018c). The Tennessee completion of the HPV series for female adolescents is 37.6% and 30.9% for male adolescents and below the national averages of 45.1% and 36.1%, respectively (ODPHP, 2018d; ODPHP, 2018e). To increase vaccination rates, health care providers must understand the reasons vaccinations may be declined or deferred until a later time (Gilkey et al., 2016).

Retail clinics offer an opportunity for adolescents to receive their recommended vaccinations (Uscher-Pines et al., 2012). In our retail clinics, adolescents and their parents frequently decline adolescent vaccinations during their annual sports physical. Often parents state that their adolescent does not need the vaccinations, or they desire further information before they are willing to consent. Sometimes families return for the vaccinations, but this is a rare occasion. Once a greater understanding of parental attitudes of adolescent vaccinations is gained in our retail clinics, tailored interventions can be implemented to increase adolescent vaccination rates.

Purpose

Our study measured the parental attitudes of adolescent vaccinations in the local retail health setting in Tennessee through the Vaccination Confidence Scale (VCS), which was adapted from the Centers for Disease Control and Prevention (CDC) Parental Attitudes Module of the National Immunization Survey (NIS)-Teen Questionnaire to better understand the prevailing parental perceptions of adolescent vaccinations (National Opinion Research Center [NORC], 2010; Gilkey et al., 2014). Additionally, we compared the attitudes from our local retail clinic to

state, national and other population-based studies. The long-term purpose of our study was to develop educational materials and targeted interventions based on our findings to increase adolescent vaccinations in our retail health care setting.

Specific Aims

The specific aims of our study were to:

1. Measure the parental attitudes of adolescent vaccinations using the VCS in the retail healthcare setting.
2. Compare the local parental attitudes within the retail health care system to state, national, and population health care studies.
3. Assess the main reason the parent decided to have or not to have their adolescent vaccinated.

Research Questions:

The following research questions were assessed:

1. What are the total scores on the VCS and the subscale scores of benefits, harms, and trust towards adolescent vaccination in the retail health care setting?
2. How do the local parental attitudes within the retail health care system compare to state, national, and other population health care studies?
3. What is the main reason the parent decided to have or not have their adolescent vaccinated?

Significance

It is estimated that 35 million American adolescents are behind on recommended vaccinations (Das, Salam, Arshad, Lassi, & Bhutta, 2016). Several barriers to adolescent vaccination include lack of routine health care visits, decreased insurance coverage, and

difficulty acquiring parental consent (Suh et al., 2012). Reminder systems, strong provider recommendations, standing orders, and educating patients and parents of the individual diseases and benefits of routine vaccinations are viable strategies to increase adolescent vaccination rates (Das et al., 2016). Provider recommendations are more effective through a collaborative communication continuum between the patient and provider allowing for exchange of information, consideration, and decision of treatment implementation (Moss, Reiter, Rimer, & Brewer, 2016a). Once parental attitudes are better understood within our local retail health clinics, specific educational materials can be developed to help communicate the importance of completing recommended vaccinations (Gilkey et al., 2016). The data gathered through our study provided a basis for a targeted action plan in retail health clinics to effectively engage parents on the benefits of vaccination and adequate follow up for series completion of adolescent vaccines.

Common reasons for refusing or pushing off vaccines included concerns of adverse effects of the vaccine, lack of confidence in the vaccine, and the lack of belief the vaccine is necessary (Darden et al., 2013). It is imperative that health care providers understand the parental concerns influencing participation in vaccination programs within our practice settings (Gilkey et al., 2016). As our retail health clinics begin to understand the parental attitudes of adolescent vaccinations, providers may become better equipped to directly engage parents and adolescents regarding vaccination concerns. Through more directed patient engagement, providers have the potential to reduce the number of missed vaccinations opportunities and improve rates of adolescent vaccination with a strong and effective recommendation (Wong, Taylor, Wright, Opel, & Katzenellenbogen, 2013; Moss et al., 2016a).

Literature Review

Vaccination programs are cost-effective, public health approaches to reducing infections and the morbidity and mortality of certain diseases in the overall population. Previously, most programs were focused on younger children instead of adolescents (Das et al., 2016). Adolescents are still growing and remain in a critical stage for vaccinations and health promotion strategies (Morris et al., 2015). The adolescent vaccination schedule has been recommended since 2005 to help protect this population from select acute illnesses and increased the need to directly engage adolescents in the health care system (Wong et al., 2013). The responsibility for the health of the adolescent still rests with the parent and requires directed intervention (National Foundation for Infectious Diseases, 2005).

Consequences of Missed Vaccinations

The Tdap vaccine protects adolescents from tetanus, diphtheria and pertussis. Each of these diseases are caused by unique bacteria that produces a variety of symptoms and disease processes in adolescents and younger children. Tetanus can be fatal in one out of five patients, and diphtheria can be fatal in one in 10 patients (CDC, 2014). Pertussis can be fatal in one in every 100 patients infected with the bacteria (CDC, 2017). The meningococcal vaccine protects adolescents from meningitis, which affects the patient's neurological system. Once treated, 10 to 15 out of 100 patients still die from meningitis (CDC, 2015). The HPV vaccine helps to prevent the spread of the human papilloma virus, which causes various cervical, vaginal, anal, throat, and penile cancers. It is estimated that 14 million patients are infected by the virus yearly (CDC, 2018). By not following the current vaccination schedules, parents and providers place the adolescent population at risk from these various infectious diseases (Mahoney, 2010). The negative impacts of decreased adolescent immunizations rates include outbreaks of preventable

diseases, reduced quality of life, and increased cost of morbidity and mortality of vaccine preventable diseases (Das et al., 2016).

Vaccination Rates

Currently, Tennessee's Tdap rate has increased from 81.9% in 2015 to 90.2% in 2016 while the MCV4 rate has increased from 77.3% to 78.7% (ODPHP, 2018b; ODPHP, 2018c). The rates for HPV series completion for female and male adolescents remain well below the national goal of 80% at 37.6% for females and 30.9% for males (ODPHP, 2018d; ODPHP, 2018e). Nationally, higher levels of Tdap vaccination were noted in adolescent patients with a mother with an advanced degree, of Black or African American ethnicity, and if the adolescent was male (ODPHP, 2018b). Adolescent meningitis vaccines rates were higher in adolescents with a mother with an advanced degree, of Black or African American ethnicity, and if the adolescent was female (ODPHP, 2018c). Data on HPV vaccination rates in female adolescents is limited; patients demonstrate have higher levels of vaccination with a mother with less than a high school education and parents of American Indian or Alaska Native only (ODPHP, 2018d). Male adolescents are more likely to receive the HPV vaccine if their mother had less than a high school education, and if they were of the Native Hawaiian or other pacific islander ethnicity (ODPHP, 2018e).

Vaccination Attitudes

A variety of parental attitudes were noted when it comes to vaccinations of children (Opel et al., 2011). While some parents choose to vaccinate according the CDC's recommendations, other parents refuse or delay for various reasons. Qualitative research found parental concerns of vaccinations to include insufficient evidence for increased number of vaccinations, lack of risk in the child's potential to acquire the preventable disease(s), and that

the families simply wanted more educational materials on vaccinations prior to consent (Darden et al., 2013). The vaccine-hesitant parents are not a homogenous group and must be individually engaged to determine their concerns regarding vaccination. By understanding the various concerns of the parents, health care providers will be better equipped to discuss vaccinations with vaccine-hesitant parents. Opel and colleagues (2011) began to identify the childhood vaccination beliefs of parents in a variety of settings through development of survey tools to analyze the concepts of immunization behavior, vaccine safety, parental attitudes, and overall trust in childhood vaccinations. The researchers developed an 18-item survey to help evaluate the parental attitudes, beliefs, behaviors and trust in vaccination programs known as the Parental Attitudes of Childhood Vaccinations (PACV) (Opel et al., 2011). While the PACV was useful in assessing vaccination delays for childhood vaccinations, it did not accurately determine delays for adolescent vaccinations (Roberts et al., 2015).

Survey Development

The original PACV survey was a combination of dichotomous (yes, no, etc.), 5-point Likert scale and two 11-point Likert scale questions for a total of 18 items related to immunization behavior, beliefs concerning vaccine safety, attitudes of mandates of vaccines, and trust in early childhood vaccinations. The survey was validated through an expert panel review with a pretest of parents taking the survey yielding a strong face validity of the PACV. No quantitative reliability was available (Opel et al., 2011). Further research showed a predictive validity of the PACV to children becoming up to date on vaccinations, but no internal validity was reported (Opel et al., 2013). Roberts et al. (2015) modified the PACV for use among parents of adolescents instead of parents of school aged children. The original 18 items and domains were included but updated to clarify adolescents. In the modified survey, four items were a “yes,

no, I don't know" response with 12 items being a 5-point Likert Scale, and two items were an 11- point scale. No Cronbach's alpha was reported for the modified PACV in the adolescent population; however, the authors determined that the survey did not predict the adolescent's vaccination status (Roberts et al., 2015).

The Parental Attitude Module was used by the CDC in the NIS-Teen to assess parental attitudes of adolescent vaccinations. The survey included 11 items in a 11-point Likert scale to assess parental attitudes of vaccination (NORC, 2010). The VCS was developed from the data collected from the NIS-Teen to validate an eight-item scale with an 11-point Likert scale. The overall Cronbach's alpha was determined to be 0.77, which was the only Cronbach's alpha found for surveys related to parental attitudes of adolescent vaccinations (Gilkey et al., 2014). With the VCS having a reported Cronbach's alpha, we decided to use this scale for our study of parental attitudes of adolescent vaccinations. Finally, an open-ended qualitative question can help identify the main reasons parents do or do not vaccinate their adolescents (Rand et al., 2011).

Parental Attitudes

In a national survey, Darden et al. (2013) utilized the NIS-Teen data and evaluated parental attitudes for declining or refusing vaccination. The survey results found the main barriers for not vaccinating adolescent included: vaccinations not recommended by the provider; vaccines not necessary; lack of knowledge about the vaccines; adolescents not being the appropriate age for vaccination; or parental concerns of side effects. Responses differed based on vaccination type, such as the Tdap and MCV4 vaccination versus the HPV vaccine. The primary reasons for refusing the Tdap and MCV4 was that no recommendation was made by the provider for the vaccination, followed by the vaccination was not necessary or there was a lack of overall parental knowledge of the vaccine. Regarding the HPV vaccine, the main reason indicated that

the adolescent was not sexually active or that the vaccine was not needed or necessary for their adolescent's health (Darden et al., 2013).

Currently parental barriers to vaccinations include lack of knowledge of vaccine recommendations, low trust in vaccinations, and lack of threat from the vaccine preventable disease (Gilkey et al., 2014). Greenfield et al. (2015) conducted focus groups in ethnically diverse communities in Washington state and found misunderstandings regarding vaccine efficacy, the benefits of vaccinations, and the ability of vaccinations to decrease the spread of illness in the community. Parents did not know how the pertussis bacteria was transmitted, how it was different from other upper respiratory infections, and others believed pertussis would lead to a tuberculosis infection. Misconceptions of meningitis included that adolescents were not at risk of the disease and that it was spread by the sun and wind. Similarly, parents felt that teens were not at risk from the HPV and did not know infection by the virus could lead to other health complications such as cancer (Greenfield et al., 2015).

Another national study utilized data from the NIS-Teen to determine various demographic factors for patients receiving the MCV4 vaccine. Mothers who had more than high school education were significantly more likely to vaccinate with MCV4 than mothers at high school level (35.2% vs 27.1%, $p< 0.01$). Race and ethnicity were not significant predictors for adolescents to receive the vaccination for mothers who reported vaccination recommendations from their medical provider (Lu, Jain, & Cohn, 2010).

In a national survey regarding the uptake of the HPV vaccine, Cheruvu, Bhatta, and Drinkard (2017) examined various factors for parents who declared "no intent" to vaccinate their daughters with the HPV vaccine. Parents with "no intent" to vaccinate based on lack of knowledge of the vaccine were significantly greater for female adolescents 15 and 16 years old

compared to 13 years of age. Additionally, black non-Hispanics and Hispanics were more likely not to vaccinate compared to white non-Hispanics due to lack of knowledge. The concerns for safety and effectiveness were higher in mothers who had some college or a graduate degree than mothers who had less than high school education (Cheuvu et al., 2017).

Roberts et al. (2015) found similar hesitancy in the Oklahoma Child Health Research Network and South Carolina Pediatric Practice Research Network with adolescents and vaccination uptake if parents were unable to discuss concerns about vaccinations with their adolescent's provider. With their modified PACV survey, 25% of the participants were unsure about vaccinating their adolescents (Roberts et al., 2015).

Gilkey et al. (2014) argue that for vaccination programs to be successful, parents must have a high level of confidence in the vaccinations. One area of concern is parent's belief that vaccinations were not necessary, which can decrease adolescent vaccination rates. The authors developed a VCS based on data from the CDC's NIS-Teen Survey's Parental Attitudes Module to detect parents who might decline vaccination efforts (Gilkey et al., 2014). The NIS-Teen telephone survey was conducted in 2010 and assessed households on immunization related health topics for patients 13 to17 years of age. The Parental Attitudes Module of the NIS-Teen was an 11-item Likert scale which addresses the benefits, harms, and overall trust in health care providers (Gilkey et al., 2016).

Theoretical Framework

The Health Belief Model

The Parental Attitudes Module of the NIS-Teen survey was developed from the principles of the Health Belief Model (HBM) and the concepts of benefits, harms and trust were maintained in the eight items of the VCS (Gilkey et al., 2016). The HBM was established by the

U.S. Public Health Service social psychologists in the 1950s (Janx & Becker, 1984). The HBM guides the analysis of the psychological behaviors regarding specific healthcare services including vaccinations (Wanless, 2017). This theoretical framework allows researchers to gain a deeper understanding regarding the uptake or refusal of vaccinations (Reiter, Brewer, Gottlieb, McRee, & Smith, 2009). As parental attitudes are better understood in terms of the HBM, providers will be able to engage parents and increase vaccination rates (Donadik et al., 2014).

The HBM theory consists of the individual premises of perceived susceptibility, perceived severity, perceived benefits, barriers, cue to action, and self-efficacy (Schneider, 2011). Perceived susceptibility identifies that a patient believes they have the potential to contract a medical condition. The premise of perceived severity revolves around the patient's belief of the significance of the medical condition. Benefits are the actions that patients believe can reduce their susceptibility or the severity of the disease, while barriers are the expense of taking such actions. The cue to action includes the elements which encourage the patient to take action to improve their health. Finally, the concept of self-efficacy is the patient's level of confidence in taking action in their healthcare journey (Schneider, 2011).

Table 1 identifies the major concepts of the HBM in terms of guiding our current study. Health motivation of the patient or guardian is the main focus of the HBM and aides in classifying the barriers to the individual's motivation regarding health care services (Schneider, 2011). The items in the VCS are categorized into the premises of the HBM with four items addressing the HBM's benefit concept, two items for the harms concept, and two items for the concept of trust (Gilkey et al., 2014). By utilizing the concepts identified in the HBM framework, the parental attitudes measured through the VCS guided identified directed interventions in our local retail health care system to increase adolescent vaccinations.

Identifying and Defining Study Variables

Our study used the VCS to assess parental attitudes of vaccination (Gilkey et al., 2014). Table 2 depicts the theoretical and operational definitions of the variables included in our project.

Methodology

Research Design

Our project utilized a descriptive survey design to measure the total score of the eight item VCS and its sub-scores of the benefits, harms, and trust in medical providers of the parents of adolescents (Creswell, 2014; Gilkey et al., 2014). The VCS measures parental attitudes of adolescent vaccination through a 11-point Likert Scale. The VCS was used to assess the research question 1, What are the total scores on the eight item VCS and the sub-scores of benefits, harms, and trust in medical professionals?

Through the literature review, various state, national, and population-based studies were identified, which were compared to our study results. The previous studies were used to compare our local parental attitudes with other traditional health care settings. The comparison allowed us to answer the research question 2, How do the local parental attitudes within the retail health care system compare to state, national, and other population health care studies?

Finally, a qualitative survey item was added to the study and used to assess research question 3, What is the main reason you decided to vaccinate or not vaccinate your adolescent? This open-ended question identified the major themes surrounding why the parents do or do not have their adolescent vaccinated. The combination of the VCS and qualitative research component allowed the study to be completed in a realistic and feasible time frame.

Study Sample

The target sample was parents of adolescents 13 to 17 years of age. Our study used convenience sampling to recruit all parents of adolescents who presented to the retail clinic for their adolescent's annual sports physical. Eligible parents were 18 years or older and included both male and female parents from all races and ethnicities. Participants were included in the study if: 1) parents presented in the clinic with adolescents between the ages of 13 and 17 years of age; 2) parents of adolescents presented for a sports physical; 3) parents were able to speak English; and 4) parents were able to read the survey in English. Participants were excluded if they were parents whose adolescent presented to the clinic for services other than a sports physical and were less than 18 years of age.

Sample Size

The convenience sample was collected between August 1, 2018 and November 30, 2018. Starting in July, our retail clinics used in the study historically have five to ten sports physicals per day as adolescent patients prepare for their fall sports. It was estimated that the clinic would have at least five sports physicals per day, seven days a week totaling over 500 potential parents during the study. Due to the work schedule, the student researcher worked half of these days. Therefore, we aimed to include 250 parents of adolescents during the study time frame. The student researcher completed a screening log to calculate the response rate. The participant screening log documented the number of ineligible participants, the number who declined, the number who turned in a blank survey, and the number of completed surveys. The participant screening log did not contain any participant names or personal identification.

Recruitment of Subjects

The student researcher verbally recruited parents to participate in the study after the registration process for their adolescent's sports physical as they presented to the retail health

clinic. Parents provided verbal consent after the student researcher reviewed the informed consent form with the parent prior to the administration of the survey. The survey was completed by the parent while waiting in the privacy of the individual exam room and finishing the routine sports physical documentation.

Setting

The retail health clinics are located inside the parent retail stores in a metropolitan area of the Mid-South Atlantic Region and open seven days a week, with no appointments necessary. The scope of services in the clinics incorporates preventative health care and episodic care for acute illnesses and management of chronic conditions. Care for episodic care, includes but is not limited to, treatment for rashes, urinary tract infections, upper respiratory tract infections, and ear infections. Preventative care includes biometric screenings, school and sports physicals, Department of Transportation physicals, and administration of vaccinations. Chronic conditions such as hypertension, diabetes, and thyroid disorders are also managed. Each retail clinic is staffed with a Board-Certified Nurse Practitioner or Physician Assistant and data were collected from only one clinic in the region (Bachrach et al., 2015).

Instrumentation/Measurements

Two different surveys were used to collect data for this study. The first tool was used to gather demographic data on the parents accompanying their adolescents to the clinic for their adolescent's sports physical. The educational level of the parent was defined as less than high school education, completion of high school or GED equivalent, and completion of higher educational degree. Race of parent included white/Caucasian, black/African American, and other. Ethnicity was defined as Hispanic or Latino and not Hispanic or Latino. Sex of parent was categorized as either male or female. Adolescent's age was documented between 13 to17 years

as the age of the adolescent the day of their appointment. The final demographic variable was the sex of the adolescent labeled as either male or female.

The second tool was the VCS survey, which measured parental attitudes of adolescent vaccination. Gilkey et al. (2014) developed the VCS survey consisting of eight Likert response items, with categories ranging from strongly disagree = 0 to strongly agree = 10 and a choice of "don't know" for each individual item. The possible range of mean scores is 0 to 10 for the total scale with higher scores indicating a higher confidence level in adolescent vaccination. The eight-item scale also consists of three subscale scores for benefits, harms, and trust in health care providers. Items 1,3,4, and 8 are related to the attitudes regarding the benefits of adolescent vaccinations, items 2 and 7 are related to attitudes of harms of vaccinations, and items 5 and 6 describe the attitudes of trust in health care providers (Gilkey et al., 2014). Two negative items (items 2 and 7) needed to be reverse coded in the data analysis process.

The VCS was derived from the Parental Attitudes Module of the NIS-Teen questionnaire and data collected in the CDC's 2010 NIS-Teen survey by the CDC (NORC, 2010; Gilkey et al., 2014). The NIS-Teen survey was constructed from the basis of the infant NIS survey which includes the Parental Attitudes about Childhood Vaccines (PACV) (Jain, Singleton, Montgomery, & Skalland, 2009). When the PACV was developed, an expert panel reviewed the questions and found strong content validity (Opel et al., 2011). During the development of the VCS, the coefficient alpha of the total survey was calculated at 0.77. While the alpha is slightly lower than .80, the VCS was estimated to be a reliable way to assess parental attitudes of adolescent vaccination. The one factor model fit was calculated at $X^2(20) = 1367$, $p < 0.001$; CFI= 0.93; RMSEA= 0.08 (Gilkey et al., 2014).

A factor analysis of the VCS was also conducted and confirmed the three subscales scores of benefits, harms, and trust. The benefits subscale score was determined from the responses of items 1,3,4 and 8 and yielded an alpha of .78. The harms subscale score included items 2 and 7 with a calculated coefficient alpha of .49. Finally, the trust subscale score was calculated from items 5 and 6 with a coefficient alpha of .51. A good fit was determined from the three-factor model with $X^2(17) = 550$; CFI= 0.97; RMSEA= 0.06. In comparison to the one-factor model range of standardized factors from 0.31 to 0.73 ($p< .05$), the three standardized factor loading had a range from 0.41 to 0.84 ($p< 0.05$) with equal or greater values to the one factor model (Gilkey et al., 2014).

Data Collection Procedure

Data were collected from the adolescent's parent during their wait time in the retail clinic. After the patient registered in the clinic for the adolescent's sports physical, the accompanying parent(s) were identified as potential subject(s) for the study based on the predetermined inclusion and exclusion criteria. Each parent that presented to the clinic during the study time frame who met the study criteria was approached. A screening log was used calculate the response rate and track the number of refusals. No participant names or personal identification were recorded on the participant log.

The student researcher reviewed the informed consent for exempt research and answered any questions the parent had prior to administration of the paper and pen survey. The student researcher asked the parent to respond to the surveys in the private exam room while they completed the routine paperwork for their adolescent's sports physical. As the parent must complete a routine medical history form on the adolescent for the physical, disruption of patient

care was minimal while completing the additional surveys during their wait time. The estimated time to complete both the demographic survey and the VCS was less than ten minutes.

To minimize the variation in the delivery of the survey, the student researcher was the only person to interact with the participants in reviewing the informed consent and administering the survey. Once the parent completed the demographic survey and VCS, the parent was instructed to seal the surveys in a numbered envelope and leave the sealed envelope at the end of the office visit. If the participant declined to complete the survey, they were able to seal the blank survey in the individually numbered envelope. This procedure allowed for confidentially of survey results and reduction of potential bias in parental responses. Through following this procedure, limited variation in administration of the survey occurred as the student researcher followed the same recruitment, consent, and administration process for each participant.

The student researcher locked the sealed numbered envelops in a clinic drawer until the end of the work day. Once the work day has ended, the sealed numbered envelops were ordered numerically to ensure all responses were present. The surveys remained in a locked filing cabinet in the clinic until entered into the electronic Excel spreadsheet. At the end of the work week, the student researcher entered the data into a password protected Excel spreadsheet on a password protected USB drive. During the course of the study, the original surveys were locked in filing cabinet in case of data corruption of the USB drive. Initially, a pilot of the demographic survey and VCS was conducted with three participants who completed the surveys to ensure that the data collection tools were measuring data as intended. Data from this pilot were not used for data analysis.

Since no patient identifiers were collected, the risk of testing to internal validity may have occurred if a parent presented to the clinic on different days with another

adolescents/sibling for a sports physical. The threat of testing involves participants becoming familiar with the possible outcomes of the survey and changing their answers in repetitive testing (Creswell, 2014). To minimize this threat, the student researcher asked each participant if they have filled out the survey previously. If the participant replied yes, they were not surveyed again during the course of the study.

Data Analysis Plan

Data were entered and coded into the password protected Excel 2016 spreadsheet until the end of the data collection period was reached. Data entry was double checked by the student researcher during the weekly data entry with a secondary check the following week to improve accuracy of previously entered data. To examine the accuracy of data entry before data analysis, the student researcher trained an outside examiner to verify the data entry on a random 25% of the collected sample accounting for 25 parental surveys. A random number generator in Excel 2016 was used to identify the surveys chosen for outside review. One inaccurate data point was corrected based on examiner feedback and consensus with the student researcher prior to data analyses.

After consultation with a biostatistician, the Excel Data Collection Spreadsheet was imported into IBM SPSS 25 for data analyses. To calculate reliability, a Cronbach's coefficient alpha was calculated from the parental responses on the total score and three subscale scores of the VCS. The descriptive statistics using frequencies and percentages for the demographic data and the means, standard deviations, and range of total scores of the VCS and the subscale scores of benefits, harms, and trust were calculated.

The first research question was analyzed through the means, standard deviations, and range of the scores of the VCS to examine the total score of parental attitudes of adolescent

vaccinations. Subsequently, the subscale scores of benefits, harms, and trust were analyzed through the means, standard deviations, and range of scores of items 1,3,4 and 8, items 2 and 7, and items 5 and 6, respectively. The second research question was analyzed through a comparison of the local parental attitudes gathered by the VCS and those found in the previous literature search. The qualitative research question was analyzed through the constant comparative technique of identified themes provided on the survey.

Ethical Considerations

In preparation of the research study, our study was reviewed and deemed exempt by George Washington University's (GWU's) Institutional Review Board (IRB) and a site permission letter from the Director of Patient Centered Strategies in the corporate office of the retail healthcare organization. Since the student researcher is a provider for the clinic, parental attitudes could be influenced if confidentiality was not protected. The student researcher did not collect any parent or adolescent names or personal identification, and parents were asked to place the completed survey, including a blank form if no response was provided, in a sealed envelope before the survey was collected by the student researcher at discharge from the clinic. At the end of the work week, survey responses were entered into a password protected Excel spreadsheet and subsequently imported into a SPSS file, which was kept on a password protected USB drive for research purposes only. The original surveys were kept in a locked filing cabinet until the end of the study in case of data corruption of the USB drive. Data analysis occurred in the office of the student researcher under the direction of the principal investigator and statistical consultant. No patient identifiers were used in data analysis.

Results

VCS Reliability

We sampled 94 parents of adolescents who presented to the retail health clinic during a four-month period for their annual sports physical. During the study period, 140 parents of adolescents presented to the clinic with 45 of the adolescents presenting for sick visits instead of sports physicals and one parent spoke Spanish and could not complete the surveys in English. Of the 94 parents who met the inclusion criteria, 93 completed and turned in the demographic and VCS surveys yielding a response rate from the target sample of 98.9%. The Cronbach's alpha coefficient of the VCS and subscale scores were calculated from responses of the 93 participants and summarized in Table 3.

The Cronbach's alpha coefficient for the VCS was .843 for the total scale yielding a high reliability for the total scale and higher than the alpha of .77 in a previous study (Gilkey et al., 2014). The Cronbach's alpha of the benefit subscale score was .868 and stronger than our total scale's Cronbach's alpha. The harm and trust subscales had a lower Cronbach's alpha of .433 and .642, respectively. However, the two items in the harm subscale were positively related at $r = .279$ ($p = .02$) and the two items of the trust were positively correlated at $r = .483$ ($p < .001$). As both of these subscales had items that were significantly positively correlated, we decided to use these subscale scores from the survey.

Demographics Characteristics of the Respondents

Out of the 93 parents in the sample who completed the surveys, the majority had more than a high school education (n=71, 76.3%), were white (n=51, 54.8%), non-Hispanic (n=87, 93.5%), and female (n= 67, 72%). Many of the adolescents were 14 and 16 years old (n=45, 48.4%) with more male adolescents than females (n=55, 59.1%; Table 4).

Study Outcomes

To assess research question 1 addressing the total scores and subscale scores on the VCS, the total mean score and three subscale scores of the VCS were calculated. The total mean score was 7.56 ± 1.86 indicating a high level of parental confidence in adolescent vaccinations. Of the three subscale scores, trust had the highest mean at 8.43 ± 2.08 with the lowest mean for the harm subscale score of 5.89 ± 2.47, indicating a high level of parental trust in health care providers but a moderate concern for the possible harms of adolescent vaccinations. The benefits subscale score of 7.78 ± 2.22 demonstrated a high level of parents' belief in the benefits of adolescent vaccinations.

To assess research question 2 addressing the local parental attitudes within the retail health care system compared to other population health care studies, the mean score and sub-scores of the VCS in our local retail health clinic were compared to other studies utilizing the VCS with data from the national (NIS)-Teen survey. Our VCS total mean of 7.56 ± 1.86 was lower than previous studies of 8.15± .02 (Gilkey et al., 2014) and 8.19 ± .03 (Gilkey et al., 2016) indicating that parental attitudes of our respondents had less confidence in adolescent vaccines compared to scores reported nationally. Our subscale scores for benefit of 7.78 ± 2.22 and trust of 8.43 ± 2.08 were also lower compared to other studies who reported benefit scores of 8.45 ± .03 and 8.49 ± .03 (Gilkey et al., 2014; Gilkey et al., 2016) and trust scores of 9.04 ± .02 and 9.06 ± .03 (Gilkey et al., 2014; Gilkey et al., 2016). Previous studies reported lower harms subscales at 3.34 ± .04 and 3.31 ± .04 than our subscale mean of 5.89 ± 2.47 (Gilkey et al., 2014; Gilkey et al., 2016).

To assess research question 3, the main reason parents vaccinated or did not vaccinate their adolescents was described from the qualitative responses gathered during our study. Of our 93 parents in the sample, 43 parents gave qualitative answers on the survey. The majority of

parents responded positively on why they vaccinate their adolescents in the retail health care setting to prevent disease (n=25, 58.14%) and comply with school requirements (n=4, 9.30%). The main reasons parents reported they did not vaccinate their adolescents were the lack of knowledge of vaccines (n=5, 11.63%) and possible side effects (n=3, 6.98%; Table 5).

Discussion

Our study utilized the VCS to measure the parental attitudes of adolescent vaccinations in the retail health care setting. A high level of parental confidence in adolescent vaccinations was found through a high total VCS score and greater levels of confidence in the benefits and trust in medical providers subscale scores, albeit slightly lower than parents examined in national studies. In Tennessee, adolescents are often behind in their vaccinations. Our lower level of parental confidence in vaccination could be attributed to Tennessee not meeting the national goals for all adolescent vaccinations especially when adolescents are not actively engaging with health care providers. In 2014, it was estimated that 21% of adolescents did not have a well-child exam (CDC, 2016). A study determined that adolescents who had at least one preventative visit had less missed opportunities for Tdap (OR = .24), MCV (OR = .19), and HPV (OR = .34) compared to adolescent who did not have a yearly preventative visit (Wong et al., 2013). While the sports physical is not a well child exam, it can be a chance to engage with parents concerning their adolescent's vaccinations in light of the high level of parental confidence in adolescent vaccination (Greenfield et al., 2015).

While the total VCS score, benefit, and trust subscales scores were high, the parents in our local retail setting where the study was performed had slightly lower scores in these values compared to those in national surveys. Currently in Tennessee the Tdap is the only required adolescent immunization for school entry into the 7th grade. MCV4 and HPV are recommended,

but not required to attend school. This lower level of confidence and higher harm subscale score could relate to lower levels of vaccination of MCV4 and HPV in Tennessee adolescents. State policies can increase the vaccination rates of adolescent vaccinations. By 2015, 47 states required the Tdap and 25 states required the MCV4, while only three require the HPV series (Moss, Reiter, Truong, Rimer, & Brewer, 2016b). Local parental concerns regarding the harms of adolescent vaccinations could lead to refusal of recommended, but not required adolescent vaccinations. Without the legal requirement for documented adolescent vaccinations, our retail providers will have to make a strong and effective recommendation for all the adolescent vaccinations (Das el al., 2016). A strong recommendation by medical providers is one of the most influential reasons parents choose to have their adolescents vaccinated (Greenfield et al., 2015; Roberts el al., 2015). When parents are not having their concerns about the harms of vaccination addressed, they may refuse or delay immunizations (Reiter et al., 2009). The higher harm scale reported in our study could relate to the refusal of the recommended but not required immunizations for school.

The majority of our parents stated they chose to vaccinate their adolescent to help prevent disease. The benefits of vaccination are another reason that parents chose to vaccinate their adolescents (Gilkey et al., 2016). This speaks to the HBM and the fact that parents have been called to action since they believe their adolescents are at risks of disease, that they believe vaccinations can help prevent disease, and that barriers to vaccination have been reduced (Reiter et al., 2009). Without the belief that vaccinations will benefit the health of the adolescent, the health action of vaccination will not occur. The lack of information was the number one reason parents decided not to vaccinate their adolescents in our study and was similar to previous studies regarding vaccine refusal (Darden et al., 2013; Radisic, Chapman, Flight, & Wilson,

2017). If parents feel like they do not have adequate information about the vaccinations, this barrier will prevent them from participating in recommended vaccination programs.

Study Limitations

A total of 93 completed surveys were collected in this study. The limited time frame and use of a single student researcher limited the potential sample size, and a larger sample size would have been preferred. Our study sample was limited to adolescents between the ages of 13 and 17 from previous research. If the study sample was expanded to included parents of 11 and 12-years old based on the CDC recommendations for early vaccination, the sample size could have been larger and may have yielded additional insights to parental attitudes of adolescent vaccinations in the retail health care setting. Additionally, the low reliability of the subscale scores of harm and trust must be taken into consideration when interpreting our study findings especially when extrapolating to wider geographic areas.

Our study utilized the VCS to assess the parental attitudes in the retail health care setting. Other surveys may have given a broader sense of parental attitudes of vaccination but were not appropriate for our setting. A short, reliable survey was the best fit for our parents to complete while at the retail health care clinic. Another limitation of the study was the inability of the VCS to determine the parental confidence in specific adolescent vaccinations- Tdap, MCV4, and HPV. A longer survey could have elicited parental attitudes about individual vaccinations for a deeper understanding of parental attitudes.

Implications/Recommendations for Practice, Policy, and Research

Our study findings will be discussed with the corporate leadership of the retail health clinic and subsequently disseminated to our local clinics and other providers in the company upon leadership approval. In the fall of 2019, our study findings will be presented at a national

conference to help shape the future of retail health and the engagement of our patients. As the retail health care industry continues to grow, research and practice must shift to create a better understanding of the populations we serve. Through routine provider education, community engagement with local schools, active screening of adolescent patients, provision of evidence-based adolescent vaccination information to families, and use of state-based registries, we can increase the rates of adolescent vaccinations in our retail health care setting.

In terms of our retail practice, it is important that providers are aware that the majority of parents in our study had a strong level of confidence in adolescents' vaccinations especially regarding the benefits of vaccinations and trust in health care providers. Based on our findings of the high level of confidence perceived by our parents regarding the benefits of vaccinations and trust in in health care providers, we recommend our health care providers utilize their knowledge of the benefits of adolescent vaccination in a collaborative exchange of information with parents to improve vaccination rates (Moss et. al., 2016a). Evidence-based education must be given annually to our providers prior to sports physical season to consistently promote the benefits of adolescent vaccinations to vaccine hesitant parents (Cheruvu et al., 2017). The evidence-based education can be provided from organizations such as the American Association of Nurse Practitioners so that providers can earn continuing education at the same time. This evidence-based education on the benefits of adolescent vaccinations will provide our practitioners the knowledge to make a strong and effective recommendations for adolescents to complete their routine vaccination of Tdap, MCV4, and HPV in a collaborative communication style (Greenfield et al., 2015; Moss et al., 2016a; Reiter et al., 2009).

In addition to provider education on the benefits of adolescent vaccinations, we recommend that each of our retail health care clinics partner with at least two local middle and

high schools by providing them with information regarding our services and CDC recommendations for adolescent vaccinations. Adolescents report receiving information about vaccinations from their schools (Greenfield et al., 2015). We recommend our retail health clinics partner with local schools not only to promote the availability of services such as sports physicals outside of the hours of traditional health care clinics, but also relevant, up to date information about adolescent vaccinations. The information provided will help to educate the adolescents and their parents on routine vaccinations and promote the opportunity for the adolescent and their parent to discuss vaccines prior to their visit. By providing this vital information to the parents in our community through the school system, parents will have the opportunity to be more aware of the adolescent vaccinations recommended during the annual sports physical.

When the adolescents and their parents present to our clinics, we recommend our providers screen each adolescent for the Tdap, MCV4, and HPV vaccinations at the start of the sports physical to allow for discussion about vaccination opportunities. One study found that only 28% of parents could remember that the MCV4 vaccination was recommended during their visit (Lu, et al., 2010). By initiating the conversation at the beginning of the visit, providers can utilize the visit time to engage with parents and adolescents instead of rushing through the information at the end of the visit. In light of the premises of the HBM, our providers can offer information to these parents regarding the benefits of vaccinations and the risks of vaccine preventable diseases (Donadik et al., 2014). By focusing on the benefits of the vaccination, our providers can help parents with their call to action and increase the parent's level of self-efficacy in choosing to vaccinate their adolescents (Cheruvu et al., 2017).

Once screened, our providers must utilize their knowledge of adolescent vaccinations to provide strong and effective evidence-based recommendations to parents of adolescents who are behind on vaccinations based on standing orders. Our parents of adolescents in the retail health care setting have a higher level of concern about the harms of the vaccinations than parents in a national sample based on our study. Therefore, we recommend our practitioners be knowledgeable about the potential side effects of the vaccinations and how to reduce this barrier for parents through a strong and effective recommendation for the missing adolescent vaccinations.

Often side effects and concern of vaccine safety are major parental concerns to adolescent vaccination (Radisic et al., 2017). A strong and effective recommendation by providers using a shared communication style between providers and patients can increase vaccination uptake. One study showed a 23% increase for MCV4 and 39% increase for HPV vaccine when providers recommended the vaccination to families (Moss et al., 2016a). Once our providers discuss the possible risks and benefits of the vaccinations, we will be able to reduce the number of missed vaccine opportunities especially when coupled with a strong and effective provider recommendation (Wong et al., 2013). Therefore, our providers must understand their possible reasons for delaying vaccinations and how to address their concerns. Since there is also a high level of trust in our medical providers, our parents will likely listen to a strong and effective recommendation for adolescent vaccination when coupled with a collaborative communication technique (Greenfield et al., 2015; Moss et al., 2016a). By providing this valuable information to parents in the retail health care setting, health promotion opportunities, including adolescent vaccinations, may be maximized during the annual sports physical visit.

Four parents cited that school requirements were the main reason they vaccinated their adolescents. We recommend advocating for state policy change requiring the MCV4 and HPV series for school entry and the required use of the Tennessee Immunization Information System (TennIIS), our state-based immunization registry for all adolescent vaccinations. Not only would the requirement of all adolescent vaccinations for school entry allow for better adherence to CDC vaccination schedules but could also improve the centralization the adolescent vaccinations records into TennIIS. The lack of routine health care for adolescents can fragment immunization records (Suh et al., 2012). By requiring providers to utilize the state-based immunization registry, more adolescents will have accurate, up to date records of vaccinations and the specific dates for follow up on vaccination series (Morris et al., 2015). Therefore, we recommend our providers update the TennIIS registry directly so that we are able to provide parents with an up to date record with recommend follow up dates instead of relying on the internal electronic medical record.

Our study utilized the VCS to quantify the parental attitudes of adolescent vaccinations in our retail health care setting. Further research can utilize the VCS and analyze the levels of parental confidence in the individual adolescent vaccinations of Tdap, MCV4, and HPV. By identifying the specific attitudes parents have regarding the Tdap, MCV4, and HPV vaccines, more individualized education can be provided to increase adolescent vaccination in our retail health care clinics. As community partnerships continue to develop, our retail clinics must evaluate these partnerships for additional areas of advancement that benefit the patient and community. Through strategic partnerships, the retail health setting may demonstrate greater benefit in population health.

Sustainability

While our study did not implement a new policy or procedure into the retail health clinic, the knowledge generated will help improve our providers' ability to handle parental concerns regarding adolescent vaccination. As parental attitudes are addressed, more adolescents have the potential to become up to date on their vaccinations with subsequent reductions in missed vaccination opportunities (Wong et al., 2013). Additionally, the number of vaccinations should increase the overall number of visits to the retail health care clinics. From 2007-2009 visits for vaccinations increased to 1,952,610 from 469,330 in the retail health care setting (Uscher-Pines et al., 2012). As these visits continue to increase, the role of the retail health care clinic will become a cornerstone in the community. Since retail health clinic interacts with a unique population in the health care system, these vaccination visits will be even more important to overall community health (Bachrach et al., 2015).

Conclusions

Our study findings demonstrated high parental confidence in vaccinations as measured by total VCS scores and high levels of confidence in the benefits of adolescent vaccination and trust in medical providers at our retail health care clinic. While our VCS scores were high in relation to parental confidence in adolescent vaccinations, they were slightly lower than national averages, with a higher harm subscale score. Our study identified that the majority of parents vaccinated their adolescents to prevent disease while others were concerned with their lack of information regarding adolescent vaccinations. We recommend our retail health care setting distribute provider education on current adolescent vaccination recommendations and strategically engage with local schools to promote the importance of adolescent vaccinations. Once the patients arrive to the clinic, we recommend actively screening patients for vaccinations,

providing families with evidence-based information on vaccinations, and utilizing the TennIIS registry.

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Table 1

Concepts of the Health Belief Model Regarding Adolescent Vaccinations

Concept	Application in Adolescent Vaccinations
Perceived susceptibility	The perception that the adolescent is at risk of the disease prevented by the vaccination.
Perceived severity	The perception that the adolescent could have short and/or long-term consequences of disease prevented by the vaccination.
Perceived benefits	The perception that the vaccination will help prevent the disease in the adolescent.
Perceived barriers	The perception of the negative side effects to the vaccination.
Call to action	The parent(s) will adhere to the vaccination recommendations.
Self-efficacy	The parent will feel empowered in participating in the vaccination program to protect their adolescent's health.

Table 2

Identifying and Defining Variables of Parental Attitudes of Adolescent Vaccinations

Variables	Type of Variable	Theoretical Definition	Operational Definition
Vaccination Confidence Scale	Dependent-ordinal	Parental attitudes of adolescent vaccinations with 8 Likert Scale items including two items needing reverse coding. Likert responses 0-10 with the higher score indicating a higher level of confidence in vaccinations. Range from 0-10 for total mean score (Gilkey et al., 2016)	Parental attitude score from 0-10. Strongly disagree to strongly agree
Benefits Subscale	Dependent-ordinal	Parental attitudes of benefits of vaccination with 4 Likert Scale items. Likert responses 0-10 with the higher the score indicating a higher level of confidence in vaccinations. Range from 0-10 for total mean score (Gilkey et al., 2016)	Parental attitude of benefit score from 0-10. Strongly disagree to strongly agree
Harms Subscale	Dependent-ordinal	Parental attitudes of harms of vaccination with 2 Likert Scale items which must be reverse coded. Likert responses 0-10 with the higher the score indicating a higher level of confidence in vaccinations. Range from 0-10 for total	Parental attitude of harms score from 0-10. Strongly disagree to strongly agree

		mean score. (Gilkey et al., 2016)	
Trust Subscale	Dependent-ordinal	Parental attitudes of trust in vaccination with 2 Likert Scale items. Likert responses 0-10 with the higher the score indicating a higher level of confidence in vaccinations. Range from 0-10 for total mean score (Gilkey et al., 2016)	Parental attitude of trust score from 0-10. Strongly disagree to strongly agree
Educational level of parent	Demographic-categorical	Educational level of parent accompanying adolescent	1=<High School 2=Completion of high school or GED equivalent 3=More than high school
Race of parent	Demographic-categorical	Genetic race of parent accompanying adolescent	1=White/Caucasian 2= Black/African American 3= Other
Ethnicity of parent	Demographic-categorical	Ethnicity of parent accompanying adolescent	1=Hispanic or Latino 2=Not Hispanic or Latino
Sex of parent	Demographic-categorical	Biological sex of parent accompanying adolescent	1=Male 2=Female
Age of adolescent	Demographic- ratio	Numerical age of adolescent in years	1= 13 2=14 3=15 4=16 5=17
Sex of adolescent	Demographic-nominal	Biological sex of adolescent patient	1=Male 2=Female
What is the main reason the parent decided to have or not have their adolescent vaccinated?	Qualitative	Open ended question assessing parental main reason to vaccinate or not vaccinate their adolescent (Rand et al., 2013)	Thematic responses will be coded based on rates of appearance until saturation of ideas is noted

Table 3

Reliability Statistics for VCS Total Scale and Subscales

Variable	Cronbach's Alpha Coefficient	Number of Items
VCS Total Scale	.843	8
Benefit Subscale	.868	4
Harm Subscale	.433	2
Trust Subscale	.642	2

Table 4

Demographics Characteristics of the Respondents and Adolescents

Variable	N (%)
Parental Education	
< High school	2 (2.2)
High school or GED	20 (21.5)
More than high school	71 (76.3)
Parental Race	
White or Caucasian	51 (54.8)
Black or African American	33 (35.5)
Other	9 (9.7)
Parental Ethnicity	
Hispanic	6 (6.5)
Non-Hispanic	87 (93.5)
Parental Gender	
Male	26 (28)
Female	67 (72)
Adolescent Age	
13	19 (20.4)
14	20 (21.5)
15	14 (15.1)
16	25 (26.9)
17	15 (16.1)
Adolescent Gender	
Male	55 (59.1)
Female	38 (40.9)

Table 5

Main Reasons Parents Do or Do Not Vaccinate Their Adolescents

Variable	N (%)
Reasons Parents Vaccinate Their Adolescents	
Disease Prevention	25 (58.14)
School Requirements	4 (9.30)
Keep Them Safe	3 (6.98)
Benefits Outweigh Risks	2 (4.65)
Reasons Parents Do No Vaccinate Their Adolescents	
Lack of Information	5 (11.63)
Side Effects	3 (6.98)
Perceived Lack of Benefit	1 (2.33)