EXPLORING PNEUMOCOCCAL VACCINE UPTAKE BARRIERS AMONG AFRICAN AMERICAN ADULTS IN NORTHEAST FLORIDA

By

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To my beautiful daughter Olivia. When I began the PhD program, you had just turned six years old. Every night you would go to sleep by the light of my laptop computer asking, “Mommy, are you going to sleep soon?” Of course, the answer was no. I stayed up late, got up early, and did whatever it took to make sure I kept up with my course work, always with one thing in mind…you. Every day I strive to set a good example so you will know that with hard work and perseverance, you can be anything your heart desires. You are my highest priority, my heart, my life, my best friend, and the reason I was put on this earth. I love you with all of my heart, Mija!

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AA	African American
ABC	Active Bacterial Core
ACIP	Advisory Committee on Immunization Practices
AIDS	Acquired Immune Deficiency Syndrome
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control
CI	Confidence Interval
CLAS	Culturally and Linguistically Appropriate Services
CMS	Centers for Medicare Services
COPD	Chronic Obstructive Pulmonary Disease
DF	Degrees of Freedom
EHR	Electronic Health Record
HBM	Health Belief Model
H1N1	Influenza Type A
HIV	Human Immunodeficiency Virus
HPV	Human Papilloma Virus
IAC	Immunization Action Coalition
IPD	Invasive Pneumococcal Disease
LR	Logistic Regression
MMWR	Morbidity and Mortality Weekly Report
NCHS	National Center for Health Statistics
NIS	National Immunization Survey

OMH	Office of Minority Health
OR	Odds Ratio
PAPM	Precaution Adoption Process Model
PASW	Predictive Analytics Software
PCV7	Pneumococcal Conjugate Vaccine (7-valent)
PI	Principal Investigator
PPSV23	Pneumococcal Polysaccharide Vaccine (23-valent)
RA	Research Assistant
SAS	Statistical Analysis System
SES	Socioeconomic Status
SF-12v2™	Short Form Health Survey
SOP	Standing Order Protocol
VUQ	Vaccine Uptake Questionnaire

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Background: Pneumococcus is the bacteria responsible for three major invasive diseases: pneumonia, bacteremia, and meningitis. These illnesses affect over one million annually making invasive pneumococcal disease the most prevalent and dangerous of all vaccine preventable illnesses. Despite safety and efficacy, pneumococcal vaccine (PPSV23) uptake remains challenging particularly among minority populations. The purpose of this study was to examine variables thought to predict PPSV23 uptake such as age, gender, socioeconomic status, awareness, knowledge, trust in healthcare provider, perceived health, perceived susceptibility, perceived severity, prior negative vaccine experiences, and healthcare provider recommendation among African American (AA) adults whose age or chronic conditions rendered them PPSV23 eligible.

Methods: A substructed version of the Health Belief and Precaution Adoption Process Models served as the theoretical underpinning for the study. A pilot study using focus group methodology was conducted prior to the full study to ensure the instrument and methodologies were culturally sensitive. A quantitative cross-sectional exploratory

design using convenience sampling was utilized to survey AA adults at two churches in Northeast Florida. A self-administered Vaccine Uptake Questionnaire (VUQ) served as the primary instrument. Bivariate analyses were conducted using chi-square. An empirical model with variables found to be statistically significant in bivariate analyses was then evaluated using backward stepwise logistic regression.

Findings: Despite eligibility, only 95 of 295 (32.2%) reported PPSV23 uptake. Older age, female gender, vaccine awareness, increased knowledge, higher trust scores, perceived susceptibility, and presence of provider recommendation for PPSV23 were significant predictors of vaccine uptake in bivariate analyses. In the regression model, age, awareness, and provider recommendation remained significant with younger participants four times less likely to be vaccinated, those unaware six times less likely to be vaccinated, and those without a provider recommendation seven times less likely to have the PPSV23 vaccination.

Conclusion: Consistent with existing literature, three dimensions of the HBM (barriers, cues, and susceptibility) were significant predictors of PPSV23 uptake. With 147 (47.8%) unaware of PPSV23 existence prior to this study, adding the dimension “unaware” from the PAPM appeared to strengthen the model, and may reflect an important finding in the endeavor to increase PPSV23 uptake among AA adults.

CHAPTER 1
INTRODUCTION

Streptococcus pneumoniae, also known as pneumococcus first isolated by Pasteur in 1881, is responsible for countless cases of otitis media as well as three major invasive bacterial diseases including pneumococcal bacteremia, meningitis, and pneumonia. Together, these illnesses affect over one million Americans annually making Invasive Pneumococcal Disease (IPD) the most prevalent and dangerous of all vaccine preventable illnesses (Centers for Disease Control [CDC], 2009). Historically, several turning points have influenced the incidence and prevalence of IPD and IPD related deaths including the advent of penicillin in 1940, licensure of the first pneumococcal vaccine in 1977, and the subsequent licensure of the first pneumococcal conjugate vaccine (PCV) in 2000 recommended for every infant and child in the United States. Several iterations of the pneumococcal vaccine have taken place since its inception as new serotypes have been identified and isolated.

Current pneumococcal vaccines, PPSV23 for adults and Prevnar 13 for children two months to five years, are considered safe and effective for the prevention of streptococcal otitis media, pneumonia, bacteremia, and meningitis (Sokos, Skledar, Norwalk, Zimmerman, Fox, & Middleton, 2007). Marked decreases in the incidence and prevalence of these illnesses have been documented over the last decade particularly due to the success of the campaign to vaccinate children under five. That said, there are still at least 175,000 hospitalizations annually due to pneumococcal pneumonia; and more recently, pneumococcal co-infections following H1N1 illnesses. Despite the safety and efficacy of PPSV23 in the adult population, vaccine uptake remains challenging,

particularly among minority populations (Daniels, Gouveia, Null, Gildengorin, & Winston, 2006; Schweon, 2005).

This research sought to identify specific barriers to PPSV23 vaccine uptake among the African American sector of under vaccinated minorities identified by Healthy People 2010 and 2020. This section will explain pneumococcal illnesses, the PPSV23 vaccine, and existing challenges with vaccine uptake. Moreover, the problem statement, study purposes and associated hypotheses are stated, limitations are acknowledged, and the significance of the study will be presented.

Background and Problem Statement

Invasive pneumococcal disease can lead to three major illnesses including pneumonia, bacteremia, and meningitis. While symptoms and severity differ, each of the illnesses is caused by the same bacteria. The most common of the three illnesses and the primary focus of this dissertation, is pneumococcal pneumonia often referred to as streptococcal pneumonia. It is estimated that pneumococcal pneumonia is directly responsible for 5,000 deaths in the United States annually (Flowers, 2007). The incubation period for pneumococcal pneumonia is approximately one to three days and the illness manifests itself with a sudden onset of fever, chest pain, coughing, shortness of breath, tachycardia, tachypnea, weakness, and chills (Immunization Action Coalition [IAC], 2009). Case fatality rates for pneumococcal pneumonia in 1997 were estimated to be 12% (Feikin, 2000). A decade later, the case fatality rate remains at 10% and it is estimated that the rate is much higher among the elderly who often go undiagnosed (CDC, 2009). With a large volume of literature supporting the fact that case fatality rates are still high among the elderly, a great deal of effort has been placed on decreasing

pneumococcal illnesses in that population. A less studied population vulnerable to invasive pneumococcal illnesses are young and middle aged African Americans. The incidence of pneumococcal illnesses has been found to be higher among African Americans than their Caucasian counterparts in the US by two to four-fold (Butler & Schuchat, 1999). Pneumococcal diseases are only slightly higher among elderly Blacks than elderly Whites. Although the role socioeconomic status plays in pneumococcal illnesses is poorly understood, it seems to play a confounding role in the incidence of pneumococcal illnesses among African Americans who were found to have a 10-fold increase in pneumococcal illness in a study conducted in metropolitan, Atlanta (Butler & Schuchat).

Incidence and Prevalence

Pneumococcal bacteremia (blood infection) occurs in about 50,000 patients with pneumococcal pneumonia, and has an overall case fatality rate of approximately 20%. Meningitis of pneumococcal origin constitutes approximately 15% of all bacterial meningitis cases in the United States annually. Symptoms include headache, fatigue, nausea and vomiting, irritability, fever, seizures, and coma. The case fatality rate for pneumococcal meningitis is approximately 30% (Active Bacterial Core [ABC] Surveillance - CDC, 2009).

In the past two years, pneumococcal pneumonia and bacteremia have emerged as a significant cause of bacterial co-infection among persons with H1N1 influenza, further highlighting the importance of pneumococcal vaccine uptake. Researchers from the Centers for Disease Control (CDC) analyzed lung tissue samples from 77 people who died of H1N1 flu between May and August of 2009 and found that 22 (29%) of the

subjects had secondary bacterial pneumococcal infections (US Department of Health and Human Services, Office of Minority Health [OMH], 2009. Of the 22 subjects with bacterial co-infections, ten were confirmed to have *S. pneumoniae*, with none of the victims reportedly over 56 years of age. Health histories available on 21 of the subjects revealed that 16 of them had pre-existing conditions which may have increased their risk factors for contracting influenza and pneumococcal pneumonia. By virtue of their pre-existing conditions, each had indications for PPSV23, though vaccine status on the subjects is listed as “unknown” in the literature (CDC, Morbidity and Mortality Weekly [MMWR], 2009).

With pneumococcall pneumonia emerging as a cause of bacterial co-infection in patients with influenza, it is more imperative than ever to prevent the spread of opportunistic bacterial infections such as pneumococcus. Fortunately this is a realistic goal given the proven efficacy of the pneumococcal vaccine. The CDC estimates up to half of the pneumococcal related deaths annually could be prevented by administration of PPSV23 to eligible recipients, which may prove vital if faced with inadequate supplies of H1N1 vaccine and some measure of public skepticism regarding the newly introduced H1N1 vaccine (CDC, 2009).

Statistics regarding invasive pneumococcal disease in the United States are based on active surveillance using the CDC Active Bacterial Core Surveillance (ABC) system. In 2008 there were an estimated 43,000 (14.3 per 100,000 population) cases of invasive disease nationally, with 4,400 (1.5 per 100,000 population) deaths. More than half of the pneumococcal related deaths occurred in adults with specific risk factors for severe disease: chronic lung disease and immunosuppression (Muench, Herbert, & Rajnik,

2010). Invasive Pneumococcal Disease is more common among African Americans, Native Alaskans, and Navajo and Apache Indians than any other ethnic groups in the United States even when studies have controlled for socioeconomic factors (Muench, Herbert, & Rajnik). The reason for this disparity is yet unclear and more research is sorely needed. Intuitively however, the higher rates of pre-existing health conditions such as diabetes, heart disease, and chronic kidney disease, may place these groups at an increased risk for illness and death.

Vaccine Indications and Administration

The pneumococcal vaccine was first licensed in the US in 1977, affording protection from 14 of the 90 known serotypes of pneumococcus. The current form of the pneumococcal vaccine (PPSV23) was licensed in 1983, replacing the former 14-valent vaccine (Sokos, et al., 2007). PPSV23 contains 25 micrograms of purified capsular polysaccharide from 23 serotypes (1, 2, 3, 4, 5, 6B, 7F, 8, 9N, 9V, 10A, 11A, 12F, 14, 15B,17F, 18C, 19A, 19F, 20, 22F, 23F and 33F) and is reported to be up to 75% effective in preventing pneumonia due to pneumococcus among immunocompetent patients (Sisk, Whang, Butler, Sneller, & Whitney, 2003). The vaccine is administered as a single dose commonly via the deltoid muscle as a 0.5 ml injection. It does not contain live virus and can be given at the same time (via separate syringe) as any other vaccinations. The PPSV23 vaccine is given throughout the year without regard for seasons (Sokos, et al., 2005). If vaccination status is unknown, it is considered safe to assume that the patient has not received the PPSV23 vaccine, and therefore, it should be administered (CDC, 2007). According to the CDC (2007), repeated pneumococcal vaccinations yielded only self-limiting local reactions with no other adverse events.

PPSV23 vaccination is indicated by the CDC for all persons ≥ 65 (Sisk, et al., 2003). It is also indicated for adults 18-64 who are immunologically suppressed related to chronic conditions such as congestive heart failure, diabetes mellitus, liver disease, lung disease, renal failure, splenectomy, cancer, cochlear implants, organ transplant, and Human Immunodeficiency Virus (HIV) (Sisk, et al.). In October 2008, the Advisory Committee on Immunization Practices (ACIP) revised PPSV23 recommendations adding cigarette smoking to the list of indications for immunization, confirming smoking as an independent risk factor for pneumococcal pneumonia (CDC, 2008) (Appendix A).

Efforts to Improve Vaccine Uptake

Over the past two decades, multiple efforts have been made to increase vaccine uptake including a governmental regulation to allow standing order programs (SOPs) in 2002 (Middleton, et al., 2005). To facilitate the process of pneumococcal vaccination, the CDC provides a generous supply of teaching materials and sample sets of standing orders that can be utilized to improve outcomes. Development of SOPs gives nurses and pharmacists the autonomy to vaccinate eligible individuals based on a set of predetermined evidence based criterion (Schweon, 2005). In an important ruling, the Centers for Medicare and Medicaid Services removed the federal requirement for a physician's order to give each pneumococcal vaccine, paving the way for better compliance by empowering other disciplines such as nurses, physicians' assistants, nurse practitioners, and pharmacists to screen and vaccinate when appropriate without first consulting a physician (Sokos, et al., 2007). Centers for Medicare Services (CMS) reimburses the cost of PPSV23 ranging from $18.50 to $25.00 between states for all Medicare recipients (CMS Guidelines, 2009). SOPs utilize a series of questions to

establish prior vaccination, identify at risk individuals, obtain consent to administer, and ultimately vaccinate those who agree. Additionally, a standing order protocol (SOP) enhances the capability for institutions to document patient refusals, medical contraindications, and post vaccination adverse events (CDC, 2006). Florida Medicaid on the other hand, reimburses for the pneumococcal vaccine only for institutionalized recipients who do not have Medicare benefits and despite the CDC's recommendation that some persons get a second vaccine after 65; reimbursement is limited to one per lifetime per recipient (Rosenbaum, Stewart, Cox, & Lee, 2003).

With all of the provisions in place, it would appear that the stage has been set for PPSV23 uptake to significantly improve, yet according to Healthy People 2010, only about 50% of those eligible for the vaccine actually receive it, and the number of PPSV23 eligible recipients drops off sharply when examining Black and Hispanic populations. Results of the National Immunization Survey (NIS) in 2007 where 7,055 adults self-reported their pneumococcal immunization status revealed PPSV23 uptake rates among those 65 and older at 67.8% for Caucasians, 52.5% among Blacks, and 51.3% for Hispanics (NIS, 2007). The NIS study exposed less promising PPSV23 uptake rates for vaccine eligible adults in the age group 18 to 64 with only 34% of Caucasians, 26% of Blacks, and 19% of Hispanics having ever been vaccinated (National Immunization Survey [NIS], 2007).

While there are a number of studies focusing on immunizations for all ethnicities ≥ 65, little attention has been given to the approximately 22 million people aged 18-64 whose chronic health conditions or current smoking habits place them at risk for pneumococcal disease and thus eligible to receive the PPSV23 vaccine (Cantrell,

2009); and even fewer studies have focused exclusively on pneumococcal vaccine uptake among African Americans. The most recent statistics on vaccine uptake as well as pneumococcal mortality rates substantiate the pattern of under vaccination and overburden of pneumococcal disease among minority African Americans of all ages; particularly those under the age of 65 with pre-existing health conditions such as diabetes and heart disease, and/or current smoking habits.

Despite efforts to increase awareness and access to immunizations, marked racial disparities persist in pneumococcal vaccination rates (O'Malley, Sheppard, Schwartz, & Mandelblatt, 2004). CDC data show that vaccination levels for non-Hispanic African Americans and Hispanics lag behind those for non-Hispanic whites. In 2007, pneumococcal vaccination coverage reflected that 62 percent of non-Hispanic Whites versus 47 percent of non-Hispanic African-Americans and 34 percent of Hispanics had ever received a pneumococcal vaccine (CDC, 2007).

Although the percentage of vaccine uptake and pneumococcal disease burden are actually higher among Hispanics, African Americans were chosen as the population of interest in this study primarily due to the demographic characteristics of the study location. According to the United States Census Bureau, the racial composition of Jacksonville, Florida is 62.3% White, 30.1% African American, 4.2% Hispanic, 0.3% American Indian, 3.5% Asian, 0.1% Native Hawaiian, and 1.8% non-specified. The significant number of African Americans residing in Jacksonville afforded the researcher the opportunity to obtain an adequate sample population in a timely manner. Moreover, subsequent interventional research aimed at increasing PPSV23 vaccine uptake may

be more impactful given the large percentage of African Americans residing in Northeast Florida.

Purpose of the Study

The purpose of this study was to examine factors such as age, gender, SES, vaccine awareness, vaccine knowledge, overall trust in healthcare provider, perceived health, perceived susceptibility of contracting pneumococcal illness, perceived severity of pneumococcal illnesses, prior negative experiences with vaccines, and healthcare provider recommendation for vaccination which may influence pneumococcal vaccine uptake among all vaccine eligible African Americans ≥ 18 years of age. A better understanding of the characteristics consistent with the vaccinated portion of the population is needed in order to address and eliminate disparities. As understanding increases, nurses and public health professionals will be better equipped to develop and implement targeted interventions aimed at increasing vaccination rates among African Americans. Thus potentially influencing policy at the state level where PPSV23 is currently not covered by Medicaid, bringing us closer to stated goals in Healthy People 2020 for a healthier population overall.

Study Aims

1. To determine how socio-demographic variables such as age, gender, and socioeconomic status, may predict pneumococcal vaccine uptake among African Americans ≥ 18 whose age or pre-existing health conditions are known to increase the risk of contracting pneumococcal illness such as: diabetes, heart disease, cancer, chronic obstructive pulmonary disease (COPD), sickle cell disease, immunological suppression, asplenia, cochlear implants, liver disease, and cigarette smoking render them eligible for PPSV23.
2. To determine how vaccine awareness, knowledge, trust in healthcare provider, perceived health, perceived susceptibility, perceived severity, prior negative experience with vaccines, and healthcare provider recommendation may predict pneumococcal vaccine uptake among African Americans ≥ 18 whose age or pre-existing health conditions known to increase the risk of contracting

pneumococcal illness such as: diabetes, heart disease, cancer, COPD, sickle cell disease, immunological suppression, asplenia, cochlear implants, liver disease, and cigarette smoking render them eligible for PPSV23.

Hypotheses

H_a – Sociodemographic variables such as age, gender, and socioeconomic status may predict pneumococcal vaccine uptake among eligible African Americans.

H_a – Constructs operationalized from the HBM and PAPM such as awareness, knowledge, trust in healthcare provider, perceived health, perceived susceptibility, perceived severity, prior negative experience with vaccines, and healthcare provider recommendation may predict pneumococcal vaccine uptake among vaccine eligible African Americans.

Significance

Over a decade of statistics maintained by the CDC's National Health Interview Survey show that African American and Hispanic persons are disproportionately affected by invasive pneumococcal disease (CDC, 2009). In 1998, there were an estimated 62,840 cases and the incidence among African Americans was 2.6 times higher than that of whites (95% CI [2.4, 2.8]). Among patients aged 2 to 64 years, 50.6% had a vaccine indication as defined by ACIP. The case-fatality rate among patients aged 18 to 64 years with an ACIP indication was 12.1% compared with 5.4% for those without an indication (relative risk, 2.2; 95% CI [1.7, 2.9]) (ACIP, 2009).

An increased understanding of the lack of awareness surrounding pneumococcal illnesses and the PPSV23 vaccine may assist health care providers in developing better strategies to educate underserved and under vaccinated sectors of the population. Additional knowledge of the factors influencing decisions to be vaccinated with PPSV23 may lead to the development of population based interventions among vaccine eligible African Americans ≥ 18 years of age. Through administration and analyses of the Vaccine Uptake Questionnaire (to be detailed in the methods section), the author hoped to identify clinically significant variables responsible for influencing pneumococcal

vaccine uptake for use in a future study whereby an intervention designed to specifically address the needs of this underserved population and increase PPSV23 uptake will be implemented.

CHAPTER 2
LITERATURE REVIEW

This chapter presents a literature review in three major sections relevant to the specific aims of the study. First, the broad topic of pneumococcal illness and vaccine uptake in the United States will be addressed. Second, the literature review will focus on immunization disparities and the burden of pneumococcal illnesses among African Americans in the United States. Finally, the description will focus on potential barriers to immunization such as knowledge deficit, trust in healthcare provider, perceived health/susceptibility, prior negative experiences with immunizations, and provider recommendation (or lack thereof) for vaccine.

Research focusing specifically on pneumococcal vaccine uptake was utilized for this literature review, though it should be pointed out that there were relatively few articles focusing solely on the pneumococcal vaccine. More commonly, research was found on the influenza vaccine which differs from PPSV23 in a number of significant ways. Whereas the pneumococcal vaccine is a onetime immunization not associated with a given season, the Influenza vaccine is administered annually and associated with “flu season” which is often the impetus for uptake. Influenza vaccine campaigns are widespread; therefore, public awareness is intuitively much higher. And finally, the Influenza vaccine is indicated for nearly everyone in the population leaving little ambiguity about who is eligible to receive it. In spite of these differences, some of the Influenza literature has been cited in this dissertation because it most closely resembles findings one might expect related to beliefs, trust, knowledge, and perceived susceptibility of pneumococcal illnesses and vaccine uptake.

Pneumococcal Illness and Vaccine Uptake

Diagnosis

Streptococcus pneumoniae is the etiological agent for a number of different diseases including community acquired pneumonia, meningitis, and otitis media. Streptococcus is the leading cause of pneumonia in the US, accounting for 36% of community acquired pneumonia and 50% of hospital acquired pneumonia. Moreover; it has been reported as a major source of bacterial co-infections following influenza illnesses. Estimates vary widely, but the Active Bacterial Core Surveillance Report states that 5-70% of adults in the US are asymptomatic carriers of pneumococci. Carriage of the pathogen and how this relates to immunity is not well understood. Those who do become ill typically have a short incubation period of roughly three days, then manifest symptoms such as chest pain, cough, dyspnea, tachypnea, hypoxia, tachycardia, general malaise, weakness, and productive rust colored sputum (CDC, 2009).

Pneumococcal illness may be diagnosed when isolated in fluids which are normally sterile such as blood and cerebrospinal fluid (Robinson, Baughman, Rothrock, et al., 2001). The most accurate way to diagnose pneumococcal illness is through a blood culture, although only 25-30% of the pneumococcal cases have bacteremia so many cases are likely to be missed using only serology (Morrison, Lake, & Crook, et al., 2000). Sputum samples can be analyzed for the presence of lancet-shaped diplococci by gram stain, however; this diagnostic study must be interpreted carefully because diplococcic are often found in the naso-pharyngeal passages and would not necessarily indicate infection. Generally, the presence of at least 25 white blood cells, and a large

number of gram-positive diplococci along with fewer than 10 epithelial cells in a gram stained sputum specimen are reason to confirm diagnosis of pneumococcal pneumonia (CDC, Active Bacterial Core, 2009). Diagnosis by sputum sample collection is highly problematic because when a patient merely “coughs up” a sputum sample nearly 40% of the time it contains only saliva and bacterial pathogens present in the lung would likely be missed. Among patients who do seek care, the healthcare provider often just prescribes antibiotics as opposed to obtaining a sputum sample or blood culture. With diagnostic studies proving to be problematic, the author believes the full burden of pneumococcal diseases in the US is grossly underestimated particularly when factoring in the large numbers of people who likely fail to seek out any diagnostic confirmation or medical care. Once diagnosed, streptococcal infections are treated with broad spectrum antibiotics and symptoms begin to abate within 12 to 36 hours (CDC, 2011). As previously stated in the introduction, roughly 50% of all pneumococcal related pneumonia infections could be prevented if persons eligible for the PPSV23 vaccine were properly screened and vaccinated.

Vaccine Success Over the Past Decade

Although there is much to be done, the incidence of pneumococcal illnesses has indeed declined over the last decade due in large part to a concerted effort to vaccinate children, adults with pre-existing health conditions, and the elderly. In late 2000, the pneumococcal conjugate vaccine (PCV7) was introduced for children under five. Prior to that time, PPSV23 was available only for adults. Since the introduction of the PCV7 targeting children under five, great strides have been made in the overall reduction of IPD not only among vaccinated children, but also among unvaccinated children and

adults thus demonstrating both direct and indirect vaccine effects (Pilishvili, et al., 2010). Efforts to improve vaccine uptake among children under five and adults over the age of 65 have proven highly successful overall. While disease surveillance from 1998 (pre-PCV7) to 2007 revealed steadily declining rates of IPD in all age categories, the most significant results were found in children under five where the disease rate per 100,000 decreased from 934 to six (Pilishvili et al.). The incidence and prevalence of pneumococcal illnesses post PCV7 introduction were broken down by ethnicity found that Caucasian children were more likely to be vaccinated than their African American counterparts (82.1%, versus 75.2% respectively), (CDC, 2007).

Without vaccination, pneumococcal pneumoniae rates begin to increase dramatically ≥ 65; and although persons in this age category only account for 29% of reported cases, they make up 55% of pneumococcal related deaths (Butler & Schuchat, 1999). Often, pneumococcal pneumoniae outbreaks can be found in settings where many people are in close proximity with one another such as nursing homes. With high case fatality rates and the emergence of drug-resistant strains of pneumococcal illness among the unvaccinated, the elderly have been heavily targeted for vaccination with the most current iteration of the pneumococcal vaccine (PPSV23) over the last decade.

Since the inception of PCV7, adults ≥ 65 were found to have an overall decline in IPD from 638 to 68 per 100,000 (89.34% reduction), and adults between the ages of 18 and 64 had a decrease in disease rates from 930 to 133 per 100,000 (85.69% reduction) (Pilishvili, et al., 2010). Although the results of this study demonstrate a robust decrease in the incidence of IPD and certainly provide evidence of vaccine efficacy, they should be interpreted with caution because they are not broken down by

ethnicity, and as previously discussed; pneumococcal illness is inherently difficult to diagnose and it is likely that the incidence is underestimated (World Health Organization, 2007). When considering pneumococcal illness among the elderly, it is also important to note that most of the studies reported on age as a demographic variable, but failed to further break down incidence, prevalence, and mortality rates by ethnicity.

Pre-Existing Health Conditions

Adults between the ages of 18 and 64 are typically not targeted for PPSV23 vaccination unless they have pre-existing health conditions likely to increase their risk of contracting pneumococcal illnesses. Immunocompromising conditions such as leukemia, cystic fibrosis, sickle cell disease, non-Hodgkin's lymphoma, asplenia, and HIV/AIDS warrant immunization with PPSV23, as do certain heart and lung conditions such as congestive heart failure, cardiomyopathies, COPD, and emphysema. Liver disease, kidney failure, cerebrospinal fluid leaks, diabetes mellitus, and alcoholism are also listed by the Centers for Disease Control as pre-existing conditions warranting pneumococcal vaccination. In 2010, smoking was added as an independent indicator for the PPSV23 vaccine. A case-control study of immunocompetent smokers revealed they had 4.1 times the odds of contracting pneumococcal pneumonia than their non-smoking counterparts (Sisk, 2003). Many studies (Butler, & Schuchat, 1999; Young, Bleyl, Clark, Oderda, & Liou, 2004) examined special adult populations such as those with HIV/AIDS, and cystic fibrosis to determine the extent to which they are aware of the vaccine and willing to accept it. Unfortunately, these studies did not present findings specific to ethnicity.

In a study (Young, Bleyl, Clark, Oderda, & Liou, 2004) designed to examine PPSV23 vaccine uptake among adults with Cystic Fibrosis (a pre-existing condition placing individuals at an increased risk for contracting pneumococcal illnesses, found that only 11.8% of adults between the ages of 18 and 49, and 29.9% of those 50-64 with chronic lung disease, had been vaccinated. In this study, a simple reminder system was implemented at the health clinic, and vaccine uptake among patients with Cystic Fibrosis increased from 14.5% to 65% suggesting that awareness may play a key role. While clearly demonstrating a successful intervention among adults between 19 and 64, this study did not categorize by race; therefore, it is unclear whether or not African Americans were represented in the study (Young, et al.).

A study conducted in San Francisco County, California, found that patients with HIV had a higher incidence of pneumococcal illness than non-infected persons, 54.4% to 45.6% respectively (Nuorti, Butler, & Farley, 2000). Not only were HIV infected patients more likely to incur pneumococcal infections, but that African American patients with HIV had a significantly higher rate of pneumococcal infection (2,384.8 per 100,000 cases). The pneumococcal infection rate ratio comparing Black to non-Black patients was 4.5 (CI [3.1, 6.5]), and case fatality rates (although not specified) were reported as “similar” (Nuorti, et al.). These findings further substantiate the author’s decision to choose African American’s as the population of interest for this study.

Pre-existing health conditions such as diabetes, heart disease, cancer, COPD, immunological suppression, sickle cell disease, asplenia, cochlear implants, liver disease, and current smoking practices, place individuals at increased risk of contracting pneumococcal illness. While the literature clearly delineates the overall

problem with vaccine uptake among individuals 18-64 with pre-existing conditions, there are few studies that further examine specific ethnic group demographics, thus demonstrating the need for this research to further inform and fill a gap.

Immunization Disparities and the Burden of Pneumococcal Illness among African Americans

Inadequate PPSV23 vaccine uptake among the general population in the United States has been well established in the literature (Daniels, et al., 2006; Egede, & Zheng, 2003), but African Americans and Hispanics reflect the greatest uptake disparity (Healthy People 2010). Vaccine uptake disparities among African Americans reportedly persist independent of access to care, health insurance, and socioeconomic status (Egede, et al.). Even with standing orders in place and healthcare provider recommendations for PPSV23, in a prospective study on vaccine acceptance, African Americans were significantly more likely to refuse the vaccine compared with Caucasians and Asians (19% refused, p= 0.01) (Daniels, et al.). The decision to focus on African Americans as the population of interest in this dissertation is based largely on the objectives of Healthy People 2010 which highlights not only disparities in pneumococcal vaccine uptake and IPD, but also a disproportionately high incidence of disease processes among African Americans known to increase the risk of contracting IPD such as diabetes, heart disease, and HIV/AIDS (US Department of Health and Human Services, [OMH], 2008).

Diabetes is among the chronic illnesses meeting the criteria for PPSV23 vaccination in the 18 to 64 population. In a study examining Influenza and pneumococcal vaccine uptake in diabetic patients (n = 1,906), subjects who were

White/Non-Hispanic had a vaccination rate of 38% compared to 22% uptake rate in African Americans (p <0.005). The study data were adjusted for access to care, SES, and health insurance coverage, and the authors concluded that racial disparities in vaccine coverage were an independent predictor for vaccine uptake. The authors in this study hypothesized that there may be cultural or communication barriers contributing to the disparity, but drew no conclusions. Rather, they suggested that additional research to drill down to the true reasons for the disparity was sorely needed (Egede & Zheng, 2003). Daniels et al. (2006), focused on understanding vaccine acceptance by ethnicity. They interviewed a sub-set of African Americans who refused the PPSV23 vaccine (n = 88), and found that reasons for refusal were related to “fear of vaccines” (24%), “fear of vaccine related illness” (35%), and “do not believe it is necessary” (35%) (p. 1091).

A retrospective cohort study (Hausmann, et al., 2009), focused specifically on racial disparities in the care of patients with pneumonia and examined quality indicators considered to be “gold standard” treatment for patients diagnosed with pneumonia set forth by Joint Commission and CMS. Of these indicators, African Americans were less likely to receive the pneumococcal vaccine (53.8%) than non-Hispanic Whites (67.7%). African Americans were also less likely to receive their first dose of antibiotic within four hours, less likely to be offered smoking cessation counseling, less likely to be given the appropriate antibiotic initially and less likely to receive the influenza vaccine. The unadjusted hospital mortality rates were significantly higher (N = 1,183,753, p <0.001) for African Americans (4.5%) compared with whites (4.1%). In adjusted models, within-hospital effects indicated that African Americans had significantly higher odds of mortality when compared with whites treated at the same hospital (OR = 1.05, 95% CI

[1.02, 1.09]). Differences in care and mortality rates were explained in two important ways; hospitals with high concentrations of minority populations tended to be lower performing facilities overall, and the inpatient population tended to be sicker on admission (higher number of pre-existing health conditions). The comprehensive nature of this study with patient level information from 4,000 hospitals lends a high degree of generalizability to the findings that African Americans are receiving substandard care when compared with their White counterparts both within and between hospitals across the country (Hausmann, et al., 2009).

Whereas the patients in the Hausmann study (2009) all had access to care, this is not always the case. Hypothesizing that access to care might influence immunization uptake among racial minorities, a study (Rangel, Shoenbach, Weigle, Hogan, & Bangdiwala, 2005) determined if access to care could account for the racial disparities seen with the influenza vaccine uptake. Results showed that although there were significant differences in vaccination between non-Hispanic (NH) whites (66%) and Hispanics (50%, p <.001) and between NH whites (66%) and NH blacks (46%, p <.001), they were only partially explained by access to care leaving other factors such as patient attitudes yet to be determined (Rangel et al.).

Thus far, the review of literature in general has highlighted subpar PPSV23 vaccine uptake among adults in the US in general, and an even larger problem with uptake among African Americans. Efforts to explain the gap in vaccine coverage among African Americans has proven challenging, and the advent of standing order protocols has fallen short of resolving the issue. Unfortunately, there is evidence that African Americans suffer from higher incidence of pre-existing health conditions, particularly

diabetes; thought to increase their risk of contracting pneumococcal illness. Even more troubling, when faced with IPD, African Americans are less likely to receive care consistent with the quality indicators set forth by The Joint Commission and CMS; and finally, African Americans who do become ill are more likely to die from pneumococcal infections than their White counterparts.

Potential Barriers to Vaccine Uptake

With substantial evidence to support PPSV23 vaccination, and clearly defined racial disparities with vaccine uptake and pneumococcal disease burden, the next logical step was to develop an understanding of what the barriers to vaccination were among the population of interest and how they might be overcome. Therefore, a comprehensive review of the literature on PPSV23 vaccine attitudes was conducted. Most studies found did not focus on the attitudes of African American adults; those that did targeted subjects over 65 years of age. In prior research of attitudes among African Americans towards other matters of preventative care such as mammography, Human Papilloma Virus (HPV), and influenza vaccines, five barriers were identified which may be applicable to PPSV23 vaccine uptake (Ehresmann et al., 2002; Santibanez, et al., 2002; Young, 2004). These barriers include: 1) vaccine awareness, 2) knowledge, 3) healthcare provider recommendation, 4) trust in healthcare provider, 5) perceived health, 6) perceived susceptibility, 7) perceived severity, and 8) prior negative experience with vaccines. Each of these barriers along with sociodemographic variables thought to influence PPSV23 uptake were explored in the literature and will now be discussed in some detail.

Sociodemographic Variables

Overview

Kamal, Madhavan, & Amonkar, (2003), concisely measured the sociodemographic variables of interest. Using data from the Behavioral Risk Factor Surveillance System (BRFSS), influenza and PPSV23 vaccine uptake were examined by demographic variables: age, gender, and socioeconomic status (SES). Participants with health insurance were 1.66 times more likely to receive a pneumonia vaccine (p = .015). While males were more likely than females to get the influenza vaccine, no gender differences were found for the pneumonia vaccine. Education appeared to predict vaccine uptake, with high school graduates 1.23 times (p= .005) more likely to get pneumonia vaccinations than those with less than high school education. Participants with some college were 1.38 times (p < .0001) more likely than those without high school diplomas to be vaccinated. Each of these sociodemographic variables (age, gender, & SES) will now be broken down and discussed independently.

Age

The incidence of pneumococcal pneumonia is typically high in children and the elderly, but low among young and middle aged adults (Nuorti, et al., 2000). Adult's ≥18 are eligible for the PPSV23 vaccine based on clinical risk factors such as diabetes and heart disease. All adults 65 and older are eligible for PPSV23 by virtue of their age. The National Center for Health Statistics (NCHS) publishes PPSV23 uptake rates annually based on selected eligibility criteria broken down by age categories. In 2001 PPSV23 vaccine uptake rates were 5.9% for ages 18-49, 15.4% for ages 50-64, 54% for ages 65-74, 50% for ages 65-74, and 58.4% for ages 75 and older. Six years later, in 2007,

PPSV23 uptake statistics had improved very little with rates of 5.7%, 18.2%, 52%, and 63% respectively (NCHS, 2007).

In 2011, the National Vaccine Advisory Committee (NVAC) published a report on the current state of PPSV23 vaccination in the United States and concluded that uptake among high risk adults aged 18-64 was only 18% compared with that of adults 65 and older at 61%. These uptake rates fall well below the goals of Healthy People 2020 (58%, and 84% respectively) (NVAC, 2011). Data reflected in each report must be interpreted with caution for the purposes of this dissertation work because they were broken down strictly by age or race, not both. Nonetheless, poor PPSV23 uptake rates among African Americans aged 18-64 with existing risk factors are consistently reported in the literature.

Gender

There were conflicting data in the literature on the relationship between gender and vaccine uptake. In the aforementioned study by Khamal, et al., (2003), no gender differences for PPSV23 uptake were detected, however; the 2007 NCHS report indicated a slight difference, not statistically significant, in uptake rates (54.3% male, 59.2% female). Qualitative studies pertaining to HIV vaccination and “intent to vaccinate”, found that while perceived barriers to vaccination differed between genders, overall intent was similar (Kakinami, Newman, Lee, & Duan, 2008). An influenza uptake study among 939 COPD patients yielded no significant uptake differences between genders (Campos, Alazemi, Zhang, Sandhaus, & Wanner, 2008).

Allen, Kennedy, Wilson-Glover, and Gilligan, (2007), conducted focus groups to elucidate men’s perceptions of prostate cancer screening and found that African

American men often felt that going to the doctor was a sign of weakness. Two respondents in the study called the phenomenon “superman syndrome,” saying “Black men don’t go to the doctor until something is falling off” (Allen, et al., p. 2194).

While gender differences pertaining to vaccine uptake were not different in some of the studies, this relationship remains of interest, particularly because the pneumococcal study was composed of all African American subjects, and therefore, uniquely positioned to observe gender differences within the population of interest. A priori plans examining gender as a sub-group will be discussed in Chapter 3 of the dissertation.

Socioeconomic Status

According to the National Center for Educational Statistics (NCES), socio-economic status (SES) is defined as combined economic and sociological measures of a person's work experience, economic and social position relative to others. Standard measures are typically based on income, education, and occupation, although wealth is sometimes included as well (NCES, 2008). Measuring income is reportedly problematic because the rate of non-response is typically high, particularly among minority groups. Income also fails to capture items such as health insurance and disability benefits (Shavers, 2007).

Other measures of SES identified in the literature included insurance status, geographical location by zip code, and neighborhood conditions such as crime and housing (Moore, 2009). The most common measures of SES found in the literature were education and income combined; however, there was insufficient data to support the use of one combination over another. Hence, for the purpose of this dissertation

review, selected SES variables (education and health insurance), will be considered separately as potential demographic predictors of pneumococcal uptake. Based on focus group responses, questions regarding income have been deemed intrusive; therefore, in the interest of cultural sensitivity, this information will not be collected.

Health insurance

Florida Medicaid reimburses for the PPSV23 vaccine only for institutionalized recipients who do not have Medicare benefits. Despite the CDC's recommendation that certain persons get a second vaccine after 65, reimbursement is limited to one per lifetime per recipient (Rosenbaum et al., 2003). The Saint Johns and Duval County Health Departments in Florida were contacted for pricing. Duval County stated the fee was $55.00 and Saint Johns County reported $45.00. Sliding scale fee schedules exist, but were not provided (Garvin, C., personal communication, July 11, 2011). Payment of $45-$55 dollars may be cost-prohibitive for some, thus type of insurance and insurance status may indeed be predictive of PPSV23 uptake for some.

Data from 6,334 elderly respondents of the National Health Interview Survey (NHIS) in 2005 were analyzed for racial disparities related to influenza vaccine uptake. Demographic components found to be significant predictors of vaccine uptake were race, education, social support, and insurance status. A greater proportion of Caucasians than African Americans had either private or Medicare coverage (74% and 43% respectively). Overall influenza vaccination coverage was 63.2% (95% CI [61.7, 64.6]) and coverage differences between whites and blacks were 65.6%; (95% CI [64.1, 67.1]), and 45.9% (95% CI [41.6, 50.3]) respectively. Controlling for education and social support (using marital status as a proxy for social support), the rate of non-

vaccination only decreased by 1/3, leaving the researchers to conclude that being uninsured was a strong predictor of non-vaccination. (Rangel, et al., 2005).

Education

Studies have shown that education level is often predictive of vaccine uptake or at least the belief that vaccines are safe (Endrich, Blank, & Szucs, 2009; Galarce, Minsky, & Viswanath, 2011; Rangel, et al., 2005). Those with higher levels of education tend to believe vaccines are safe, whereas individuals with less education are more suspect. Concerned with H1N1 as a pandemic virus, Galarce, et al. surveyed 1,569 individuals online, oversampling minorities based on data reflecting persistent disparities. Among other findings such as beliefs about vaccine safety and efficacy, the authors found that less than half of the individuals with less than a high school diploma perceived the vaccine as safe, whereas two thirds of those with a Bachelor's or higher degree felt it was.

Vaccine Awareness and Knowledge

Lack of awareness of the pneumococcal (PPSV23) vaccines' existence has been written about fairly extensively in the literature. Unlike the influenza vaccine which is given annually, PPSV23 is typically only given once in an adult's lifetime after the age of 65 unless pre-existing health conditions known to increase the risk of pneumococcal illness necessitate that it be given sooner. Given the administration guidelines, it is not surprising that the vaccine could be overlooked. If the target population is largely unaware of the existence of PPSV23, there is little doubt that uptake rates will continue to suffer (Santibanez, et al., 2002).

Several studies designed to evaluate and measure the extent to which lack of awareness affects PPSV23 vaccine uptake have identified awareness as problematic irrespective of race, gender, or socio-economic status (SES) (Daniels, et al., 2006; Flowers, 2007; Santibanez, et al., 2002; Winston, Wortley, & Lees, 2006). The following studies represent quantitative and qualitative works on PPSV23 vaccine awareness primarily among the population of interest. Moreover, a distinction has been made between the constructs of “knowledge” and “awareness” as they pertain to PPSV23 vaccine uptake.

Sapsis & Janssen, (2002), conducted qualitative surveys among African American and Hispanics ≥ 65, and again found that most were unaware of the pneumococcal vaccine. Questions such as “Why didn’t my doctor tell me about it,” were common. Using a quantitative approach, Wahid Nag, Bilous, Marshall and Robinson, (2001), examined 268 diabetic patients (race not reported), 144 of whom had clinical conditions warranting PPSV23 vaccination, and found that only 35% had received the influenza and pneumococcal vaccines (93/144). Unvaccinated subjects were largely unaware of the need for either or both vaccines (69% and 91% respectively).

In 2002, researchers for the Department of Health studied knowledge, attitudes, and beliefs among the general public regarding the pneumococcal vaccine. Self-reported pneumococcal vaccine coverage was 59% (95% CI 54%, 64%). Once again, a lack of awareness contributed significantly to non-vaccination (OR 25.3, $p < 0.001$). Unvaccinated participants who had heard of PPSV23 stated they would have accepted the vaccine had they known it was safe and played a major role in preventing pneumonia (Ehresmann et al., 2002). While it is unclear whether awareness alone

would have increased PPSV23 uptake in the aforementioned studies, or if additional knowledge regarding PPSV23 would first be necessary, the scope of the problem is clearly defined in the literature.

A vaccine disparities initiative conducted by Winston, et al., 2006, explored barriers to pneumococcal and Influenza vaccine uptake using a cross-sectional telephone survey stratified by race. Vaccination awareness was ascertained by asking subjects (*n* = 4,577) if they had ever heard of the pneumonia shot and whether or not their healthcare provider had recommended it. Inclusion criteria for this study were seniors age 65 and older from the Medicare Enrollment Database (EDB), excluding those between 18 and 64 whose pre-existing health conditions could predispose them to pneumococcal illnesses. Vaccine uptake rates by race were 70.3% for Whites, 40.8% for Blacks, and 53.2% for Hispanics. Importantly, provider recommendation (risk ratio (RR) 52.32, 95% confidence intervals CI [52.10, 2.57]) and vaccine awareness (RR 51.60, 95% CI [51.40, 1.82]) were associated with greater pneumococcal vaccine uptake (Winston, et al.).

When Daniels et al. (2006) evaluated a sub-set of CDC study participants, they found that of 249 patients surveyed, 180 were completely unaware of the vaccine's existence. The authors of this study noted that "knowledge" was higher among adults ≥ 65, but it was not significantly different between Whites and African Americans. In this study alone, 72% of patients were unaware of the PPSV23 vaccine certainly suggesting that healthcare educators have much work to do.

The Department of Health and Human Services, conducted 18 focus groups in five US cities to examine knowledge, beliefs, and attitudes towards influenza and

pneumococcal illnesses. Participants in this particular study were all African American or Hispanic and over the age of 65. While the study revealed significant knowledge of the influenza vaccine, most of the participants were completely unaware of the existence of the pneumococcal vaccine. The participants were keenly aware of the health risks pneumonia posed to them, but lacked knowledge of the vaccine entirely (Department of Health and Human Services, CDC, 2009).

Daniels, et al., (2004), conducted a series of four focus groups asking 22 unvaccinated African American and Latino adults eligible for PPSV23 by virtue of age or clinical conditions, what their reasons for non-vaccination were. Many participants reported that they were altogether unaware of the pneumonia vaccine, or they lacked information about the benefits or potential side effects of PPSV23. They also stated their physicians had not discussed or recommended the vaccine. The majority expressed willingness to be vaccinated, and felt that community churches might serve as a venue for an immunization campaign.

Awareness Versus Knowledge

It is unclear whether awareness alone would have increased PPSV23 uptake in the aforementioned studies, or if additional knowledge regarding PPSV23 would first be necessary. In order to more fully understand the problem, it is necessary to make a distinction between awareness and knowledge. Knowledge implies a higher degree of understanding beyond simple awareness of PPSV23 vaccine existence (Ehresmann, et al., 2002). This distinction was alluded to, although not explicitly stated, in the Daniels study, where subjects felt they would have chosen to be vaccinated had they known the eligibility criteria and benefits of the vaccine. To operationalize and measure the

constructs of awareness and knowledge in this dissertation study, two single-item questions, each of which will be discussed in greater detail in Chapter 4, were included on VUQ. “Before this study, had you ever heard of the pneumococcal vaccine (sometimes called the pneumonia vaccine)”, was adapted to measure awareness as a potential predictor variable. To measure knowledge, a 5-level Likert style question was added: “I don’t have enough information about the pneumococcal vaccine to make an informed decision about whether or not I should receive it”.

Vaccine Awareness - Role of the Healthcare Provider

Without awareness of the PPSV23 vaccine existence, individuals must rely on health care professionals for information, recommendation, and administration. While in many instances health care practitioners appropriately recommend PPSV23, some do not. Time constraints, lack of awareness in primary, secondary and tertiary care settings, and the individual belief systems of professionals may be at work as well. In an unpublished thesis entitled *Pneumococcal vaccine uptake in the acute care setting*, Fry (2008), found significant knowledge gaps among nurses related to PPSV23 indications and administration in the acute care setting, and subsequently conducted an education intervention aimed at increasing nursing knowledge of the vaccine. Pre and post intervention analyses demonstrated a statistically significant increase (-2.09, $p < .05$) in PPSV23 vaccine uptake among subjects ($n = 90$) once the nursing staff was educated about the vaccine, thus providing one example of how integral the role of the health care provider is in vaccine uptake.

Use of education at the point of service as a means to improving pneumococcal vaccine uptake has proven only moderately successful over the short term. No long

term improvements in vaccine uptake associated with provider education alone were found in the literature. Implementation of standing order protocols for pneumococcal vaccination among patients at or above 65 years of age was reported to have improved compliance from zero to 78% (Shevlin, Summers-Bean, Whitney, & Todd, 2002).

As these studies demonstrate, not all health care practitioners are vaccine savvy and when faced with rising costs, staffing challenges, and time constraints, preventative care can take a back seat to the acute problem or “reason for visit” in many cases. Armed with this information, consumers of health in the current delivery model clearly need to educate themselves taking an active “partner in care” approach to health maintenance and preventative care. The paradigm shift from “patient” to “informed consumer” will not happen overnight, and must be fostered by health care practitioners committed to informing the public about vaccine indications, including PPSV23. Upon completion of this dissertation work, the author plans to disseminate findings on knowledge, trust, perceived susceptibility, perceived health status, and prior history with vaccines among healthcare providers and key administrative leaders in the community. Once healthcare providers are aware of the reasons African Americans opt to accept or decline PPSV23, education for provider and interventions aimed at the target population may be designed and implemented.

Provider Recommendation for Vaccine

The constructs’, vaccine knowledge and healthcare provider recommendation for PPSV23 appear to be interrelated. For example, a patient may be aware of PPSV23, but lack knowledge pertaining to indications, safety, and efficacy largely due to a lack of explanation by the healthcare provider and/or a recommendation. In fact, studies have

shown that healthcare providers sometimes lack vaccine related knowledge themselves, or report being “too busy” to address vaccine status. Registered nurses have also voiced concerns and reluctance to administer PPSV23 without a physician’s order despite existing protocols (Middleton, et al., 2005).

Studies on a variety of vaccines including: HPV, varicella, influenza and pneumococcal, support the notion that patients are more inclined to accept a vaccination when a healthcare provider, (whether a physician, nurse, nurse practitioner or pharmacist), recommends the vaccine (de Courval, de Serres, & Duval, 2003; Telford, & Rogers, 2003, Winston, Wortley, & Lees 2003;Young, 2004). Authors found that provider recommendation for the varicella vaccine contributed significantly as a predictor of uptake (n = 477).

Winston, Wortley, & Lees (2006), examined barriers to influenza and pneumococcal vaccine uptake among Medicare recipients in five US communities with a particular focus on racial disparities. They found that pneumococcal vaccination coverage was 70.3% for Whites, 40.8% for Blacks, and 53.2% for Hispanics. Importantly, the proportion of participants who reported provider recommendation for vaccination differed significantly according to race/ethnicity (RR = 2.32, 95% CI [2.10, 2.57]). Although significantly related to vaccine uptake, only half of respondents reported provider recommendation for influenza vaccination. According to Young (2004) “Health care providers play a pivotal role in influencing a patient’s decision on whether to receive pneumococcal vaccination” (p. 23). Thus, it is unclear why providers often fail to recommend vaccines when they come in contact with patients, especially when they have the ability to influence patients’ decisions. Sapsis, and Janssen, (2002), conducted

qualitative interviews asking elderly African Americans and their physicians why influenza vaccination rates lagged behind Caucasian counterparts, and found that not only were patients unaware; but often healthcare specialists were unfamiliar with vaccine eligibility and guidelines essential for further patient education and decision making. Moreover, physicians did not feel they had time to provide lengthy explanations as to why patients should be vaccinated.

Designed to examine the effects of an education cue on vaccine acceptance, Ashby-Hughes, & Nickerson, 1999, sent two separate brochures, (one for influenza vaccine and another for pneumonia) to ½ of their 463 participants (race not reported). They then followed up with an anonymous questionnaire intended to determine if the pamphlet had prompted participants to be vaccinated. The education intervention was non-significant. Instead, healthcare provider recommendation was the strongest predictor for vaccine acceptance.

Trust in Primary Care Provider

"Trust is the belief that health care providers or medical institutions will act competently and with the best interests of patients in mind, and is influenced by providers' interpersonal skills, as well as their medical knowledge" (Mechanic, 1998, p. 342). Several authors have written about the constructs of provider trust, and trust in medical institutions; and how each affects patient satisfaction, health seeking behaviors, and medical outcomes (Doescher, Saver, Franks, & Fiscella, 2000; Hall, Zheng, Dugan, Camacho, Kidd, & Mischara, 2002; Sohler, Fitzpatrick, Lindsay, Anastos, & Cunningham, 2007; Harris, Chin, Fiscella, & Humiston, 2006). Trust, is an essential tenet of any patient/clinician relationship, yet there are a number of articles (Anderson,

& Dedrick, 1990; & Hall, et al., 2002), citing mistrust as a central issue to compliance with general preventative care. A lack of trust in the healthcare system as a whole and in primary care providers are two variables which may be considered together or separately.

Historical atrocities such as slavery, generations of systematic discrimination, and the Tuskegee incident have left an indelible mark on many African Americans. Although much progress has been made in recent decades, racism and stereotypes persist and undermine efforts to eliminate health disparities. African Americans continue to suffer significant health disparities, some of which have been attributed to discriminatory treatment within the healthcare system (Centers for Disease Control, 2005; Kunitz & Pesis-Katz, 2005; Smedley, Stith, & Nelson, 2002). Reports of verbally dominant physician-patient interactions and bias related to beliefs about African Americans lesser intelligence and propensity for non-compliance persist (Johnson, Roter, Powe, & Cooper, 2004).

Some of the intrinsic components of patient trust in healthcare provider include confidence in abilities, open communication, compassion, and confidentiality (Anderson & Dedrick, 1990; Mechanic, 1998; Mechanic & Schlesinger, 1996; Pearson & Raeke, 2000; Thom, Ribisl, Stewart, & Luke, 1999). Given the historical backdrop and lingering inequities in treatment, it is not surprising that African Americans consistently report higher rates of distrust. Bova, Fennie, Watrous, Dieckhaus, and Williams, (2006), maintain that high rates of mistrust provide partial explanation for persistent healthcare disparities among African Americans. In a community tracking study, Bova, et al., (2006), found that African Americans residing in cities, and those with lower education

levels and no health insurance were significantly more distrustful. Moreover, African American men were less likely to trust their healthcare provider than women and results varied by geographic region. In other words, the patients who may need us most trust us the least.

Sohler et al. (2007) examined the construct of trust in primary care providers with a group of marginally housed African American's with HIV, and found that at least 50% of the participants had some degree of distrust in their providers. The authors evaluated racial concordance to determine whether or not having a physician of the same ethnicity would decrease distrust, and although not significant, there was less distrust overall when racial concordance was present. When appraising the construct of trust in the healthcare system, researchers found that many of the study participants had deeply rooted concerns with respect to their rights to privacy and informed consent (Sohler, et al.). Participants concerns ranged from thinking that their personal information would be shared to beliefs that unauthorized procedures and experiments might be performed on them. These alarming trepidations provide insight to deep seeded mis-trust among some portion of the African American community (Corbie-Smith, Thomas, Williams, & Moody-Ayers, 1999; & Freimuth, et al., 2001).

When African Americans do have a trusting relationship with their healthcare provider, studies have shown increased adherence behaviors such as vaccine uptake, better follow-up, and continuity of care (Altice, Mostashari, & Friedland, 2001; Thom, et al.,1999). Measuring trust as an independent variable and possible predictor of outcomes is still in its infancy. Previously, when patient-provider relationships were examined, the focus was on communication and satisfaction. These concepts may be

related to trust, but they are not the same as the often more instinctual nature of trust itself (Hall, et al., 2002). The pneumococcal vaccine may be indicated given the patient's age or risk factors; it may be readily available; the cost covered by insurance, and the patient may be sitting in the exam room, but if the patient does not trust the provider and/or the healthcare system in general, it is quite possible they will refuse the vaccine.

Perceived Health and Susceptibility

Health

Little is known about the construct of perceived health as it relates to African Americans preventative or health seeking behaviors. A review of the literature revealed no findings using key terms: perceived health and immunization or vaccine status, even without factoring in the population of interest. Searching more broadly on perceived health and health seeking behaviors produced two studies (discussed below), only one of which includes the population of interest; thereby uncovering a potential knowledge gap to be further explored in this dissertation study. Perceived health or self-perceived health, is intuitively defined as "an individual's perception of his or her health", (Hunt, et al., 1980), and is increasingly being utilized by healthcare professionals as an adjunctive measure to traditional assessments (Glover, Bellinger, Bae, Rivers, & Singh, 2010).

The construct of perceived health status represents a myriad of individual factors such as personal experience, physical and functional disabilities, the presence or absence of diseases, and knowledge of diseases and consequences. In order to operationalize these concepts, they are placed into physical, emotional, and social

domains (Krokavcova, et al., 2009). The decision to accept or decline a vaccine such as PPSV23 is an individual's. In order to better understand the complex nature of the factors which influence this decision, it is necessary to ascertain information on the individuals perceived health status.

When comparing perceived health of African Americans with that of Caucasian counterparts, studies have shown African Americans consistently report lower perceived health scores (Cummings, & Jackson, 2008; Hunt, et al., 2011; Jin-Sun, Bramlett, Wright, & Poon, 1998). The reason for this finding may be due to complex intersections between dimensions of trust, and socio-economic status, among others. Lewis and Reigel, 2010, sampled 1,485 community dwelling adults aged > 60 with hypertension to identify determinants of perceived health. Consistent with other studies, perceived health entailed more than the obvious physical components intuitively associated with health. There were striking differences between African American and Caucasian reports of "excellent", or "good" health: (excellent health: 5% and 14.5% respectively), and (good health 42.6% and 52.6% respectively).

Glover, et al., (2010) set out to determine racial variations pertaining to utilization of specialty care (cardiology, nephrology, etc.) among those with chronic illnesses such as hypertension. 58% of the respondents (n = 6,722) self-identified as African American. Participants with poor perceived health status were significantly less likely to receive specialty care (OR = 0.528, 95 % CI [0.354, 0.788]). Not surprisingly, health insurance was also significantly associated with specialist care utilization, with uninsured participants 13% less likely to utilize specialty care (AOR= 0.138, 95 % CI [0.064, 0.294]) than privately insured counterparts. A measure of SES, health insurance or lack

thereof, may independently predict perceived health. Shields & Shooshtari, (2001) reported that in addition to physical factors, psycho-social characteristics and socio-economic status were significantly related to perceived health.

A broader search of the literature revealed a study in which perceived health was found to influence vaccine uptake in one population. Influenza vaccine uptake is highly encouraged for healthcare workers whose frequent contact with ill patients is an unavoidable job hazard. Hubble, Zontek, & Richards, (2011) sought to document vaccination rates of EMS professionals and identify predictors of vaccination uptake and refusals. Using a cross-sectional survey designed to capture beliefs about vaccine efficacy, and influenza illness, researchers found that overall vaccine uptake among the 601 participants surveyed was 47.9% (p= 0.01). Unvaccinated individuals perceived themselves as “healthy”, and thus, did not feel “at risk” for acquiring influenza. Also relevant to this dissertation work, authors noted significant differences in vaccine uptake when the employer recommended it (OR= 3.6, $p < 0.01$). Perceived health in this study inversely predicted vaccine uptake. In other words, when perceived health was high (the individual believed themselves’ healthy), vaccine uptake was low. While this study did not target the population of interest, the directional relationship between perceived health and health promoting behavior, provide support for the authors decision to examine how these variables interact in the pneumococcal study.

This dissertation sought, not only to examine a potential relationship between perceived health and PPSV23 uptake, but also to evaluate the nature of the relationship between the perceived health and the susceptibility dimensions of the Health Belief Model (HBM).

In a study examining predictors of influenza and pneumococcal vaccination, Ru-Chien, Reiber, & Neuzil, (2006) used logistic regression and identified factors such as older age; female sex, higher socioeconomic status, poor perceived health status, and the presence of chronic diseases as positive predictors for vaccination. When health status was perceived as “good” 60% of participants reportedly accepted the PPSV23 vaccine, whereas “poor” health status participants had 70.3% vaccine uptake. Of the 39,377 study participants, vaccine acceptance by ethnicity was 65.5% among Caucasians and 41.9% among African Americans. Smokers who participated in the study had a 55.7% vaccine uptake rate; therefore, African American ethnicity and current smoking practices were independent negative predictors for receipt of the pneumococcal vaccine (Ru-Chien, et al., 2006). Importantly, those with current smoking practices were not further broken down into race or ethnicity. Based on this review of the literature, it would seem that smokers do not consider themselves less healthy or more susceptible to vaccine preventable illnesses, however; much more information is needed to thoroughly evaluate this notion (Looijmann, Verheij, van Delden, van Essen, & Hak, 2007). In this dissertation, the author included smoking status in the questionnaire to evaluate what, if any significance there was with smoking and PPSV23 uptake specifically among African Americans.

Perceived susceptibility

Perceived susceptibility is defined as “the degree to which individuals perceive and personalize the risk of acquiring disease or suffering the ill effects from existing disease” (Weissfield Kirscht, & Brock, p. 1990). Perceived risk or perceived susceptibility reflects an individual's belief about the likelihood of a given health threat such as pneumococcal

illness. Works analyzing the construct of perceived susceptibility have sought to determine why certain people access preventative care, while others do not. Similar to what has been described for other variables, studies found in the literature examining perceived susceptibility of contracting vaccine preventable illnesses in the adult population focused largely on influenza. Although influenza is not the focus of this study, some of the findings can be helpful to understand beliefs and perceptions of vaccines in general.

Gallant, (2007) described the personal decision individuals face when it comes to accepting or declining the influenza vaccine and aptly mentioned the fact that this decision may well be influenced by perceived vulnerabilities. In some cases, patients described their risks as low because they led healthy life styles, had minimal exposure, and rarely became ill (Gallant). Methodological problems exist with measuring the construct of perceived susceptibility, particularly when a person may not be familiar with a given disease or illness such as pneumococcal pneumonia. The Health Belief Model serves as a theoretical underpinning guiding the researcher with the task of operationalizing susceptibility.

A meta-analysis conducted to exam the relationship between risk perception and health behaviors, found that although the terms “susceptibility” and “likelihood” or “perceived risk” are often used interchangeably in the literature; they are not the same (Brewer, et al, 2007). Questions for operationalizing these constructs were proposed: Perceived risk or Likelihood – “If I don’t get immunized, there is a high chance of me getting pneumonia” (Madhavan, Rosenbluth, Amonkar, Fernandes, & Borker, 2000). Perceived susceptibility would be examined with a question pertaining to an individuals’

susceptibility to a given health hazard and operationalized with a Likert measure of an item such as this: “I get sick more easily than other people my age”, (Nexoe, Kragstrup,& Sogaard, 1999). Finally, the construct of perceived severity would be defined as the degree of harm a hazard would cause. In other words, a statement such as: pneumonia could lead to death” would measure the dimension of severity (Nichol, Lofgren, & Gapinski, 1992; Zimmerman et al., 2003).

To explain health behaviors and examine predictors of influenza vaccination uptake, Chen, Fox, Cantrell, Stockdale, and Kagawa-Singer, (2007), used key constructs of the HBM including perceived susceptibility, and perceived severity among ethnically diverse parishioners in a faith-based congregation. Subjects were stratified by age, race, education, and gender to assess for modifying variables perceived susceptibility to influenza was tested using a three level likert response question: ‘‘How concerned are you about getting the flu?’’ Perceived severity of getting influenza was measured similarly: ‘‘How would getting the flu affect your life?’’ One open-ended question for non-vaccinators was included: ‘‘what is the main reason you did not get a flu shot in the past year?’’ 12 responses were identified, one of which was “I do not need it”. Caucasian and African American subjects concerned about getting the flu were significantly more likely to be vaccinated (96% and 91%, respectively), compared with those who were not concerned (45% and 33%). Forty-five percent of African Americans reported being not at all concerned about getting influenza compared with 35% of Caucasians ($p < 0.01$) (Chen, et al.). Other responses relevant to this dissertation work, not in the category of perceived health were: 1) influenza vaccine causes influenza, 2)

access and cost issues, 3) lack of knowledge of vaccine and 4) healthcare professionals did not recommend.

Acceptance or declination of a vaccine such as PPSV23 is a personal decision. In order to better understand the complex nature of the factors which influence this decision, it is necessary to ascertain information on the individuals perceived health status. The constructs of perceived health and susceptibility represent a myriad of individual factors such as personal experience, physical and functional disabilities, the presence or absence of diseases, social support, and knowledge of diseases and consequences (Shields, & Shooshtari, 2001; Lewis, & Riegel, 2010).

The construct of perceived susceptibility (a component of the HBM) was, therefore, measured in two ways: first with two single-item questions asking participants if they got sick easily or considered themselves more vulnerable to illness, and second with the proxy variable of perceived health. The reasons for this were twofold. First, the author believed perceived susceptibility was inextricably tied to perceived health. In other words, if one perceives themselves as healthy, they are less likely to feel susceptible to contracting a given illness. Second, it was based on the premise that an adult would have to believe they were susceptible to pneumococcal illnesses, such as pneumonia, for the preventative health behavior (immunization) to take place (Becker, et al., 1977; Rosenstock, 1974).

Prior Negative Experience with Vaccines

Review of the literature revealed a portion of vaccine refusals, stemming from some prior negative experience with immunization either personally or through an acquaintance (Rosenthal, 2007). Many elderly participants refused the influenza

vaccine because they felt that they had become ill soon after they received it in years prior (Telford, 2003). In the same study another group of individuals refused the vaccine because people they knew reported similar experiences and they felt it best not to take any chances.

Prior negative experience with immunizations, even if indirect, could impact decisions and lead to refusals. A study pertaining to the challenges with the Human Papilloma Virus (HPV) gave further credence to this notion (Rosenthal, 2007). Five focus groups with women of varied age, ethnicity, and background revealed a few participants who knew of others who had significant side effects from a vaccine, and even one who reported that she knew a person who developed Down's syndrome after receiving a vaccine. Another participant vividly recalled a story her grandmother told about how her two brothers had died of diphtheria back when no vaccine was available. She was clearly a proponent of vaccines and passed those feelings along to her offspring (Rosenthal). As health professionals, it might be easy to discount these prior experiences and accounts; however, the impact these stories have on others (regardless of their factual basis) cannot be denied.

Harris et al., (2006) used semi-structured qualitative survey questions and asked 20 African Americans ≥ 65 reasons why they had not received pneumococcal and influenza vaccinations. The majority unvaccinated participants felt that had become ill or gotten the flue after an influenza vaccine. Subjects stated that many African Americans don't get their vaccines because they are worried they will get sick instead of actually preventing an illness. Moreover, negative vaccine experiences extended beyond

concerns that vaccines could cause illness. A 70 year old male participant recounted his traumatic experience with vaccines as a child:

> I remember when I was a boy in the South; we had to take shots for everything right until the fifth grade. And the nurse down there treated you like you were an animal. They did not care. They were not sensitive. They would just jab you in your arm like you were an animal. That's how they treated us, you see. So I don't want any shots. I still have those memories. (p. 1680).

Summary

Literature clearly supports pneumococcal vaccine uptake for adults age 65 and over as well as those between the ages of 18 and 64 with existing pre-existing health conditions such as diabetes, heart disease, lung disease, liver disease, organ transplant, cochlear implants, asplenia, smoking, and compromised immunity. The literature also highlights a gap in vaccine uptake despite a decade worth of efforts to improve and meet Healthy People 2010 goals (CDC, 2010; Harris, et al., 2006). Although studies have been conducted to examine vaccine uptake, there have been very few studies specific to pneumococcal vaccine uptake among African Americans as a subset of the population. It was therefore not surprising that the author did not find a central theme lending itself to a parsimonious approach to the problem of insufficient PPSV23 uptake among vaccine eligible minorities. Factors such as knowledge deficits, trust in healthcare provider, perceived susceptibility of contracting pneumococcal illness, perceived health, and prior experience with vaccines, are potential barriers to vaccine uptake overall. The decision to look carefully at PPSV23 vaccine uptake specifically is largely due to the fact that pneumococcal illnesses among African Americans occur at nearly twice the rate as their White counterparts (24 per 100,000 and 12.2 per 100,000 respectively) (CDC, 2008).

The novelty of this study lies in the integration of the five aforementioned variables believed to influence PPSV23 vaccine uptake. While some of the studies relevant to this dissertation work examined one or more of the potential predictor variables, none have examined all of them. Much of the data collected in pneumococcal vaccine uptake studies has focused on awareness, and while many have found significance with this variable, none have made a distinction between awareness and knowledge. Trust in healthcare provider and PPSV23 vaccine uptake had not been previously explored. Perceived health established with one question from the BRFSS was asked in two studies found in the literature; however, perceived health has been defined by experts as a complex construct and, therefore, may not lend itself well to a single-item question. No studies using SF-12v2™ as a measure of perceived health to examine the potential relationship between perceived health and vaccine uptake were found. Components of the Health Belief Model have been utilized to examine vaccine uptake in a number of studies. In the pneumococcal study, the author has placed insurance status in the model as a potential barrier to vaccine uptake based on prior studies where SES was deemed significant. Those with Florida Medicaid benefits were of particular interest with this variable since vaccine cost is not covered for them. Disparities in PPSV23 uptake are well documented and must be addressed. A parsimonious approach to the problem may not be feasible given the complexities of the decision making process. Through exploration of the aforementioned variables, the author sought to contribute to what is already known, and build new knowledge with an eye toward targeted interventions and a reduction in health disparities.

CHAPTER 3
METHODS

Theoretical Perspective

Theory Overview

In order to investigate the relationships between the dependent variable (pneumococcal vaccine uptake or willingness to accept), and the independent variables: knowledge, trust in healthcare provider, perceived susceptibility, perceived health status, and prior experience with vaccines; two theoretical models; the Health Belief Model (HBM) and the Precaution Adoption Process Model were evaluated and subsequently substructed to serve as the underpinnings for this study.

Health Belief Model

First, the HBM developed by Hochbaum, Leventhal, Kegeles, and Rosenstock in 1950, will be used to evaluate and explain individual differences in preventative health behavior. Perceived susceptibility, perceived seriousness, perceived benefits, perceived barriers, and cues to action comprise the key components of the HBM. The belief that a specific health action such as pneumococcal vaccine uptake might prevent illness can be interpreted and explained through the lens of the HBM. The HBM proposes that action for prevention such as pneumococcal vaccine uptake will occur if the individual perceives themselves as susceptible to the potentially serious illness. When the perception of susceptibility exists, the individual must also weigh potential consequences, determining whether a particular action is beneficial in decreasing susceptibility or severity of the condition, and if the benefits for the action outweigh the barriers (Hochbaum et al., 1958).

Precaution Adoption Process Model

The second theoretical framework to be utilized in this dissertation is the Precaution Adoption Process Model (PAPM). Adoption of a new precaution (healthy behavior) serves as the construct for PAPM which was developed by Weinstein in 1989. The five stages of this model are as follows: "unaware of the issue," "aware of the issue but not personally engaged," "engaged and deciding what to do," "planning to act but not yet having acted," and "acting" (Weinstein). For the purpose of this study, the most important distinction between the HBM and Precaution models lie in the precontemplation component; specifically, the inclusion of “unaware” of the healthy behavior and its implications. Although the underlying assumptions of the PAPM are not explicitly stated, review of the seminal works (Weinstein, & Sandman, 1989, suggest that the parallels between the PAPM and the Transtheoretical model are many, thus for the purpose of this dissertation the underlying assumptions are considered to be as follows: behavioral change is a process that unfolds over time through a sequence of stages; stages are both stable and open to change; there are a common set of change processes that people apply across a broad range of behaviors; and without planned interventions, individuals or communities may remain stuck in the early stages (Edberg, 2006). Review of the literature for pneumococcal vaccine uptake utilizing the PAPM and HBM frameworks will now be presented.

Precaution Adoption Process Model and Pneumococcal Vaccine Uptake

While there were no findings in the literature linking PPSV23 vaccination to the PAPM, there were findings for other preventative behaviors. Weinstein and Sandman (1989), first presented PAPM as a theoretical model for examining the likelihood that

individuals would test for Radon in their homes. The initial stages of the theory, “Unaware of, or unengaged by the issue,” played a crucial role in the same research findings. Since the Radon studies, there have been a number of studies where PAPM has been tested including a study on Hepatitis B vaccination (de Vet, 2008). In summary, PAPM is an attractive possibility as a theoretical framework for the pneumococcal research for two reasons: 1) the “unaware” variable, and 2) the unidirectional nature of the model.

Further support for the PAPM theory is illustrated when examining a qualitative study conducted by the Office of Health Communications and the Centers for Disease Control and Prevention whereby a comprehensive summary of what African Americans in five US cities think about the pneumococcal vaccine was explored (Winston, Pascale Wortley, & Lees, 2006). In this study, participants perceived pneumonia to be dangerous and in some cases life threatening; however, most respondents were unaware of the existence of the pneumococcal polysaccharide vaccine. Comments such as, “Why didn’t my doctor tell me about it?” were recorded during the focus groups. While many of the participants knew little or nothing about the vaccine, there were some who were aware of the basic indications for the vaccine and many knew that it was not administered annually like the flu shot. A few of the respondents believed that the vaccine could protect against the flu as well. None of the respondents felt that the vaccine itself would cause illness. This was a favorable response to researchers who felt that with proper introduction, the PPSV23 vaccine might be well received within the target population. Reasons for non-vaccination mirrored the excuses for flu shot refusal

in that most participants said they were healthy and would not get pneumonia (CDC, 2003).

Health Belief Model (HBM) and Pneumococcal Vaccine Uptake

While few studies examining pneumococcal vaccine uptake with the HBM as a theoretical underpinning were found in the literature, there were two poignant studies on influenza vaccine uptake with relevance to this research. In an effort to better understand barriers to influenza vaccination, Nexoe et al. (1999) constructed and validated a questionnaire using the HBM as a theoretical underpinning. The 46-item instrument was sent to 2,147 participants ≥ 65 and revealed that the HBM positively predicted influenza vaccine acceptance with perceived benefits, perceived barriers, and perceived severity constructs all being significant in the model.

The HBM was also utilized in a study examining five ethnic groups and their vaccine determinants. A telephone survey of parishioners' aged 50-75 was conducted in Los Angeles and Honolulu specifically addressing the constructs of susceptibility, perceived severity, and self-reported barriers to vaccination. Findings revealed that Whites and African Americans who were concerned about getting the flu (perceived susceptibility) were significantly more likely to be vaccinated (96% and 91%, respectively),compared with those who were not concerned (45% and 33%) (Chen, et al., 2006). Authors in this particular study chose to explore only the constructs of perceived susceptibility, perceived severity, and barriers to vaccination, omitting the constructs of perceived benefits, cues to action, and self-efficacy. They rationalized the decision to amend the model based on empirical evidence and the uni-directional nature of vaccine uptake.

HBM - Susceptibility, Severity, and Health

The first construct of the HBM is perceived susceptibility which is defined as a subjective perception of the risk of an illness (Glanz, & Schwartz, 2008). One's belief regarding their individual risk of being diagnosed with a specific disease process or illness in the immediate or long term future may be based on personal characteristics or behaviors.

Perceived severity is the second construct of the HBM. Perceived severity is one's belief about the seriousness of a medical condition and the ramifications of a given diagnosis. Consequences could be minimal such as a brief disruption of daily activities or quite severe including loss of work, long term disability, chronic pain, or death. The concept of a perceived threat merges the construct of susceptibility with that of severity in the HBM. Perceived severity, formerly known as perceived seriousness, is defined as perceived morbidity and mortality (Glanz, 2008). For this dissertation study, perceived health will be addressed using the SF-12v2™ to be discussed in detail under the methods section.

Operationalizing the Theoretical Models

Methodological problems exist with measuring the construct of perceived susceptibility, particularly when a person may not be familiar with a given disease or illness such as pneumococcal pneumonia. The literature on health seeking behaviors such as vaccination and the constructs of perceived risk, susceptibility, and severity were therefore examined closely. Questions for operationalizing these construct were proposed by Nexoe, Kragstrup, and Sogaard (1999). Within this study, a series of questions were used to determine perceived risk, susceptibility, and severity. Questions

such as: “If I don’t get immunized, there is a high chance of me getting pneumonia” were used to evaluate risk. Thought to be a different construct, perceived susceptibility was examined with a question pertaining to an individuals’ susceptibility to a given health hazard and operationalized with a Likert measure of an item such as: “I get sick more easily than other people my age”. Finally, the construct of perceived severity which was defined as the degree of harm a hazard would cause was evaluated with a question such as: “Pneumonia could lead to death” (Nichol, et al., 1992; & Zimmerman et al., 2003). These studies provided an excellent blueprint for evaluation of perceived susceptibility and severity in the pneumococcal study.

An individuals’ decision to accept or decline a vaccine such as PPSV23 involves a complex multifactorial process, therefore, it is important to ascertain information on the individuals’ perceived health status. The construct of perceived health represents a myriad of individual factors such as personal experience, physical and functional disabilities, the presence or absence of diseases, social support, and knowledge of diseases and consequences (Shields, et al., 2002; Lewis, & Riegel, 2009). Examination of relevant works on perceived health along with instruments such as the SF-12v2™ which are designed to measure self-reported perceived health provided a framework to guide the pneumococcal study.

PAPM - Vaccine Awareness and Knowledge

The construct of awareness is not addressed in the HBM which is why the PAPM has been included in the theoretical framework. Using the PAPM model, the author ascertained participants’ awareness of the PPSV23 vaccine’s existence. Knowledge of the pneumococcal vaccine was addressed using a single item on the questionnaire

whereby participants were asked, “Have you ever heard of the pneumococcal vaccine?” Scoring for this item is discussed in the measures section.

HBM - Perceived Benefits

According to the HBM, perceived benefits refer to one’s belief in the various disease reducing actions’ effectiveness. Perceived benefits are one’s belief in the efficacy of the advised action to reduce health risk. Also termed as perceived benefits of taking health action, the attitudes of health behavior changes are reliant on one’s view of the health benefits for performing a health action (Glanz, & Schwartz, 2008.

In this study perceived benefits were addressed indirectly by examining the constructs of perceived health, susceptibility, and severity. These constructs were measured using the SF-12v2™, and single item questions all of which are discussed in detail in the methods section of this dissertation.

HBM - Perceived Barriers

Perceived barriers refer to the potential negative aspects of, or obstructions to, taking a recommended health action (Glanz, & Schwartz, 2008). This can also be conceptualized as individual beliefs about the physical and psychological costs of taking health action. An internal cost-benefit analysis occurs, weighing the health action’s expected effectiveness against perceptions that it may become an obstacle. Potential barriers may include financial expense, fear/perceived danger, pain, difficulty, inconvenience, and time-consumption. Perceived barriers to PPSV23 uptake could be emotional (a fear of shots), social (trust or lack thereof), or physical (concern over a past experience with a vaccine) (Glanz, & Schwartz). In this study, perceived barriers were identified by asking participants a single item question such as whether they feared

needles or had a prior negative experience with vaccines, and having them complete the Wake Forest Trust Scale which were discussed in detail in the research design section.

HBM - Cues to Action

Cues to action are the strategies or internal incentives that initiate one's readiness to take a health action such as vaccination. Considered difficult to study, Glanz, & Schwartz, (2008) suggest that a cue to action could range from media announcements to a person coughing or sneezing. Cues to action were operationalized in this dissertation as a recommendation by a healthcare provider to receive the pneumococcal vaccine. This cue to action may or may not be present; therefore, the researcher asked one question on the VUQ to ascertain the existence of this cue: "Has your healthcare provider ever suggested you get the pneumococcal vaccine?"

In summary, each of the independent variables in the pneumococcal study were informed by the theoretical model, categorized according to the constructs awareness, perceptions and modifying factors, and assessments, and then operationalized in the VUQ through a series of questions designed to predict PPSV23 uptake. Figure 3-1 provides a visual representation of the substructed theoretical framework used for this study.

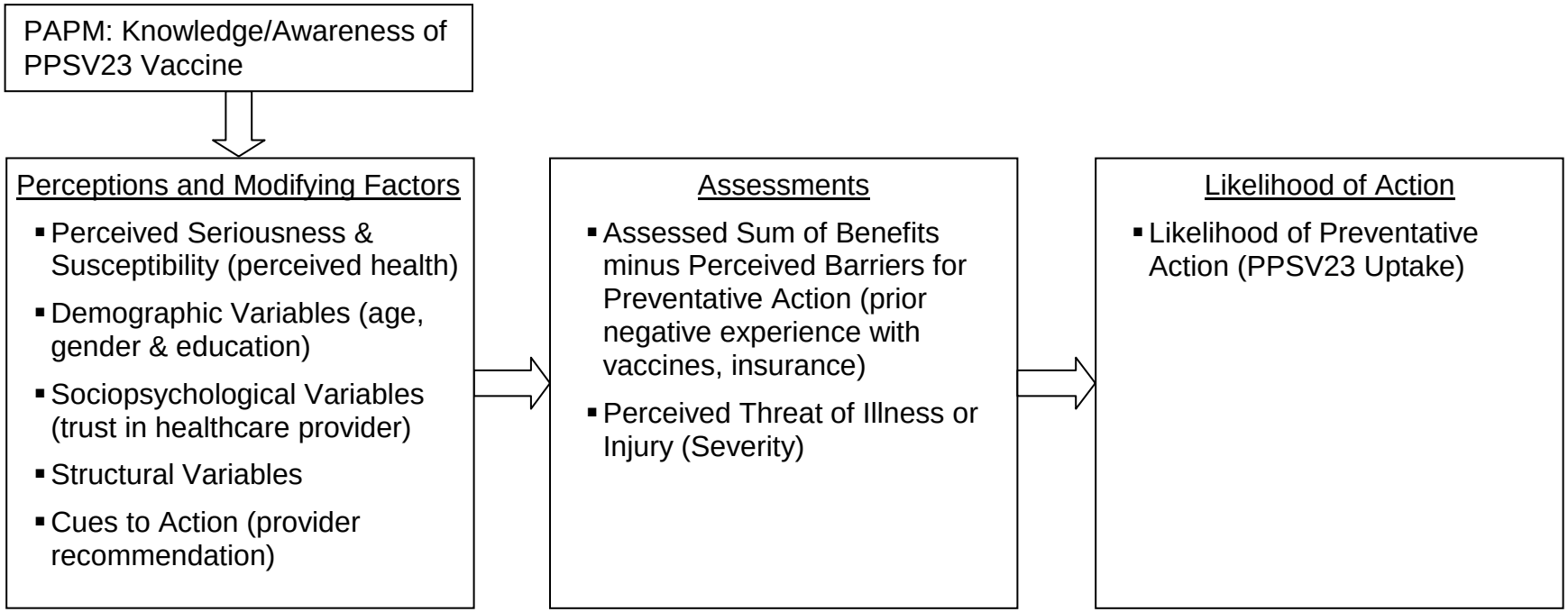


Figure 3-1. Health belief and precaution adaptation substructed model

Research Design

This study used a quantitative cross-sectional exploratory design. Based on the literature review concerning pneumococcal vaccine uptake among individuals who self-identify as African American, the proposed study sought to fill in the knowledge gap by performing an exploratory study to examine pneumococcal vaccine uptake among AA adults in Northeast Florida. Independent variables of interest were: vaccine awareness, vaccine knowledge, trust in healthcare provider, perceived health, perceived susceptibility of pneumococcal illness, perceived severity, prior experience with vaccines, and the impact of healthcare provider recommendation. Demographic information was also be obtained to further detail the characteristics of this population and examine possible relationships between PPSV23 uptake and age, gender, type of insurance, and education. Insurance and education served as proxy variables for socio-economic status in this study. In order to ensure that the instrument and research procedures were culturally sensitive, a pilot study using focus group methodology was conducted prior to the full study. The pilot study is discussed in Chapter 4 of this dissertation.

Sample and Setting

The population being investigated in this study includes African Americans ≥ 65 and those 18-64 with pre-existing conditions making them eligible for PPSV23 vaccination residing in Northeast Florida. To determine an adequate sample size, two predictor variables were considered: awareness of vaccine, and cueing. From the literature it is estimated that 60% in this population are aware of the vaccine and 50% are cued by their health care provider to receive the PPSV23 vaccine (CDC, 2011;

Winston et al., 2006). It was therefore determined that a sample size of 300 would provide adequate power (i.e., power greater than .80). The power analysis was conducted using the POWER procedure in Statistical Analysis System (SAS) for logistic regression (version 9.2, Cary, N.C.). The level of significance was set at 0.05. Assuming an unvaccinated rate of .60 and a dichotomous predictor with prevalence between .30 and .70 (for example, between 30% and 70% of the sample report that they are aware of the vaccine), the detectable odds ratio for variable significance is at least 2.1 for a sample size of 300 with power at least .80 (Faul, Erdfelder, Buchner, & Lang, 2009).

This study used convenience and snowball sampling and participants were recruited at two predominantly African American churches in Jacksonville/Northeast Florida. Participants were recruited utilizing a pre-screening tool (Appendix B). Recognizing the fact that recruiting African Americans in the community might be challenging, an AA community informant actively involved in the churches was hired as a research assistant (RA) to facilitate participants' recruitment and participation.

Inclusion and Exclusion Criteria

Participants' inclusion criteria were: a) adults ages 18 and up who self-identified as AA and whose age or pre-existing conditions rendered them PPSV23 eligible; b) those who spoke fluent English; c) individuals who were capable of completing a questionnaire either independently or with the assistance of the principal investigator (PI) or RA. Eligibility was determined using a pre-screening tool which is discussed in detail in the next section. Exclusion criteria included: a) age less than 18; b) pregnant or breastfeeding women. Using the suggested vaccination guidelines published annually by the Centers for Disease Control, children under the age of 18 would be eligible for

the PCV7 vaccine, rather than the PPSV23, and were therefore excluded from this study. The decision to vaccinate women who are pregnant or breastfeeding is a highly personal choice fraught with controversy. Tillet (2004), published a paper compiling the CDC's basic guidelines for immunization during pregnancy and breastfeeding along with recommendations that the practitioner have a discussion with the patient assessing risks and benefits carefully before making a decision. PPSV23 is considered safe for administration during the second and third trimesters of pregnancy as well as during breastfeeding, and is thought to confer some immunity to the newborn. That said, pregnant mothers without pre-existing medical conditions such as diabetes, heart disease, cancer, COPD, immunological suppression, sickle cell disease, or current smoking habits, would not be eligible for PPSV23. Expectant mothers with one or more of the pre-existing conditions are not only eligible, but highly encouraged to be vaccinated with PPSV23 (Tillet). While this dissertation examined knowledge, trust, perceived susceptibility, perceived health, and prior experience with vaccines; it did not address the variable "perceived susceptibility for harm to fetus/newborn," which would implicitly be present with an expectant or breastfeeding mother. Given the relatively low number of pregnant women who would typically be eligible for PPSV23, the controversial nature of vaccine uptake while pregnant, and the additional variable of perceived susceptibility to fetus/newborn, pregnant and breastfeeding mothers were excluded from this study.

Eligibility Screening

The population of interest for this study was African Americans whose age or pre-existing conditions render them eligible to receive the PPSV23 vaccine; thus, a pre-

screening tool was designed to determine eligibility. Studies in the literature where participants were not pre-screened for vaccine eligibility, found that roughly 44% were not eligible for the vaccine (Allen, 2010). If this were true in the pneumococcal study, nearly 600 participants would be needed, necessitating a much larger budget and additional settings.

Following IRB approval, the one page screening tool was distributed among members of the congregation at each of the churches. This tool was not collected; it was merely a tool for potential participants to determine if they were eligible. The tool asked the participants for their age, gender, ethnicity, and whether or not they had any of the following conditions: heart disease, lung disease, kidney disease, liver disease, cancer, immunological suppression, asplenia, cochlear implants, sickle cell disease, or diabetes. Additionally participants were asked if they smoked. At the end of this brief questionnaire, a statement was included telling the participant that if they have answered “yes” to any of the conditions above, OR they were ≥ 65 years of age, they were eligible to participate in a questionnaire based research study that would take approximately 15 minutes of their time. If willing to participate, information on when and how they could obtain the questionnaire was be provided on the lower half of the pre-screening tool. In addition to the pre-screening instrument, the study was advertised on bulletin boards at the churches and via word of mouth. The total estimated population of the first church was 350 and the estimated population of the second church was 870. These estimates were provided by support staff for each of the churches and may not be reflective of the actual number of attendees on a given Sunday. Of the 1,220 possible subjects, 329 self-identified as eligible based on the screening criteria and

ultimately participated. Again, screening tools were merely posted, not collected; therefore no one actually refused to participate. Rather, those who fell into the eligibility criteria listed and felt inclined to participate approached the PI or RA following services to obtain and complete a questionnaire.

Measures

The primary instrument for this study, known as the Vaccine Uptake Questionnaire (VUQ) was a self-administered paper and pencil questionnaire written in English at a 5th grade education level for ease of understanding (Appendix C). The PI and RA were available on Sundays following church services for the duration of the study to assist participants who experienced any difficulty completing the questionnaire. The questionnaire took approximately 15-20 minutes to complete, and participants were asked to place it in a sealed envelope prior to turning it in.

The VUQ included demographic data such as age, ethnicity, education, insurance, chronic disease diagnoses, smoking history, alcohol intake, and vaccination history. Additionally, the VUQ asked questions related to the research variables of interest utilizing a compilation of three validated instruments whose authors granted expressed written permission for utilization in this study: 1) Behavioral Risk Factor Surveillance System (BRFSS) 2) The Wake Forest Trust Scale and 3) SF-12 version two. Single item questions addressing knowledge, perceived susceptibility, perceived severity, and healthcare recommendation were also be included in the VUQ. Each of the instruments as well as the construction of single item questions will now be discussed in detail.

The dependent variable PPSV23 uptake is dichotomous categorical variable and was reported as 0= unvaccinated, 1= vaccinated, and 2= unsure. Trust in healthcare

provider is an independent scale level variable with scores ranging from 1 to 5. Perceived health,susceptibility, and severity were independent scale level variables with Likert based scoring. Prior negative experience with vaccines was an independent dichotomous categorical variable where 0= no past negative experience and 1= past negative experience. Univariate descriptions of the scale variables: trust, perceived health, susceptibility and severity were analyzed to obtain a mean, SD, range, minimum and maximum. Awareness, prior negative experience, and PPSV23 vaccine uptake were categorical variables; consequently, frequency and variance data were obtained and reported.

Pneumococcal Vaccine Uptake

The outcome variable for this dissertation study was determined by self-reported compliance with pneumococcal vaccination. Intended to be a dichotomous response, the question: “have you ever received the pneumococcal vaccine (sometimes known as the pneumonia vaccine)” was asked of all participants. Answer choices were 0 = no, 1 = yes, and 2 = unsure. From a clinical standpoint, when a patient is unsure of his/her vaccine status, the recommendation is to administer PPSV23 (CDC, 2009). Given these empirical guidelines, subjects who answered “unsure” on the VUQ were therefore also treated as unvaccinated (0 = no) for analyses.

Refusals

Respondents who answered “no” to PPSV23 vaccine uptake, were given an opportunity to inform the researcher whether or not they had refused the vaccine in the past. Those who did refuse could then check boxes or write in an explanation for their decision on the questionnaire. Refusals have often been eliminated from prior studies

found in the literature. Arguably, “refusers” are more important than anyone else in the study to better inform healthcare professionals of their thought processes and rationale for the decision. For the purposes of this dissertation and data management, those who refused the vaccine were be treated as 0 = no. Prior to collapsing the category however, a priori plans to examine this group separately for unique characteristics and responses were carried out.

Unsure

According to Mieczkowski, and Wilson (2002), a large number of patients may not recall whether or not they have been vaccinated. ACIP recommends that if a person’s status is “unknown”, they should be re-vaccinated. Moreover, they may not remember whether or not their healthcare provider has recommended the vaccine. This is highly problematic for researchers attempting to accurately uncover the full extent of the pneumococcal vaccine uptake disparity. Methods for handling don’t know/unsure responses varied in the literature. In two separate studies conducted by the CDC respondents who reported unknown pneumococcal vaccination status were excluded from the analysis. The 2000 study reported 1,037 adults ≥ 65 with unknown PPSV23 status as having been excluded compared with only 212 who reported unknown influenza vaccine status (NIH, 2000).

Believed to be an important component of the study, a decision was made not to eliminate these subjects from data analyses. Instead, this sub-group was analyzed separately, for unique characteristics, then ultimately subjects were placed into the “no” category since the recommendation from ACIP and the CDC is that they be treated as unvaccinated. These patients were not eliminated. Instead, “intention to vaccinate” was

measured in a priori analyses prior to collapsing the variable by asking subjects, “If you answered unsure, would you be willing accept the vaccine if it were offered to you today?”

Behavioral Risk Factor Surveillance System

The Behavioral Risk Factor Surveillance System (BRFSS) is a state-based collection of health surveys established by the Centers for Disease Control in 1984 as a means of collecting relevant health data in the United States, the US Virgin Islands, and Guam (CDC, 2011). Each year, the BRFSS collects information on more than 350,000 adults making this instrument the largest telephone based survey in the world. Questions from the BRFSS were developed by a federal agency and are considered to be public domain; accordingly, they may be utilized without permission provided they have been properly referenced and the core component questions are administered without modification. Core module topics include such items as seatbelt use, hypertension, arthritis burden, health status, tobacco use, and immunizations. Optional module topics are variable by year and have included survey items such as smokeless tobacco, oral health, cardiovascular disease, and firearms (CDC BRFSS, 2011).For this dissertation, the BRFSS primarily informed the demographic questions; particularly the verbiage utilized to ask questions regarding health seeking behaviors, age, education status, insurance status, smoking, and immunization uptake.

Trust in Health Care Provider - Wake Forest Trust Scale

Patients’ trust in their healthcare provider was measured by using a 10-item instrument known as the Wake Forest Physician Trust Scale (WFPTS). First developed by Hall, et al. in 1992, the WFPTS measures trust through a multidimensional model

conceptualized through review of seminal works on trust with high internal consistency and reliability scores (α 0.93). The authors of the trust scale used the theoretical and empirical works of others (Luhmann, 1973; Goold, 1998; Mechanic, 1998) to conceptualize and test five domains: 1) fidelity, 2) competence, 3) honesty, 4) confidentiality, and 5) global trust. With the theoretical model and constructs in place, Hall, et al. (2002) developed questions, pilot tested them, revised based on factor analyses, then field tested 26 candidate items nationally via telephone survey (*n* = 959). Items demonstrating a high degree of reliability were retained and ultimately, the authors published long and short versions of the Trust instrument (Appendix E). Permission to utilize the WFPTS was obtained from the author (Appendix F).

In a national sample of 1,045 adults with primary care relationships including physicians and practitioners, mean scores of the WFPTS were 20.4 (77.0 on a scale of 100), SD= 3.1 (15.5), alpha= .87. The 10-item instrument is scored 5-1, for strongly agree, agree, neutral, disagree, strongly disagree. Items 2, 3, and 8 are reverse scored. A score of 50 (or 100 on a scale of 100) indicates complete trust in healthcare provider, whereas a score of 10 (20 on a scale of 100) indicates complete distrust. Sample questions from this instrument (not in same numbering order) are: 1) [Your doctor/healthcare provider] is extremely thorough and careful, and 2). You completely trust [your doctor's] decisions about which medical treatments are best for you. In the VUQ, questions 22-31 are drawn from the Wake Forest Trust Scale questions.

Perceived Health, Susceptibility, and Severity - SF-12v2™

When perceived health is higher (the patient believes he/she is very healthy), it was hypothesized that there would be an inverse relationship with vaccine uptake.

Several studies: (Glover, 2010; Hunt, 1980; Ru-Chien, et al., 2006) have emphasized the importance of obtaining subjective health status information from individuals to examine the relationship between perceived health and susceptibility and accessing preventative services. For this study, perceived health was examined using the SF-12v2™ (Appendix G). A well-known instrument for evaluating general health status utilizing a 12-item short form self-reported questionnaire, the SF-12v2™ has demonstrated high degree of validity and reliability. Permission to utilize the instrument and scoring software were obtained from Quality Metrics (Appendix H). The SF-12v2™ involves a complex theoretical scoring system to be conducted using software. Raw scores using a summative approach are also possible with 56 being the highest possible score for perceived health and 10 being the lowest. Resnick and Parker, 2001 proposed scoring the SF-12 by reverse weighting four items and using cumulative scores from each category, and found a high degree of internal consistency on a Cronbach's alpha > .70. Given the precedence set by this and other researchers (Magerøy, Johnsen, & Moen, 2007) for utilizing raw scores in lieu of the more complex analyses requiring training and specialized software, the simplified method using cumulative scores was selected for analyses of the SF-12 data within the VUQ. Sample questions from this instrument (not in same order) included items such as: "In general you would say your health is…excellent, very good, good, fair, poor". Indirect measures of health status were examined with questions such as, "does your health now limit you in these activities…vacuum cleaner, climbing several flights of stairs". In the VUQ, questions 58-64 made up the SF-12v2™ component of the survey.

Single Item Questions

Typically used to measure global constructs such as attitudes, health status (DeSalvo, Fisher, Tran, Bloser, Merrill, & Peabody, 2006), readiness to change (Williams, Horton, Samet, & Saitz, 2007), and symptom severity; single item questions have often proven to be nearly as effective as multiple item questionnaires (Bergkvist, & Rossiter, 2007; Youngblut, & Casper, 1993).

Single item questions were created to measure awareness, knowledge and theoretical components of the HBM including perceived susceptibility, perceived severity, perceived barriers, and cues to action; specifically healthcare provider recommendation. Awareness was measured with the question: Before this study had you ever heard of the pneumococcal vaccine sometimes known as the pneumonia vaccine? Respondent options for this question were yes/no. Knowledge was measured using two separate questions the first of which was: Do you know who is supposed to get the pneumococcal (pneumonia) vaccine? Respondent options for this question were yes, no, and unsure. Those who answered unsure were ultimately collapsed into no for the purposes of data analyses. The second question designed to measure knowledge had five-item likert response options ranging from strongly agree to strongly disagree. This question was: I don't have enough information to decide whether or not to accept the pneumococcal (pneumonia) vaccine.

Constructs derived directly from the HBM were also measured with single-item questions. Perceived susceptibility was measured with two single-item questions: 1) I get sick more easily than others, and 2) I am at risk for getting pneumonia. Each of these questions had five point likert response options ranging from strongly agree to

strongly disagree. Perceived severity was measured using two additional questions: 1) I believe pneumonia is serious, and 2) I believe pneumonia can cause death. Again, five point likert responses ranging from strongly agree to strongly disagree were offered on the VUQ. Finally, perceived health (also measured with the SF-12v2™) was evaluated using a single-item question: “I consider myself to be healthy” with a five-level likert response option from strongly agree to strongly disagree. While the single-item questions for perceived susceptibility, severity, and health were constructed explicitly for the purposes of the pneumococcal study, there were many other studies using the HBM to examine health seeking behaviors with similarly constructed questions found to perform reliably.

Prior Negative Experience with Vaccines

Using the HBM as a theoretical underpinning, the construct, “prior negative experience with vaccines” was considered a barrier to vaccination. This construct was measured using two questions: 1) Have you ever gotten sick after getting any type of vaccine, and 2) Has anyone you know, other than yourself, ever gotten sick after getting any type of vaccine. Response choices for these questions were dichotomous yes/no, and although the study itself was quantitative, a free text option was provided for subjects to explain any symptoms, side effects, or complications they might have experienced.

Provider Recommendation for Vaccine

Another component of the HBM known as cue to action served as the framework for the construct “provider recommendation” for PPSV23 vaccine. This construct was measured by asking: “Has your healthcare provider recommended that you receive the

pneumococcal vaccine, sometimes known as PPSV23 or the pneumonia vaccine?" Response choices for this question were yes, no, and unsure. Ultimately, those who answered unsure, were treated as no for statistical analyses since intuitively it would seem that a subject would remember if their healthcare provider had recommended something to them.

Data Analysis Plan

Analyses were conducted using the Statistical Package for Social Sciences software (PASW Statistics version 20.0). Univariate descriptive statistics were analyzed and reported. Next, Chi-square, analyses were used to for bivariate measurement between PPSV23 uptake (DV) and each of the IVs. Once bivariate analyses and a priori comparisons (discussed below) were completed, a logistic regression model was built and run using a backward stepwise method to assess the overall predictive value of the model, assess model fit and to interpret the coefficients. This method was chosen as the primary statistical technique because it allowed exploration of the influence and predictive nature of all variables whether scale level or categorical, on the outcome variable. A -2LL. Nagelkerke pseudo R^2 cautiously predicted the percent of variance the model predicted, and the Hosmer and Lemeshow test showed whether the predicted probabilities matched the observed probabilities.

Normality of distribution is not required for logistic regression analysis; however a histogram was screened to determine if data were severely skewed. Additionally, bivariate descriptions of each IV to IV were run using correlations to prescreen for multicollinearity. The regression was assessed with a model in which variables were ordered and entered by their level of significance in the bivariate analyses.

Outliers were identified by using ZRE (standardized residual) scores. ZRE scores were examined and 99% of the cases had values < 2.5 and 95% of the cases should had values < 2. Outliers were evaluated to see if they were influential cases using dfbetas. Any influential cases (dfbeta >1) were examined. Two influential cases were found and determined to be miscoded. Examination of the original surveys revealed the entry errors, and corrections were made accordingly. No exceptional cases were identified. Assumptions were tested. Multicollinearity was prescreened using IV-IV bivariate analyses to obtain correlations and evaluate shared variance. . Independence of error terms were examined with a null plot and a Durbin-Watson statistic. Crosstabs were run for each dichotomous pair to check for empty cells. If empty cells were present, the data were re-categorized. Collinearity diagnostics were run and VIF values checked. VIF values >10 indicate multicollinearity. If the assumption of multicollinearity was violated, eigenvalues were reviewed. Only the variables awareness and knowledge were identified as offenders with Eigenvalues > .5. Ultimately, a decision was made to remove the knowledge variable from the model given the fact that a person cannot have knowledge of something if they are unaware of its existence. With the knowledge variable removed from the model the regression was rerun without further violations.

A Priori Analyses

Upon completion of data collection, there were a number of variables well suited for comparison in a priori analyses prior to running the logistic regression model. Among the variables of interest, gender and age categories were evaluated to determine if there were differences in refusal rates between the groups.

Hypothesis Testing

The hypotheses tested in this analysis were as follows:

Hypothesis 1. Sociodemographic variables such as age, gender, and insurance type, and education may predict pneumococcal vaccine uptake among eligible African American adults. Using the HBM, demographic questions taken primarily from the BRFSS were reported and analyzed for their ability to predict vaccine uptake. This was accomplished by conducting bivariate analyses between each predictor variable and the outcome variable using the chi-square statistic, and subsequently entering the statistically significant sociodemographic variables into the logistic regression model.

Hypothesis 2. Constructs operationalized from the HBM and PAPM such as awareness, knowledge, trust in healthcare provider, perceived health, perceived susceptibility, perceived severity, prior negative experience with vaccines and healthcare provider recommendation may predict and pneumococcal vaccine uptake among vaccine eligible African Americans. Using a substructed model of the PAPM and HBM as theoretical underpinnings, this hypothesis was tested via survey instrument. Responses were coded and analyzed using PASW. Bivariate analyses were conducted using Chi-square analyses. Scale level variables (perceived health, susceptibility, severity, and trust) were scored cumulatively then dichotomized with theoretically driven cut points before being entering each into the model. Ultimately, the variables of interest from each hypothesis found to be significant in bivariate analyses were entered using backward LR to determine the predictive nature of the variables as a whole.

Post Hoc Testing

After each of the hypotheses were tested, a number of bivariate analyses revealed statistically significant relationships which piqued further interest for post hoc evaluation. Among the variables of interest, the construct of trust was evaluated between age groups of study participants. Trust in healthcare provider was also compared with the construct of racial concordance between healthcare provider and participant. Perceived health scores from the SF-12v2™ were evaluated to determine whether or not age had an impact on subjects' perception of his/her health. Finally, perceived health scores from the SF-12v2™ were compared with the single-item question created to measure health in order to ascertain whether or not a single-item question could reliably capture perceived health as effectively as a more complex instrument.

Protection of Human Subjects

Approval for this study was obtained from the University of Florida Health Science Center Institutional Review Board (IRB 01) prior to any subject recruitment or data collection. Two different IRB approvals were sought and obtained: 1) the pilot study to validate the VUQ instrument, (Appendix I) and 2) the eligibility screening tool and primary data collection for the full study (Appendix J).

Participation in the focus group of the pilot study and full study were strictly voluntary and subjects could opt to withdraw from the study at any time without fear of repercussion. A waiver of informed consent was obtained from the IRB at the University of Florida in order to avoid collection of any protected health information or personal identifiers. Elements of informed consent were reviewed with all subjects (Appendices K and L) whose participation/survey completion served as tacit consent for the study. The

“elements of consent” form which contained contact information for the PI, her faculty advisor, and IRB staff, was given to each participant for their personal records. Strict confidentiality was maintained by use of a coding system whereby participants were assigned a number from 1-300 entered into PASW strictly for analyses. All data were de-identified, files were kept in a locked file cabinet in the researcher’s private office, and no one else had access to the data.

CHAPTER 4
PILOT STUDY

Exploring Pneumococcal Vaccine Uptake Rates among African Americans in Northeast Florida is a dissertation proposal intended to develop a better understanding of persistent vaccine uptake disparities between African Americans and their Caucasian counterparts despite access to care (Daniels, et al., 2006). Though health disparities are well documented in the literature (CDC, 2009; Smedley, et al., 2002), relatively little is known about how attitudes and beliefs among African Americans might influence preventative health decisions such as vaccine uptake.

A number of studies cited in the literature emphasized challenges with surveying African Americans, given the fact that this population has been historically difficult to reach. Explanations for accessibility issues when attempting to survey African Americans do not suggest a parsimonious answer. Rather, it would seem that historical exploitations have led to mistrust and hesitance to allow “outsiders” to be privy to private health matters. Lack of cultural competence among typically Caucasian researchers may also explain some of the challenges with African American research participation (Shavers-Hornaday, Lynch, Burmeister, & Torner, 1997). Cognizant of the challenges with surveying African American subjects, a pilot study using focus group methodology was designed to address the aforementioned barriers to participation, and facilitate collaboration and problem solving to ensure the development of a culturally appropriate data-gathering instrument. Hence, pilot study objectives were to: 1) establish face to face communication with key community stakeholders to begin building trust; 2) refine the data collection process and instrument to ensure cultural sensitivity, visual appeal, understanding, and to include any additional questions deemed important to key

stakeholders; and 3) give the Principal Investigator (PI) and research assistant (RA) an opportunity to operationalize the construct of cultural sensitivity. Chapter 4 details the methodology, procedures, and results of the pilot study conducted to address barriers to African American research participation. Integration of pilot study findings and current literature are also discussed.

Methods

Sample

Upon receipt of IRB approval, the RA in collaboration with the PI identified 12 individuals willing to participate in the pilot study. Pilot study participants were chosen based on their representativeness of the population of interest (*n* = 12), and for their roles within the congregation as key community gatekeepers. Typically, pilot study participants do not constitute a random sample. Nonetheless, they should be representative of the population of interest (Portney & Watkins, 2009).

A few weeks before the pilot study, an invitation letter explaining the purpose of the focus group and the role of the participants was given to each individual in person, along with the date, time, and location of the meeting (Appendix M). Six participants who self-identified as African American from each of the two churches were invited to participate in the focus group.

Procedures

The VUQ was developed from an extensive review of the literature and the integration of the aforementioned instruments and was thought to be culturally and developmentally appropriate, theoretically grounded, and a fairly self-explanatory self-administered instrument. That said it had not been tested among the intended audience

for cultural sensitivity, understandability, and visual appeal, thus necessitating a pilot study. This was accomplished in four steps. First, group members were apprised of the study and consented; second, they were all asked to complete the survey just as participants in the full study would do; and third, focus group members were then provided with a second copy of the VUQ on which to make comments and suggestions. Finally, focus group members were asked a series of questions (Appendix N) about the consent, the VUQ, recruiting, incentives, and cultural sensitivity.

Establish Trust

To operationalize pilot study objectives, an African American Research Assistant (RA) whose longstanding relationship with church leaders placed her in a unique role to serve as a key informant, was sought out, apprised of the study, and hired to assist with recruiting and data collection. Existing literature (Alvarez, 2011; Dein, 2006; & Shellman & Mokel, 2010) supports this strategy citing the notion of commonalities in heritage and experiences as a bridge to the population of interest, and an opportunity to enhance cultural sensitivity and foster a trusting relationship.

The focus group was held at the church on Sunday afternoon following services, so participants were familiar and comfortable with the setting. On the day of the focus group, lunch was provided for participants. The PI and RA greeted each participant, welcoming them and thanking them for their time. The PI and RA introduced themselves, provided a brief biography, then discussed the background, purpose, and significance of the study as previously mentioned to assuage concerns pertaining to study legitimacy, privacy, and procedures. In order to avoid leaving out important details, a basic guide was designed as a reference tool for the PI and RA (Appendix O).

The PI then reviewed the consent process with the group as a whole, encouraging participants to interject if they had questions or concerns about wording, privacy, or otherwise. Informed consent forms were not signed, nor were they collected. Instead, participants were informed that they should read the consents, and keep it for their records. Since the overarching goal of informed consents is to ensure that everyone clearly understands the study and what is being asked of them, best practices for consenting subjects were reviewed prior to conducting the focus group (Flory & Emanuel, 2004). Although methods for carrying out the informed consent process varied in the literature, good communication and taking the time to address questions were key components in the process. The informed consent process for the pneumococcal focus group was congruent with recommendations from the literature, followed the stated guidelines of the IRB, sought to elicit participants' concerns, and afforded the PI an opportunity to fine tune any issues pertaining to the process prior to the full study.

Refine Process and Instrument

Following the study introduction and informed consent, focus group participants were asked to complete the VUQ (Appendix C) on their own thus providing the PI with an average completion time. Because the focus group was small and participants were not randomly selected, protecting their health information was of paramount importance. For this reason, VUQ completion was used only to assess completion time and generate discussion. Participants were instructed not to place their names anywhere on the survey, and completed VUQs were not collected. Instead, participants were

instructed to take the questionnaire home with them either to keep, or dispose of as they saw fit.

In the third step of the focus group, participants were given a clean copy of the VUQ and asked to either work on their own or in pairs to carefully examine each question for understandability, readability, and cultural sensitivity. Participants were instructed not to place their names on the VUQ, and not to actually answer any of the questions since this copy would indeed be collected. Pens and highlighters were provided and focus group participants were encouraged to circle, highlight, or put notes beside any item they either didn't understand or thought was worded improperly.

When the group completed scrutinizing the VUQ, a series of questions was asked of focus group participants to ascertain their opinions on wording, ease of understanding, and cultural sensitivity. Any questions deemed difficult to understand, vague, or intrusive were discussed with participants, soliciting their recommendations for revising or possibly deleting the item. Time spent discussing the instrument was framed as an idea-generating session, where all thoughts and suggestions could be heard.

The PI also solicited opinions from the group on recruiting strategies, incentives, data collection venues, and cultural sensitivity. Additionally, the VUQ questions about income and responses of "unsure" with respect to PPSV23 uptake were specifically addressed. Participants in the full study would be provided with a modest incentive of a $10.00 gift card. During the pilot study, the PI asked the group what type of gift card would be best received by study participants.

Cultural Sensitivity

Participants were asked specifically about the use of an African American research assistant for the full study. The researcher hoped to learn more about whether or not racial concordance with the RA would enhance cultural sensitivity and participation; therefore, focus group participants were specifically questioned with regard to the use of an African American research assistant and how it would impact buy-in and willingness to participate.

Findings

The pilot study examining pneumococcal vaccine uptake served as a “first impression” for the population of interest. Establishing comfort with the researcher and engaging community members in the research process as mutual experts has documented successes in the realm of Community Based Participatory Research (CBPR) (Christopher, Watts, Knows, McCormick, & Young, 2008). While the pneumococcal study was not designed as a CBPR study, the intuitively humanistic elements of this methodology, such as mutual respect and open communication, are seen as essential and served as key components of the pilot study.

Establish Trust

Six (five female and one male) of the twelve individuals invited to participate attended the focus group held on November 20, 2011, at a church in Jacksonville, Florida. Step one of the process was to go over the study background and purpose and complete the informed consent. The group had no questions about the study background, purpose or significance. The consent process was reviewed with the group as a whole by the PI. One participant asked where to sign, at which time the PI

emphasized that no signatures or other personal identifiers would be collected at any time during the study. The PI further explained that by reading the consent and subsequently completing the survey, participants consent was implicitly understood. Importantly, subjects in the Pneumococcal pilot study had questions about whether or not they would sign the consent form. Three of the six participants tried to return the consent form at the end of the focus group. At which time, the PI explained that the consent form was theirs to keep and that it contained important contact information should questions or concerns arise.

The only other question pertaining to the informed consent process was, “What else do we have to do?” The PI explained that the only thing being asked of participants for the focus group was completion of the survey and input regarding content and the research process for the full study. Further, the PI explained that in the full study, participants would only be asked to complete and turn in the survey. Moreover, the paramount importance of informed consent and privacy were discussed step by step, and all concerns were addressed by the PI. Explanation of the study purpose highlighting vaccine uptake disparities and the disproportionate number of African Americans affected by pneumococcal illnesses was emphasized as well. Questions and feedback were encouraged, and the contribution participants are making towards enhancing nursing knowledge of vaccine beliefs and practices among African Americans were acknowledged. The researcher explained how results may be used to develop targeted interventions aimed at increasing vaccine uptake, thereby preventing pneumococcal illness among African Americans.

Refine Process and Instrument

In step two of the focus group, participants completed the VUQ individually to provide the PI with an average completion time. Completion times ranged from eight to 19 minutes with a mean completion time of 13.5 minutes. The following questions arose during the VUQ completion:

> "What do you mean by current smoker, does that include cigarettes, and cigars?"
>
> "If I didn't finish my degree, which education box do I check?"
>
> "I have the sickle cell trait, but not sickle cell disease. Should I still check the sickle cell disease box?"
>
> "My mother is black, but my father is white. Can I still check African American for race?"
>
> "Are you going to ask us to get the vaccine today?"
>
> "What does 'immunological suppression' mean?"
>
> "What if I leave something blank?"
>
> "I had cancer, but I'm cancer free now. Do I still check the box?"

When everyone had completed the VUQ for the purpose of establishing completion times, step three of the focus group process where participants were asked to provide feedback on the instrument began. All but one of the participants paired up for the survey completion component of the focus group. The group engaged in lively discussion as they completed the survey but had few questions for the PI and RA. When the group completed the editorial component of the process, a series of questions were asked of the participants to ascertain the respondents' opinions on wording, ease of understanding, and cultural sensitivity (Appendix N). Participants expressed no concerns about the wording of questions. One participant commented that the survey

was too long and asked if it could be shortened. Another participant echoed this sentiment. The PI explained that although the survey was long, each of the questions was felt to be of great importance; however, their recommendations would certainly be taken under advisement.

Participants were asked for their opinions about particular wording choices and inclusion versus exclusion of a question regarding income. Although no income questions were included on the VUQ at the time of the focus group, the PI inquired about the potential inclusion of such an item. Participants overwhelmingly responded that they would not answer such a question. A male participant commented, *"That's private, we Black folk don't like to talk about that kinda stuff."* A female participant added, *"We're taught at an early age not to tell people about our money troubles."*

The survey was originally designed with several questions having three possible answers: yes, no, and unsure. Pertaining to refining the instrument, the PI asked participants about a response of "unsure" to determine whether or not it should be retained since it would likely complicate the statistical analyses. Participants unanimously agreed that the "unsure" category should be retained because they didn't always know if they had been vaccinated, or if their healthcare provider had recommended the pneumonia vaccine.

Focus group participants were then asked about recruiting, data collection times and locations, and incentives. The majority felt that plenty of participants could be obtained through word of mouth alone, but agreed that flyers could also be posted. One female participant stated, "*If you're giving out a $10 grocery card, you won't have any trouble getting people to fill [the survey] out".* All participants agreed that survey

completion could be done immediately following church services on Sunday afternoons in either the Community Room or the chapel itself. When asked about the use of a barbershop in order to recruit male participants, the male in the focus group said, *"There are plenty of men here at church who will fill [the survey] out".* The PI asked the group if the $10 gift card should be a gas or grocery card. All, but one participant felt that the grocery card would be better, with one individual saying, *"Not everyone has a car, so the gas card wouldn't always work".*

Cultural Sensitivity

The final series of questions for focus group participants pertained to the cultural sensitivity of the VUQ, racial concordance between the RA and subjects, and the research process as a whole. Participants expressed no concern about the instrument or the study as a whole from a cultural sensitivity standpoint. The PI asked the group to think about the instrument and the process in terms of respect for differences in culture, respect, and trust. The researcher asked the group if they felt the congregation would be comfortable having a Caucasian female asking them to complete a survey about their health care practices and beliefs. Further, the PI asked if having an African American RA would help pave the way for buy-in and participation. One woman spoke up and said, *"I mean, as long as you treat everyone with respect, it will be fine. We are private about a lot of things, but you're doing this to help Black people understand vaccines better."* The participant also stated, *"I think it's great that Sylvia [RA] is helping with the research. We need more Black people to be involved in research."* No further discussion followed.

Discussion

Consistent with the literature which suggests that challenges with recruiting, engaging, and enrolling minority subjects in research studies includes lack of knowledge concerning the research process, cultural differences between the researcher and participants, the use of technical “jargon” in the consent process, and logistical barriers to participation such as time, transportation, and incentives (Jones, Steeves, & Williams, 2009; King, et al., 2010; Loftin, Bunn, & Sullivan, 2005; Moreno-John, Forte, Rangel-Lugo, & Perez-Stable, 2000; Staffileno & Coke, 2006), we found that focus group members needed clarification on each of these items. Focus group subjects clarified the anonymous nature of the study, made sure they were not going to be asked to do anything beyond survey completion, provided their opinions about data collection times and incentives, and emphasized their beliefs that measures of income should not be included in the study largely because of cultural beliefs about the private nature of the subject matter and concern for privacy.

When Kosoko-Lasaki, et al., (2005), conducted focus groups among African Americans to refine a data collection instrument, they learned valuable lessons pertaining to the manner in which questions were worded. For example, study participants weren’t sure how to interpret the term, “ill”, thus resulting in terminology changes. Open ended questions originally on the survey were found to be ambiguous and consequently replaced with check boxes and a series of choices based on participant feedback. When we asked about the open-ended questions pertaining to refusal reasons, focus group participants recommended that they remain in the VUQ. Although this is inconsistent with the findings of Kosoko-Lasaki et al., post hoc analyses

of the full study revealed that these items were indeed problematic. This component of the research will be discussed in further detail in Chapter 6, but is certainly worth noting. Race and ethnicity in the Kosoko-Lasaki et al. study were originally two separate questions, but researchers collapsed the question based on their focus group finding that participants felt they were one and the same. Participants in the pneumococcal focus group did not recommend substantive changes to the VUQ, but did have questions about which ethnicity to select if their parents were not racially concordant.

Use of monetary incentives and attention to logistical issues such as time, location, and transportation have been cited in the literature by Paskett, DeGraffinreid, & Tatum, 1994, and others as important considerations for conducting research successfully among African American communities. Monetary incentives, where the burden of study participation is significant, have been said to help off-set costs such as transportation and child care. Although in the pneumococcal study there was only a one-time survey to complete, monetary incentives were also reported in the literature as a means to make participants feel that researchers value their time and opinion. Word-of-mouth communication about monetary incentives associated with the study may also aid subject recruitment (Paskett, et al., 1994; Souder, 1992). Our focus group participants validated the body of literature supporting the use of incentives, informing the PI that the gift card would greatly aid in recruitment and participation in the full study.

Data collection locations and times were viewed as important components for recruiting and enrolling subjects; particularly African American men who are often underrepresented in research studies (Plowden, John, Vasquez, & Kimani, 2006). In a

series of focus groups conducted among African American men about potential interventions for prevention of prostate cancer, a number of relevant suggestions for reaching the population of interest were revealed. Among the suggestions, participants recommended churches, barbershops, fraternal organizations, and sporting events to reach African American males. “Go where the people are,” as opposed to asking them to come to you, was a key message in the focus groups (Allen, et al., 2007). Subjects in the pneumococcal focus group did not support the use of organizations outside of the church for the full study, primarily because they believed there would be plenty of willing participants within the churches themselves.

Studies emphasized that time is an important resource not to be overlooked, citing busy schedules and time commitments as barriers to participation (Flaskerud & Nyamathi, 2000; Rettig, 2000). Set appointment times for the consent process and distribution/collection of questionnaires have also been said to aid in the success of research studies among African Americans (McNeely & Clements, 1994).Rather than assuming these decision points, focus group participants were specifically questioned. With respect to data collection times and appointments, focus group members recommended that we collect data immediately following services on Wednesdays and Sundays and that we make sure the survey didn’t take too long to complete. They did not feel that appointment times were necessary, nor did the feel they would be adhered to.

Word-of-mouth recruitment strategies originating from key community gatekeepers have been shown to decrease anxiety and distrust among potential participants, particularly among populations whose cultural values show a high affinity for informal

means of communication. Word-of-mouth strategies have been cited as effective among African American communities as both a recruitment tool and a cost-saving measure; decreasing or eliminating the need for advertisement of the study (Hooks, et al., 1988; Jones, et al., 2009). Our focus group participants validated this finding by telling us that they did not see the need for any additional advertising beyond word-of-mouth and possibly some flyers. Participants felt that members of the congregation would be much more likely to participate knowing that the key stakeholders had already “checked out” the study and felt it was worth their time and efforts.

Becoming culturally competent is a life-long process, not something that can be achieved overnight. Fortunately, many years of working in the healthcare profession with diverse patient populations affords the PI a solid foundation from which to build. In addition to establishing trust and laying the ground work for effective recruiting, the PI needed to be cognizant of cultural differences which could impede good communication and data collection. A few exemplars in the literature provided guidance to operationalize the process.

Recognizing the need to facilitate culture competence in health care, in 1999 the US Department of Health and Human Services Office of Minority Health (OMH), designated 14 specific standards for providers, policy makers, and researchers to facilitate culturally appropriate health care standards. While the Culturally and Linguistically Appropriate Services (CLAS) standards are slanted towards the clinical aspect of healthcare, emphasis on the development of participatory and collaborative partnerships to achieve better outcomes is certainly applicable in the research setting (US Department of Health and Human Services, [OMH], 2001).

Taking into account what is known about the population, the CLAS recommendations, and the experiences of other researchers, this pilot study was undertaken as a means by which to “test the waters” and fine tune aspects of the pneumococcal study prior to implementation. Moreover, the pilot study served as a method by which the PI could evaluate and heighten understanding of the unique aspects of the population of interest pertaining to their cultural heritage, communication preferences, and attitudes towards research and preventative health services, such as vaccinations. Each of the CLAS standards was reviewed and incorporated into the researchers’ methodology for conducting the focus group. None of the participants had concerns about the VUQ or the research process with respect to cultural sensitivity, which led the PI to believe that the extensive preparation for the pilot study was well worth the effort.

Purported to be an effective strategy for African American recruitment and research participation, use of a racially matched research assistant (insider) (Gerrard, 1995; Pattillo-McCoy, 2000; Smetana and Gaines, 1999) was a key component of the pneumococcal study. When the researcher and the potential subjects have different ethnic and cultural characteristics, mistrust and reservations may be exacerbated. When racial concordance exists between subject and researcher, similarities in culture and shared life experiences have been shown to enhance trust and facilitate entrée into the community (Blumenthal, Sung, Coates, Williams, & Liff, 1995; Wasserman, Flannery, & Clair, 2007; Witten, 2005). Participants in the pneumococcal focus group echoed these sentiments, saying that they felt more comfortable since many of them knew the RA and had seen her at church. The pneumococcal focus group did not

express any reservations with the study despite the fact that the PI was not racially concordant. Though no findings in the literature linked racial concordance between RA and subjects to study limitations, the PI was aware of the fact that having an “insider” as the RA in the pneumococcal study could introduce bias into the research process. It is impossible to know if the outcome would have been different had there not been a racially concordant RA; however, future studies with multiple data collection sites might present an opportunity to further explore the presence or absence of a racially concordant researcher.

Summary

This pilot study was designed as a precursor to the full study to lay the groundwork for a trusting relationship, establish open communication, and aid in the recruitment of subjects through cultural sensitivity, use of incentives, and the presence of a racially matched research assistant. Considering the historical and contemporary barriers to minority research participation, the development of a culturally appropriate process and data collection instrument was an integral component of the proposed pilot. Supported in a recent study by Kneipp, Lutz, & Means, (2009), these findings were congruent with existing literature. Kneipp, et al. used a descriptive survey (n = 35), and found that low-income, predominantly African American women were more likely to enroll in research studies when: 1) they felt the researcher recognized an unmet health need (91%); 2) nurses were conducting the study (57%); and 3) researchers could be trusted to follow the procedures explained in the consent (100%). This work informed the pneumococcal pilot study of the critical role trust, good communication, and careful adherence to procedures covered in the informed consent play in the recruitment and retention of

underrepresented groups. While explaining the full study rationale to the focus group took time, this step was of paramount importance in fostering trust and open communication among African American subjects, and is reportedly often overlooked by novice researchers (Alegría, 2009).

Upon completion of the focus group, the PI reviewed field notes and as well as each of the VUQ instruments collected from participants. Notes placed on the VUQ were minimal, with no major recommendations for revision. Although no significant concerns arose from the Pneumococcal Vaccine Uptake pilot study, participants' responses were consistent with much of the current literature concerning the recruitment and participation of African Americans in research studies. Moreover, questions that arose in the focus group provided the researcher with a better understanding of the two churches in which the full study would be conducted. Satisfied that while the survey was lengthy, it was easily understood, free of errors, and visually appealing, the PI opted to retain the survey without changes for the full study. With respect to methodology, pilot study participants provided valuable information about recruitment and participation. Based on participants' comments, no additional advertising for the study was performed, nor did the PI seek other venues previously believed to be necessary to reach the number of participants needed for analyses. Questions asked by the participants on topics such as smoking, and prior history of cancer did not result in changes to the VUQ, but helped the researcher frame a consistent introductory message for all subsequent data collection points in the full study.

CHAPTER 5
RESULTS

In Chapter 5, results will be presented by addressing each of the study aims. Methods for data cleaning will be described briefly followed by univariate descriptive statistics, bivariate analyses, and the logistic regression model itself. Moreover, findings from a priori analyses conducted to examine secondary research questions concerning vaccine refusers and trust, as well as vaccine refusers and age categories will be detailed. Post hoc analyses including trust and age, trust and racial concordance, perceived health and age, and smoking and PPSV23 were analyzed and will be reported.

Data collection for the full study took place between December 18, 2011, and May 6, 2012, at two churches in Jacksonville, Florida, one of which was Catholic and the other Baptist. Each of the churches has been in the community for a number of years with well-established congregations and community ties. The PI and RA were on hand after church services on eight Sunday mornings and two Wednesday mornings for recruitment and survey collection. In total, 329 study participants answered the survey; however, 26 were eliminated because subjects did not meet aforementioned eligibility criteria for the PPSV23 vaccine. Upon further examination of the 301 remaining surveys, six subjects did not answer the DV “Have you ever gotten the pneumonia vaccine?” Consequently, they were also eliminated, yielding a final sample size 295 for data analysis. Data were entered into PASW version 20, and double checked for accuracy. The data set was cleaned using the PASW Statistical Procedures Companion Guidelines (Norusis, 2008). Each of the labels and definitions were re-confirmed, missing data were evaluated for patterns using histograms and scatterplots, and

extreme values were explored using the descriptives and explore tabs as well as dfbetas. As mentioned in the methods section, outliers identified on scatterplots and histograms were examined for accuracy and retained.

The dependent variable (PPSV23 vaccine status) had three possible responses: yes, no, or unsure. Clinically speaking, patients who do not know their PPSV23 vaccine status are treated as though they are unvaccinated. As previously discussed, there are no known harmful effects of re-vaccination other than localized inflammation at the injection site; therefore, all persons with unknown status are given the PPSV23 vaccine. Given these clinical guidelines, the researcher sought the advice of a statistician (personal communication, August 1, 2012), and made a theoretical decision to collapse the categories “no” and “unsure” into one category in PASW for analyses. A separate column was created in PASW, and after listing the number of participants who were unsure of their status (*n* = 24, 8%) in the descriptive section, future analyses were based upon the collapsed category.

Univariate Descriptive Statistics Analyses

Each of the study participants by virtue of inclusion criteria were eligible for the pneumococcal vaccine (*N* = 295). From this population, 176 (59.75%) were unvaccinated despite eligibility, with 95 (32.2%) vaccinated and 24 (8.1%) unsure. These results mirror the nationally reported Healthy People 2020 statistics and underscore the need for intervention in the African American community to increase vaccine uptake through a better understanding of the variables influencing vaccination. Approximately 2/3 of the total participants *(N* = 295) were female (*n* = 196, 66.4%), yielding 99 (33.6%) males. Age categories were utilized in the survey in lieu of actual

age. These categories were consistent with those utilized in the BRFSS instrument, with the highest number (*n* = 81, 27.5%) of participants falling into category three (46-55 years old). With health insurance and education status serving as proxy variables for SES, the majority of participants had private health insurance (*n* = 126, 42.7%) and at least a high school diploma 93 (31.5%). Table 5-1 provides a complete description of demographics for the study population.

In order to be eligible for the pneumococcal vaccine (PPSV23), study participants needed to have at least one of the aforementioned conditions or be ≥ 65 years of age. Only 47 of 295 (15.9%) subjects self-reported as current smokers, an independent indicator for PPSV23 vaccination since 2010. Among the chronic diseases, diabetes (*n* = 103, 34.9%) and hypertension (*n* = 194, 65.8%) rates were the highest in study participants. Eligibility criteria and demographics for PPSV23 vaccination are listed in Table 5-2.

Bivariate Analyses

Aim One

Aim one of the study was to determine how sociodemographic variables, such as age, gender, and socioeconomic status, influenced pneumococcal vaccine uptake among African Americans ≥ 18 whose age or pre-existing health conditions, including diabetes, heart disease, cancer, COPD, sickle cell disease, immunological suppression, asplenia, cochlear implants, liver disease, and cigarette smoking, were known to increase the risk of contracting pneumococcal illness, thus rendering them eligible for PPSV23. Chi-square analyses were used to examine each of the categorical sociodemographic variables: age, gender, type of insurance, and education.

Age

Subjects aged 18 and over were included in this study provided they met the aforementioned eligibility criteria for PPSV23. Ages were grouped according to BRFSS categories rather than obtaining an exact age for each subject. The younger the patient was, the less often they were vaccinated. For example, there were 19 subjects between the ages of 18 and 25, of which, only one (0.05%) had received the PPSV23 vaccine despite eligibility. Conversely, 29 of the 52 subjects in the 65-75 age category were vaccinated (55.76%). Following completion of univariate descriptive measures, some of the age categories had very few subjects. For example, there were only two subjects who reported themselves 90+. In an effort to report findings in a succinct manner and build a more stable regression model, the original seven age categories were collapsed into three categories: 18-44 (n = 79), 45-64 (n = 129), and 65+ (n = 87). These categories were then examined using chi-square analyses and found to be statistically significant for PPSV23 uptake whereby those who were older were more likely to be vaccinated than their younger counterparts χ^2 (1, n = 295) = 40.794, p < .001 (Table 5-3).

Gender

Evaluation of gender and vaccination rates revealed that 75 of 99 males (75.75%) were unvaccinated whereas 125 of 196 females (63.77%) were unvaccinated. Female gender proved a statistically significant predictor for PPSV23 uptake with 12% more unvaccinated males than females χ^2 (1, N = 294) = 4.445, p <.05 (Table 5-3).

Socioeconomic Status

The most common measures of socioeconomic status (SES) found in the literature were education and income combined; however, income was deemed too invasive and, therefore, not asked in the VUQ instrument. Insurance and education status and were used as proxy variables for SES and will now be reported separately in bivariate analyses.

Insurance

Among 246 subjects who answered the question regarding which type of insurance they had, 126 (42.7%) were privately insured. Once univariate descriptive statistics were reported, the original number of categories for the question: “How do you pay for healthcare” were collapsed from seven to three. In doing so, remaining categories were self-pay, Medicaid, and all others. These decision points were based on the fact that self-pay and Medicaid are unique in that the burden of PPSV23 falls solely to the individual, where private insurers including VA and Tricare cover the vaccine for those who are eligible. To be certain nothing was missed, bivariate analyses were conducted before and after collapsing this variable; however, type of insurance still did not appear to predict vaccine status χ^2 (1, n = 246) = 1.638, p > .05 (Table 5-3).

Education

Study participants were asked to indicate their highest level of education. Response choices ranged from grade school to graduate degree. Of the 294 valid responses, 13 (4.4%) had completed only grade school, 93 (31.5%) completed high school or the equivalent, 109 (37%) had some college or an Associate’s degree, and 78 (26.4%) had a Bachelor’s degree or higher. Upon completion of univariate descriptive

statistics, education level responses were collapsed into two categories: 1) no college, and 2) college, in order to provide data in a more succinct manner. Bivariate analyses were then conducted using a chi-square statistic whereby education status did not appear to significantly predict PPSV23 uptake χ^2 (1, n = 293) = 0.008, p > .05 (Table 5-3).

Aim Two

Aim two of the study was to determine how constructs operationalized from the HBM and PAPM such as vaccine awareness, knowledge, trust in healthcare provider, perceived health, perceived susceptibility, perceived severity, prior negative experience with vaccines and healthcare provider recommendation predicted pneumococcal vaccine uptake among African Americans ≥ 18 whose age or pre-existing health conditions such as diabetes, heart disease, cancer, COPD, sickle cell disease, immunological suppression, asplenia, cochlear implants, liver disease, and cigarette smoking were known to increase the risk of contracting pneumococcal illness thus rendering them eligible for PPSV23. Each of these relationships was examined in bivariate analyses prior to entering them into the logistic regression model.

Vaccine Awareness

The construct of vaccine awareness was measured utilizing one question in the survey. Participants were asked, “Before this study have you ever heard of the pneumonia vaccine?”, Response choices for the question were yes, no, or not sure. Of 295 respondents, 129 (43.7%) reportedly never heard of PPSV23 prior to the study, 12 (4.1%) of participants were unsure if they had ever heard of PPSV23, and 154 (52.2%) of subjects had at least heard of the pneumonia vaccine at some point. When

respondents answered “unsure”, they were treated as “no” for bivariate analyses. After collapsing the categories no and unsure, 141 (47.8%) had never heard of PPSV23. Of the 141 who had never heard of PPSV23, 129 (91.48%) were unvaccinated. Of the 154 subjects who had heard of PPSV23, 71 remained unvaccinated (46.1%). A relationship between vaccination status and vaccine awareness was consequently found to be significant χ^2 (1, n = 295) = 69.44, p <.001 (Table 5-3).

Vaccine Knowledge

The construct of vaccine knowledge differed from vaccine awareness based on findings in the literature review and, accordingly, was considered independently for this dissertation. Vaccine knowledge was measured utilizing two questions in the survey. First, participants were given a statement: I don’t have enough information about the pneumonia vaccine to make a decision about whether or not to accept it, with five possible responses on a likert scale ranging from strongly agree to strongly disagree. Of the 143 subjects who agreed that they lacked sufficient knowledge to make a decision about PPSV23, 124 (86.71%) were unvaccinated. Among those who felt they did have sufficient knowledge of PPSV23 (n = 76), only 23 (30.26%) were unvaccinated. Using chi-square analyses, lack of knowledge among study participants was highly significant χ^2 (1, n = 219) = 71.660, p < .001 (Table 5-3).

Participants were then asked, “Do you know who is supposed to get the pneumonia vaccine?” Of the 293 valid cases, 146 (49.5%) did not know who should be vaccinated, 52 (17.6%) were unsure, and 95 (32.42%) felt they did know who should receive PPSV23. Of the 198 subjects who did not know who should be vaccinated, 80.8% (n = 160) remained unvaccinated, whereas those who felt they did know who

should be vaccinated had a 41.05% (n = 95) non-vaccination rate. A relationship between vaccination status and vaccine awareness was, therefore, found to be significant with this item on the questionnaire as well χ^2 (1, n = 293) = 46.56, p <.001 (Table 5-3).

Trust in Healthcare Provider

Trust in healthcare provider was measured in this study using the Wake Forest Trust Scale which consisted of ten Likert Scale questions ranging from “Strongly Agree” to “Strongly Disagree” (Appendix E). Cumulative trust scores ranged from 10 (very low trust) to 50 (very high trust). The mean cumulative trust score was 29.8 (SD 8.258, n = 288). The 90 subjects who reportedly received the PPSV23 vaccine had a mean trust score of 41.29 indicating a high degree of trust in their healthcare providers (n = 90, SD 8.566), whereas the 193 subjects who were unvaccinated had a mean trust score of 38.33 (n = 193, SD 7.527). While the initial data analyses plan was to analyze the trust variable using a t test for independent samples, assumptions for scale level DV and normality were violated. Given these violations, a decision was therefore made to dichotomize the trust variable using a cut point of 35 whereby those with scores of 35 and below were considered to have low trust, and those with scores 36 and above were considered to have high trust. After dichotomizing the trust variable, 67 (81.70%) of those with low trust (n = 82) were unvaccinated compared with 126 (62.69%) of those reporting high trust (n = 201). Chi-square analyses were conducted and higher trust in healthcare provider scores were found to be significantly predictive of PPSV23 uptake χ^2 (1, n = 283) = 9.715, p < .05 (Table 5-3).

Perceived Health

When perceived health is higher (the patient believes he/she is very healthy), it has been hypothesized that there could be an inverse relationship with preventative health behaviors such as vaccine uptake. To examine this more carefully, perceived health was measured using the SF-12v2™ (Appendix G) instrument which consisted of 12 Likert Scale questions. Raw scores were calculated using a summative approach with 56 being the highest possible score (very healthy) for perceived health and 10 being the lowest (very unhealthy). The SF-12 portion of the VUQ instrument was the final component of the survey, which may explain the attrition rate with only 260 of 295 subjects completing this section. Participants who answered some but not all of the SF-12 questions could not receive a cumulative score and were consequently eliminated from this portion of the data analysis. With a range of 18-56, the mean score was 42.68 (n = 260, SD 8.464).

Consistent with the trust in healthcare provider variable, assumptions of normal distribution and continuous DV were violated with the perceived health variable as well, thus precluding the use of a t test for independent samples. A decision was therefore made to dichotomize perceived health scores using a cut point of 33 whereby those 33 and below were considered to have low perceived health and those 34 and above were considered to have high perceived health. Of those who reported low perceived health (*n* = 42), 26 (61.9%) remained unvaccinated. Those with high perceived health scores (*n* = 218) had similar rates of non-vaccination with 156 (71.56%) never having received PPSV23. Though participants with lower perceived health scores were slightly more likely to be vaccinated than those with high perceived health scores (*n* = 16, 38.1%, and

n = 62, 28.44% respectively), chi-square analyses using dichotomized perceived health scores did not reveal a statistically significant difference between the groups with respect to PPSV23 uptake overall χ^2 (1, *n* = 259) = 1.563 *p* > .05 (Table 5-3).

Perceived Susceptibility

Perceived susceptibility and perceived severity are core components of the HBM and were measured using a series of four single-item questions in the VUQ to measure this theoretical component of the model and determine their impact on PPSV23 uptake. Perceived susceptibility was measured using two single-item questions, each with a five point Likert Scale response option. Question 39, “I get sick more easily than others,” had a mean score of 2.17 (*n* = 291). Question 40, “I am at risk for getting pneumonia,” had a mean score of 2.62 (*n* = 292). The two susceptibility questions were added together for the purpose of data analysis and cumulative scores were considered. A cumulative susceptibility score of 10 would indicate high perceived susceptibility, whereas, a cumulative score of two would indicate low perceived susceptibility.

Evaluation of a histogram revealed that perceived susceptibility was not normally distributed. Consequently, susceptibility scores were dichotomized using a cut point of five, whereby those with scores of five and below were categorized not susceptible, and those with scores above five, susceptible. Among those who did not believe they were susceptible to pneumonia (*n* = 185), 136 (73.51%) were unvaccinated and 49 (26.48%) reported PPSV23 uptake. For those who did perceived themselves as being at risk for contracting pneumonia, 59 (58.41%) were unvaccinated, and 42 (41.58%) were vaccinated. Chi-square analyses detected a significant relationship between perceived

susceptibility and PPSV23 uptake with those in the high perceived susceptibility cohort more likely to be vaccinated χ^2 (1, n = 286) = 6.864, $p < .05$ (Table 5-3).

Perceived Severity

Perceived severity questions were treated in the same manner as perceived susceptibility, and individual scores for each question were evaluated. Item 37, “I believe pneumonia is serious,” had a mean score 4.48 (n = 294), and item 38, “I believe pneumonia could lead to death,” had a mean score of 4.39 (n = 289). A cumulative score for the two severity questions was then utilized for statistical analyses, with a score of 10 indicating the individual perceived pneumonia as severe and a score of two indicating low or no perceived severity. Of the participants who answered the question, “I believe pneumonia is serious,” 251 (85.1%) either strongly agreed or agreed that pneumonia was a serious illness (n = 290, mean 4.47, SD .767). Those who answered the question, “I believe pneumonia could lead to death,” strongly agreed or agreed with this statement 82.86% of the time (n = 286, mean 4.39, SD .882).

The histogram for perceived severity was skewed and the DV was dichotomous. With the assumptions of normality and scale level DV violated, a t test for independent samples could not be utilized. The relationship between perceived severity and PPSV23 uptake was accordingly examined using two separate nonparametric tests, including the Mann-Whitney U test and the Wilcoxon Rank Sum test. In each instance, results demonstrated higher mean scores for perceived severity among the vaccinated group than the non-vaccinated group using a 95% significance level and p-value of 0.05 or less. That said, the difference in means between groups appeared negligible and neither the Mann Whitney nor Wilcoxon Rank Sum produced more than a suggestion to

reject the null hypothesis. To assuage these concerns, perceived severity scores were therefore transformed into a dichotomized variable where a score of zero indicated low perceived severity and a score of 1 indicated high perceived severity. For the purposes of analysis and reporting the cut point on the perceived severity scale which ranged from 2-10 was five. Fortunately, all respondents (n = 285) fell squarely into one category or the other, with no neutral responses. Using the dichotomized perceived severity score and PPSV23 uptake, chi-square analyses were not found to be significant χ^2 (1, n = 285) = 1.903, $p > 0.05$ (Table 5-3).

Prior Negative Experience with Vaccines

Prior experience with vaccines was measured using two single-item questions: “Have you ever gotten sick after getting any type of vaccine?” And, “Has anyone you know, other than yourself, ever gotten sick after getting any type of vaccine?” Response options for each question were dichotomous yes or no. Subjects who responded that they had become ill after a vaccine or knew someone who did, were considered to have had a prior negative experience with a vaccine. Bivariate analyses were conducted using chi-square. Of the 290 subjects who answered the questions about prior negative experiences with vaccines, 113 (38.3%) indicated they or someone else had become ill following a vaccine whereas 177 (61.03%) had not. Bivariate analyses between prior negative experience and PPSV23 uptake were not statistically significant χ^2 (1, n = 290) = .039, $p > .05$ (Table 5-3)

Healthcare Provider Recommendation

In order to ascertain whether or not participants had a healthcare provider recommending the PPSV23 vaccine to these subjects, all of whom met eligibility criteria

set forth by the CDC, subjects were asked, “Has your healthcare provider ever recommended that you get the pneumonia vaccine?” There were four missing responses for this question, leaving 291 valid cases for analyses. Response options for this question were no (139, 47.1%), yes (103, 34.9%), and unsure (49, 16.6%). Participants who answered unsure for provider recommendation were treated as though they did not have a recommendation, since they could not recall one. With the categories unsure and no collapsed, 188 (64.6%) of the respondents had not received a provider recommendation for PPSV23. The relationship between healthcare provider recommendation and PPSV23 uptake was measured using chi-square analyses given the fact that each of the variables was dichotomous.

Of the 188 respondents who did not recall receiving a healthcare provider recommendation, 165 (87.76%) were unvaccinated whereas 23 (12.23%) reported having gotten the PPSV23 vaccine by some means despite the lack of recommendation. Worth noting, the VUQ did not ask participants to delineate where and when they had been vaccinated. When healthcare provider recommendation was present, 71 (68.93%) of 103 subjects did receive the PPSV23 vaccine, while 32 (31.06%) went unvaccinated. When comparing the rate of vaccine uptake between those whose providers had recommended the vaccine with those who had not received a recommendation, there was a statistically significant difference χ^2 (1, n = 291) = 97.820, p <.001 (Table 5-3).

Stepwise Logistic Regression Model

Using stepwise backward logistic regression, variables of interest found statistically significant in bivariate analyses were entered into the model beginning with

sociodemographics, age and gender. Next, statistically significant variables operationalizing the HBM and PAPM were entered into the model to determine their ability to predict pneumococcal vaccine uptake. These variables included awareness, knowledge, trust, perceived susceptibility, and provider recommendation, all of which were significant in bivariate analyses. The whole model was then considered to determine how well age, gender, vaccine awareness, vaccine knowledge, trust in healthcare provider, perceived susceptibility, and provider recommendation predicted PPSV23 uptake among African Americans whose age or pre-existing disease processes rendered them eligible to receive it.

In total, 19 subjects had missing data in some portion of the questionnaire; therefore, the case processing summary indicated that 276 valid subjects would be included in the whole model of regression analyses. Using logistic regression, the initial model with no variables in the equation (step 0) predicted vaccine uptake correctly 68.8% of the time. In Block one, age and gender were entered into the model using backward hierarchical methodology. Age was found to be a significant predictor for PPSV23 uptake ($\beta = 1.422$ $p < .05$) whereby those ages 18-44 ($n = 79$) were four times less likely to be vaccinated than those 65+ ($n = 76$) (referent group), and those ages 45-64 ($n = 124$) were roughly two times less likely to be vaccinated than the referent group. Though gender was significant in bivariate analyses, this was no longer the case when the variable was entered into the LR model along with age (Table 5-4). In Block one, the -2LL was 307.509. The Nagelkerke R square can be loosely interpreted that age and gender accounted for 16.7% of the variance with PPSV23 uptake adding

strength to the model. The Hosmer and Lemeshow test statistic (χ^2= 5.804, *DF* = 7, *p* >.05) confirms that the predicted probabilities match the observed probabilities.

In Block two, predictor variables derived from the substructed theoretical model found to be significant in bivariate analyses were entered using backward hierarchical methodology. Variables included in this step were vaccine awareness, trust in healthcare provider, perceived susceptibility, and healthcare provider recommendation. Though the knowledge variable was highly significant in bivariate analyses, it was left out of the model due to multicollinearity with the awareness variable as evidenced by VIF values > 5. A composite variable using awareness and knowledge could have been created to resolve this issue; however, theoretically and empirically these constructs had clearly delineated differences which is why the most intercorrelated variable; knowledge, was ultimately excluded from the LR model.

In Block one, vaccine awareness was a significant predictor (β = 1.868, *p* < .001) of PPSV23 vaccine uptake. Those who were unaware of the existence of PPSV23 prior to this study (*n* = 132) were 6.5 times less likely to be vaccinated than participants who were aware of the vaccines' existence (referent group) (*n* = 147) (Table 5-4). Provider recommendation was also statistically significant in the LR model (β = 1.989, *p* < .001), with participants who did not have a recommendation for PPSV23 uptake from their provider (*n* = 179) roughly seven times less likely to be vaccinated than those whose provider had recommended the vaccine (*n* = 100) (Table 5-4). With age, gender, awareness, and provider recommendation in the model, trust in healthcare provider and perceived susceptibility were no longer statistically significant (Table 5-4). By adding the variables in block two, the -2LL decreased from 307.509 to 177.215, indicating a

reduction in unexplained variance. The Negelkerke R square statistic indicated that the model with all the variables now predicted 63.4% of the variance, and the Hosmer and Lemeshow statistic remained without significance (χ^2 = 8.214, *DF* = 8, *p* >.05). With all significant variables in the model, the final iteration of the backward hierarchical logistic regression revealed improved PPSV23 vaccine uptake predictability from 68.6% baseline to 86.6%.

A Priori Analyses

Unsure and Refused

A priori plans to examine the unique characteristics of participants who refused PPSV23 (*n* = 29) were conducted using chi-square analyses. Reasons for refusal of PPSV23 vaccine in this study included: fear of needles (*n* = 39), out of pocket expenses (*n* = 22), general lack of knowledge (*n* = 40), mistrust of vaccines (*n* = 33), and lack of healthcare provider recommendation (*n* = 43). Self-reported PPSV23 refusals on the VUQ numbered 29; however, a total of 46 refusal reasons were provided which could indicate measurement bias, or perhaps a refusal then subsequent acceptance of PPSV23 at a later date. Relationships between refusals and the sociodemographic variables age, χ^2 (1, *n* = 294) = 11.233, *p* > 0.05, and gender, χ^2 (1, *n* = *293*) = 2.621, *p* > 0.05 were not significant. Insurance type and education were also examined among refusers using chi-square analyses and not found to be statistically significant, χ^2 (1, *n* = 245) = 6.608, *p* > 0.05, and χ^2 (1, *n* = 293) = 14.708 *p* > 0.05 respectively (Table 5-5).

Perceived Health Measures

Perceived health was measured with the widely used SF-12v2™ 12-item instrument with demonstrated validity and reliability in the literature, and ease of

completion. As previously discussed, the relationship between perceived health using dichotomized SF-12 scores and PPSV23 uptake, was not found to be statistically significantly (Table 5-3).To ascertain whether or not perceived health could be measured more simply, the author of this dissertation also included a single-item question from the BRFSS with a five level Likert Scale response: “I consider myself to be healthy” (5 = strongly agree, 4 = somewhat agree, 3 = neutral, 2 = somewhat disagree, and 1 = strongly disagree) (*n* = 291, mean 3.87, SD 1.080). This single-item question was dichotomized into yes and no, and reexamined. With the variable “healthy” dichotomized, descriptive statistics revealed that 41 (13.9%) considered themselves unhealthy, whereas 216 (73.2%) considered themselves healthy. Moreover, 153 (70.83%) of those who considered themselves to be healthy were unvaccinated, while 24 (58.53%) of those who did not consider themselves to be healthy were unvaccinated. Chi-square analyses were then conducted to examine the relationship between PPSV23 uptake and the single-item for perceived health and consistent with the SF-12v2™ measure, the relationship was not found to be significant χ^2 (1, *n* = 257) = 2.430, *p* >.05 (Table 5-5).

Finally, when comparing single-item perceived health with the more complex measure of health found in the SF-12v2™, findings were strikingly similar. In the single-item measure (*n* = 256), 67 reported themselves as unhealthy and 189 reported themselves as healthy. Using the cumulative SF-12v2™ scores (*n* = 259), 73 reported themselves as unhealthy whereas 186 reported themselves as healthy. Chi-square analyses of these two measures of perceived health were statistically significant χ^2 (1, *n*

= 256) = 32.967, $p < .001$, suggesting that a single-item question may be as effective in some instances as a more complex instrument to measure perceived health.

Post Hoc Analyses

Age and Perceived Health

Intuitively, it would seem that younger adults would perceive themselves as healthier than older adults; however, because all participants in this study had one or more preexisting conditions such as diabetes, heart disease, or COPD, these variables were examined in post hoc analyses to determine if this belief held true. Only 13 (17.1%) of those aged 18-45 reported themselves as unhealthy, compared with 32 (28.07%) of those aged 46-64, and 27 (39.13%) in the 65+ age group. Findings in this post hoc analysis therefore revealed a statistically significant difference in perceived health between age groups with younger age predictive of better perceived health scores χ^2 (1, n = 259) = .8.748, $p < .05$ (Table 5-5).

Trust and Racial Concordance

In post hoc analyses, racial concordance with healthcare provider as a means of enhancing trust was examined using data from the VUQ. A total of 63 (24.51%) participants reported racial concordance with their healthcare provider in the pneumococcal study. The construct of racial concordance was examined to determine if it had an impact on the variable “trust in healthcare provider”. Of the 194 subjects who did not have racially concordant providers, 53 (27.31%) reported low trust, and 141 (71.68%) reported high trust. Findings with the racially concordant group were very similar with 18 (28.57%) reporting low trust, and 45 (71.42%) reporting high trust. Thus,

the relationship between racial concordance and trust in healthcare provider was not statistically significant in this study χ^2 (1, n = 257) = .037, p > .05 (Table 5-5).

Trust and Age

The construct of trust in healthcare provider was also examined with respect to age categories of study participants. In this post hoc analysis, younger subjects were significantly less trusting than their older counterparts χ^2 (1, n = 283) = 15.106, p =.001 with those in the age group 18-45 (n = 79) reporting low trust 41.78% of the time compared with those in the 46-64 (n = 125) reporting low trust 30.4% of the time, and those 65+ (n = 79) reporting low trust only 13.92% of the time (Table 5-5).

Smoking and PPSV23 Uptake

In 2008, smoking was added to the list of independent indicators for PPSV23 uptake when the CDC and others (Breiman, 2000; Grua, 2005; Nuorti, et al., 2000), found that current smokers with known immunological suppression were 4.1 times more likely to contract pneumococcal illness than their non-smoking counterparts (95%, CI 2.4-7.3, p < 0.001). Accordingly, participants in the pneumococcal study were asked, “Do you currently smoke cigarettes?” Of the 289 respondents, 47 (16.26%) were smokers. Non-smokers had a PPSV23 uptake rate of 34.29% (n = 83), whereas, smokers had an uptake rate of 19.14% (n = 9). Thus, smokers were found to be significantly less likely to be vaccinated than non-smokers χ^2 (1, n = 289) = 4.162, p < .05 (Table 5-5).

Table 5-1. Univariate descriptive statistics

Variable	Response	*n*	%
Vaccination status	Unvaccinated	175	59.7
	Vaccinated	95	32.2
	Unsure	24	8.1
	Refused	29	10.0
	Missing	6	eliminated
Gender	Male	99	33.6
	Female	196	66.1
	Missing	0	0
Age	18-25	19	6.3
	26-35	27	9.0
	36-45	33	11.2
	46-55	81	26.9
	56-64	48	16.3
	65-75	52	17.6
	76-89	33	11.0
	90 and over	2	0.7
	Missing	0	0
Primary language English	No	0	0
	Yes	295	100.0
	Missing	0	0
Veteran	No	241	80.1
	Yes	12	4.0
	Missing	42	14.23

Table 5-1. Continued

Variable	Response	*n*	%
Education level	Grade school	13	4.4
	High school	82	27.8
	GED	11	3.7
	Some college	79	26.8
	Associate's degree	30	10.2
	Bachelor's degree	54	18.3
	Graduate degree	24	8.0
	Missing	1	0.3
Type of insurance	Self-pay	27	9.2
	Private insurance	126	42.7
	Medicare	42	14.2
	Medicaid	22	7.5
	VA benefits	7	2.4
	Tricare	18	6.1
	Other	4	1.4
	Missing	49	16.6

Table 5-2. Chronic disease processes among participants

Variable	Response	*n*	%
Current smoker	No	242	82.0
	Yes	47	15.9
	Missing	6	2.0
Diabetes	No	188	63.7
	Yes	103	34.9
	Missing	4	1.4
Heart disease	No	262	88.8
	Yes	29	9.8
	Missing	4	1.4
Hypertension	No	97	33.9
	Yes	194	65.8
	Missing	4	1.4
Alcoholism	No	277	93.7
	Yes	14	4.7
	Missing	4	1.4
Liver disease	No	283	95.9
	Yes	8	2.7
	Missing	4	1.4
Kidney disease	No	276	93.6
	Yes	15	5.1
	Missing	4	1.4
Cancer	No	272	92.2
	Yes	19	6.4
	Missing	4	1.4
Sickle cell disease	No	281	95.3
	Yes	10	3.4
	Missing	4	1.4
Leukemia	No	290	98.3
	Yes	1	0.3
	Missing	4	1.4

Table 5-2. Continued

Variable	Response	*N*	%
Asplenia	No	290	98.3
	Yes	1	0.3
	Missing	4	1.4
Immune System Disease	No	288	97.6
	Yes	3	1.0
	Missing	4	1.4
Cerebro-spinal Fluid Leak	No	291	98.6
	Yes	0	0
	Missing	4	1.4
Cochlear Implants	No	290	98.3
	Yes	1	0.3
	Missing	4	1.4
Organ Transplant	No	290	98.3
	Yes	1	0.3
	Missing	4	1.4
Currently on Dialysis	No	287	97.3
	Yes	4	1.4
	Missing	4	1.4
Receiving Chemotherapy or Radiation	No	286	98.3
	Yes	5	1.7
	Missing	4	1.4

Table 5-3. Bivariate analyses using chi-square

	Vaccinated				
	No		Yes		
Variable	*n*	(%)	*n*	(%)	P value
Age					
18 - 45 (*n* = 79)	69	(87.34%)	10	(12.66%)	*p* < .001
46 - 64 (*n* = 129)	94	(72.87%)	35	(27.13%)	
65+ (*n* = 87)	37	(42.52%)	50	(57.48%)	
Total (*n* = 295)	200	(67.79%)	95	(32.21%)	
Gender					
Male (*n* = 99)	75	(75.75%)	24	(24.25%)	*p* < .05
Female (*n* = 196)	125	(63.77%)	71	(36.23%)	
Total (*n* = 295)	200	(67.69%)	95	(32.21%)	
Insurance					
Self-Pay (*n* = 27)	22	(81.48%)	5	(18.52%)	*p* > .05
Medicaid (*n* = 22)	17	(77.27%)	5	(22.73%)	
All Others (*n* = 197)	139	(70.56%)	58	(29.44%)	
Total (*n* = 246)	178	(72.35%)	68	(27.65%)	
Education					
No College Degree (*n* = 185)	127	(68.65%)	58	(31.35%)	*p* > .05
College Degree (*n* = 108)	73	(67.59%)	35	(32.41%)	
Total (*n* = 293)	200	(68.26%)	93	(31.74%)	
Awareness (Before this research study, had you ever heard of the pneumonia vaccine?)					
No (*n* = 141)	129	(91.49%)	12	(8.51%)	*p* <.001
Yes (*n* = 154)	71	(46.10%)	83	(53.90%)	
Total (*n* = 295)	200	(67.80%)	95	(32.30%)	
Knowledge (Do you know who is supposed to get the pneumonia vaccine?)					
No (*n* = 198)	160	(80.81%)	38	(19.19%)	*p* <.001
Yes (*n* = 98)	39	(39.80%)	56	(57.14%)	
Total (*n* = 293)	199	(67.92%)	94	(32.08%)	

Table 5-4. Logistic regression model for PPSV23 non-vaccination

				95% C.I for Exp(B)	
	B	Sig.	Exp(B)	Lower	Upper
Gender					
Male (*n* = 93)	– 0.024	.955	0.976	0.419	2.274
Female (*n* = 186)	ref.				
Age					
18-45 (*n* = 79)	1.422	.006	4.147	1.492	11.525
46-64 (*n* = 124)	0.730	.075	2.075	0.930	4.628
65+ (*n* = 76)	ref.				
Awareness					
No (*n* = 132)	1.868	.000	6.478	2.807	14.952
Yes (*n* = 147)	ref.				
Trust					
Low (*n* = 79)	0.834	.080	2.303	0.906	5.855
High (*n* = 200)	ref.				
Susceptible					
No (*n* = 182)	0.725	.068	2.065	0.948	4.500
Yes (*n* = 97)	ref.				
Provider recommendation					
No (*n* = 179)	1.989	.000	7.30	3.611	14.785
Yes (*n* = 100)	ref.				

Odds ratios indicate the probability of non-vaccination. For example, those without provider recommendation were 7.3 times less likely to be vaccinated than those with a recommendation.

Table 5-5. A priori and post hoc analyses using chi-square

Independent variable	Dependent variable				P value
	Refusal				
Gender	No		Yes		
Male (*n* = 98)	87	(88.78%)	11	(11.22%)	
Female (*n* = 193)	175	(90.67%)	18	(9.33%)	
Total (*n* = 291)	262	(90.03%)	29	(9.97%)	*p* > .05
Insurance	No		Yes		
Self-pay (*n* = 27)	25	(92.59%)	2	(7.4%)	
Medicaid (*n* = 22)	21	(95.45%)	1	(4.55%)	
All Others (*n* = 193)	171	(88.6%)	22	(11.4%)	
Total (*n* = 282)	217	(89.67%)	25	(10.33%)	*p* > .05
	Trust in health care provider				
Age	Low		High		
18-45 (*n* = 79)	33	(41.78%)	46	(58.22%)	
46-64 (*n* = 125)	38	(30.4%)	87	(69.6%)	
65+ (*n* = 79)	11	(13.92%)	68	(86.07%)	
Total (*n* = 283)	82	(28.98%)	201	(71.02%)	*p* =.001
Racial concordance	Low		High		
No (*n* = 194)	53	(27.31%)	141	(72.42%)	
Yes (*n* = 63)	18	(28.57%)	45	(71.42%)	
Total (*n* = 257)	71	(27.63%)	186	(72.37%)	*p* > .05
	Perceived health (SF-12v2™)				
Age	Unhealthy		Healthy		
18-45 (*n* = 76)	13	(17.1%)	63	(82.9%)	
46-64 (*n* = 114)	32	(28.07%)	82	(71.93%)	
65+ (*n* = 69)	27	(39.13%)	42	(60.87%)	
Total (*n* = 259)	72	(27.8%)	187	(72.2%)	*p* < .05
	PPSV23 uptake				
Smoker	No		Yes		
No (*n* = 242)	159	(65.7%)	83	(34.3%)	
Yes (*n* = 47)	38	(80.85%)	9	(19.15%)	
Total (*n* = 289)	197	(68.17%)	92	(31.83%)	*p* < .05

CHAPTER 6
DISCUSSION

Following a brief review, Chapter 6 will present an interpretation of statistical analyses of the major findings within the context of the literature and theoretical underpinnings. In addition to answering the study aims, several findings extraneous to the study aims but relevant to the overall purpose will also be discussed. Moreover, this section will address study limitations and implications for future practice, as well as research and policy recommendations.

Review

It is estimated that pneumococcal pneumonia is directly responsible for 5,000 deaths in the United States annually (Flowers, 2007). Case fatality rates for pneumococcal pneumonia in 1997 were estimated to be 12% (Feikin, 2000). A decade later, the case fatality rate remained 10% and it is estimated that the rate is much higher among the elderly who often go undiagnosed (CDC, 2009). The incidence of pneumococcal illnesses has been found to be higher among African Americans than their Caucasian counterparts in the US by two to four-fold (Butler & Schuchat, 1999). A better understanding of the characteristics consistent with the vaccinated portion of the population is needed in order to address and eliminate disparities; therefore, the purpose of this study was to examine factors such as age, gender, SES, vaccine awareness, knowledge, trust in healthcare provider, perceived health, perceived susceptibility, perceived severity, prior negative experiences with vaccines, and healthcare provider recommendation for vaccination to predict pneumococcal vaccine uptake among eligible African Americans ≥ 18 years of age.

Major Findings

This study revealed several statistically significant factors predicting PPSV23 vaccine uptake. Significant findings in bivariate analyses were the relationships between age, gender, awareness, knowledge, trust in healthcare provider, perceived susceptibility, and healthcare provider recommendation and PPSV23 uptake. Using backward logistic regression, age, vaccine awareness, and healthcare provider recommendation significantly predicted PPSV23 vaccine uptake in the whole model. Consequently, the alternate hypotheses were retained in each instance.

H_a – Sociodemographic variables such as age, gender, and socioeconomic status may predict pneumococcall vaccine uptake among eligible African Americans. The alternate hypothesis is retained given the significant impact age and gender had on PPSV23 uptake in this study.

H_a – Constructs operationalized from the HBM and PAPM such as awareness, knowledge, trust in healthcare provider, perceived health, perceived susceptibility, perceived severity, prior negative experience with vaccines, and healthcare provider recommendation may predict pneumococcal vaccine uptake among vaccine eligible African Americans. The alternate hypothesis is retained given the significant impact awareness, knowledge, trust, perceived susceptibility, and healthcare provider recommendation had on PPSV23 uptake in this study.

Interpretation of Results

Gender

In bivariate analyses, gender was found to significantly predict PPSV23 uptake. With males less likely to be vaccinated than females, gender remained statistically

significant in the regression model until the final iteration, highlighting the importance of this demographic variable for further exploration and possible targeted interventions. Historically, African American males have been less likely to seek out preventative care (Byrd, et al., 2011). Moreover, males come into contact with healthcare providers less often than their female counterparts (Byrd), thus decreasing the likelihood that their healthcare provider would have the opportunity to recommend the PPSV23 vaccine. Unfortunately, this population suffers a disparate burden of chronic illnesses such as hypertension, diabetes, and renal, disease all of which place African American males at a higher risk for pneumococcal illnesses. A prospective exploratory analysis conducted by Klag, et al., (1997) found that African American males had a 44.22 per 100,000 case incidence of end stage renal disease (ESRD) compared with a rate of 13.90 per 100,000 with their Caucasian counterparts. Diabetes, poorly controlled hypertension, and smoking were cited as some of the reasons for the marked increase in ESRD among African Americans. In another study HIV prevalence between genders and ethnicities was evaluated using a multisite survey (n = 3,316) and African American males were found to have the highest prevalence of HIV (16%) compared to only 6.9% for Latino males and 3.3% for Caucasian males (Harawa, et al., 2004). Given the increased risk factors for pneumococcal illnesses, underutilization of healthcare systems, and well documented under vaccination rates among African American males, more emphasis on the health of this population and their rationale for accessing or refusing preventative care is sorely needed.

Awareness, Knowledge, and Healthcare Provider Recommendation

The constructs of awareness and knowledge are, by definition, different from one another. Accordingly, they were examined separately for the purposes of this research. With each variable statistically significant in the regression model after controlling for the demographic variables age and gender, this prospective study demonstrates that PPSV23 acceptance may depend largely on awareness and knowledge. From a common sense perspective, one could conclude that if a person was unaware of the vaccines' existence, he or she would remain unvaccinated. Moreover, lack of knowledge concerning risks, benefits, eligibility, and availability would likely produce similar findings. Though each of the participants in the pneumococcal study met eligibility criteria for PPSV23, 141 (47.8%) had never heard of vaccine before study, 198 (67.1%) did not know who should receive the vaccine, and 143 (48.47%) felt they did not have enough information about the vaccine to make an informed decision. Moreover, 67 (22.7%) participants answered the knowledge question with a neutral response implying they also lacked adequate information to accept PPSV23. These findings are congruent with a large body of literature suggesting that vaccine uptake could be improved significantly with educational strategies aimed at enhancing knowledge and addressing the unique needs of a given population (Berkley-Patton, et al., 2010; Daniels, Juarbe, Rangel-Lugo, Moreno-John, & Pérez-Stable, 2004; Thomas, Ray, & Morton 2003).

Focus groups conducted in faith based communities in San Francisco (*n* = 22) found that participants were not routinely informed of vaccine indications, benefits, and side effects when visiting their healthcare providers (Daniels, et al., 2004), thus

highlighting missed opportunities to educate and subsequently vaccinate eligible adults. Reasons for these missed opportunities to educate the lay public and enhance vaccine uptake are not entirely clear; however, a number of studies (Fry, 2008; Rushton, Ganguly, Sinnott, & Banerji, 1994) have identified deficient knowledge among healthcare providers themselves leading the author to conclude that awareness, knowledge, and healthcare provider recommendation are interwoven.

In 2008, Fry conducted a prospective quantitative survey among registered nurses in an acute care setting and found that the primary reason nurses did not follow protocol for encouraging and administering PPSV23 to inpatients was their own lack of knowledge (unpublished thesis). Similarly, a study examining internal medicine residents' knowledge of PPSV23 indications, safety, and efficacy (n = 33) found a sizable number 69.7% of participants were unaware of vaccine guidelines, and 60.6% had an exaggerated fear of adverse reactions, thus presenting a significant barrier to provider recommendation (Rushton, et al., 1994). If physicians and nurses lack the proper information on PPSV23, it stands to reason that they will not educate their patients or otherwise endorse vaccine uptake.

While variables such as age and gender may be non-modifiable barriers to vaccination, awareness, knowledge, and recommendation can most assuredly be changed with a concerted effort among healthcare providers and public health officials. Gaps in awareness and knowledge, identified in this dissertation study and the work of others, provide healthcare professionals and public health officials with a number of actionable items on which to frame interventions. Interventions such as targeted messages for underserved at risk populations, faith-based outreach programs, and

healthcare provider education modules may prove beneficial and have been detailed in the recommendations for future research, practice, and policy section.

Trust

The relevance between provider trust and vaccine uptake was examined carefully in this dissertation study and findings in bivariate analyses suggested that participants with higher trust scores were more likely to be vaccinated. When controlling for age, gender, awareness, and knowledge in the regression model, trust did not remain significant perhaps because participants in the pneumococcal study had fairly high trust scores overall (*n* = 295, mean trust score 39.27, range 10-50). Another possible explanation for these findings is the difference in trust scores between age and gender categories. Younger participants had lower trust scores than older participants, and males had lower trust scores than their female counterparts.

Findings between trust and PPSV23 uptake in the pneumococcal study are congruent with a sizable body of evidence supporting the relationship between trust in healthcare providers and increased adherence to preventative health behaviors such as vaccine uptake (Altice et al., 2001; Sohler, et al., 2007; Thom et al., 1999). Further, although not measured in the pneumococcal study, the literature overwhelmingly supports the notion that African Americans are less trusting of healthcare providers than their Caucasian counterparts (Boulware, Cooper, Ratner, LaVeist, & Powe, 2003; Doescher, et al., 2000; Saha, Komaromy, Koepsell, & Bindman 1999). Rationale cited in the literature for this phenomena includes historical influences such as slavery, the Tuskegee incident, and discrimination which persists even today leaving a lasting impression on many members of the African American community, and leading them to

feel exploited, distrustful, and reluctant to follow prescribed treatment regimens, or preventative health interventions (Thomas, & Quinn, 1991). Undoubtedly, there are many African Americans whose parents or grandparents can still provide first-hand accounts of the Tuskegee atrocity. Given the historical backdrop, it would seem intuitive that older males would be the least trusting of all; however, this did not prove entirely true in the pneumococcal study. While males were less trusting than females, younger participants were less trusting than their older counterparts.

Much of the literature (Allen, et al., 2007; Armstrong, Ravenell, McMurphy, & Putt, 2007; Jones, et al., 2009) found on trust focused on patterns between races as opposed to within and between genders and age categories. A few studies (Allen, et al., 2007; Benkert, Hollie, Nordstrom, Wickson, & Bins-Emerick, 2006) did cite gender barriers to trust within the African American population as a central issue of concern, but it does seem as though there is a gap warranting further exploration. An unexpected finding in the pneumococcal study was the statistically significant difference in trust between younger and older African Americans. Participants age 18-25 (n = 19) had a mean trust score of 37.79, whereas those ages 56-64 (n = 48) had a mean score of 44.

No studies examining African Americans, age, and trust in healthcare provider were identified in the literature, again highlighting a potential gap in the state of the science. That said, as an experienced nurse, the researcher believes one possible explanation for lower trust scores among younger participants is the changing healthcare delivery system. Anecdotally, older patients are much more likely to blindly trust their healthcare provider taking medications and having procedures they often don’t understand because the physician told them it was necessary. The paternalistic

nature of the physician patient relationship has begun to evolve over the past two decades into more of a partnership where the patient is now a client and the physician or extender engages in a conversation about treatment options rather than a dictatorial relationship. Yet challenges do remain with one author calling the current state of care "a crisis in communication between physician and patient and in the trust in health care professionals in general" (Hoffman, 2002, p 89).

Another plausible explanation for the differing trust scores between age groups in the pneumococcal study is the premise that a trusting relationship between patient and provider develops over time through multiple encounters and familiarity. Though the dynamics of trust between provider and patient cannot be explained in a simplistic manner, a study using semi structured interviews in the UK (*n* = 20) found that trust was fragile, easily undermined, and developed over time as a series of positive interactions unfolded. Though the authors in this study did not break trust out into age categories, they emphasized continuity over time as a crucial component to trust (Tarrant, Dixon-Woods, Colman, & Stokes, 2010). If this holds true, it would stand to reason that older patients who have likely been seeing a given provider for a longer period of time would be more trusting.

In another study (Grande, Shea, & Armstrong, 2011), authors examined how trusting relationships were affected when patients believed their healthcare provider received gifts from pharmaceutical companies. In a telephone based interview, participants were asked if they believed their personal physicians and/or all physicians accepted gifts from pharmaceutical companies. African American (*n* = 762) and Caucasian (*n* = 1297) participants who believed gifts were accepted by their physicians

were far less likely to trust their providers and the healthcare system in general. Analyses revealed that 55% of respondents believed their personal physician did accept gifts. Further, 31% believed all physicians accepted gifts routinely. Similar to our pneumococcal study, younger respondents were less trusting of their healthcare providers. In this instance, lack of trust among younger patients was related to the widespread belief that physicians accepted pharmaceutical gifts with 64.9% of participants' aged 40-64 believing gifts were accepted, and only 26.4% of those ages 65 and above holding this belief (Grande, et al.). Though the Grande study concluded that lower trust was related to acceptance of pharmaceutical gifts, additional variables not included in their study could also be contributory. There was no obvious explanation for the lower trust scores among younger participants in the pneumococcal study, which is why more research on this subject is recommended.

Findings in the pneumococcal study yielding lower trust scores among males than female participants were found to be congruent with existing literature in related areas. Bass, et al. (2011), used focus groups to examine perceptions of colorectal screening among African Americans and found that males were less likely to be screened than their female counterparts (n = 22), in part due to distrust and actual or perceived racism. Moreover, numerous studies have reported that African American males go to the doctor less often than their female counterparts (Allen, et al., 2007), which may provide a parsimonious explanation for a less developed rapport with their healthcare provider, hence lower trust. While the pneumococcal study findings are consistent with the colorectal screening study in as much as males were less often vaccinated and had

lower trust scores overall, more research is needed to better understand differences found between trust and gender among African Americans.

In post hoc analyses, one final variable, racial concordance with healthcare provider as a means of enhancing trust was examined using data from the VUQ. In total, 69 participants in the pneumococcal study reported being racially concordant with their healthcare provider. Of these 69 participants, 27 (39.13%) were vaccinated, whereas among those without racially concordant providers (n = 198), 55 (27.77%) were vaccinated with PPSV23. Though not statistically significant, χ^2 (1, n = 293) = 2.058, p >.05, a difference in vaccine uptake between groups of 11.36% may well be clinically significant, and findings are consistent with literature citing racial concordance between patient and provider as a means by which to enhance trust and facilitate adherence to preventative measures and treatment modalities (van Wieringen, 2002).

According to Cooper & Powe (2004), African Americans are “poorly represented” in the healthcare profession with fewer than six percent of physicians and nine percent of nurses in the United States self-identifying as African American. Although no studies were found linking racial concordance with improved patient outcomes overall, a number of studies linked concordance with higher patient satisfaction, better communication, and higher overall trust scores (Cooper, 2004; Malat, 2001; & Oliver, 2001). A study conducted in 16 urban primary care clinics in 2003 used pre and post visit surveys to examine the relationship between racial concordance and patient satisfaction. Authors of this study found that patients with racially concordant providers had longer visits (+2.15 minutes, 95% CI 0.60-3.71), higher satisfaction scores, and a more collaborative relationship (+8.42 points, 95% CI 3.23-13.60) (Cooper). With a large

body of evidence linking trust in healthcare provider with provider concordance, it is recommended that future research on concordance focus specifically on patient outcomes in order to strengthen the argument for policy change encouraging recruitment of African Americans into the healthcare field. These recommendations are discussed in further detail in the policy section of this chapter.

Despite the non-modifiable variables historical backdrop and possibly racial concordance, there are a number of actionable items which could influence and improve trust in healthcare provider among African Americans. Although not all inclusive, reasons attributing to distrust of healthcare providers in contemporary society included excessive wait times, poor quality of care, bias and stereotyping on the part of the health care provider, perceived racism, lack of continuity of care, perceived acceptance of pharmaceutical gifts, and poor communication (Bass, et al., 2011; Grande, et al., 2011; & Smedley, et al., 2002). In the past decade, trust has been increasingly recognized as a crucial component of health care; however, challenges with measuring the construct and the development of targeted interventions leading to improved trust in healthcare provider remain elusive given the multi-dimensional nature of the construct (Hall, Dugan, & Zheng , 2001). In order to develop a successful vaccination program for PPSV23, providers must not only be educated on vaccine indications and provide recommendation for the vaccine, they must also develop and nurture a trusting relationship with their patients or under vaccination, particularly among African Americans, will likely continue.

Unsure

Using the VUQ, a priori analyses found that 24 subjects reported unsure/unknown vaccine status. This problem is not unique to the pneumococcal study. Difficulty determining PPSV23 vaccination status is a persistent problem in the literature among healthcare professionals with approximately 57% of physicians reporting unknown vaccination status as a significant barrier to this important preventative health measure (Mieczkowski & Wilson, 2002). Practice guidelines suggest that anyone with unknown PPSV23 vaccine status be revaccinated (CDC, 2010); however, this can result in localized pain and inflammation at the injection site which, although not serious, would be uncomfortable for the person and potentially lead to a negative attitude towards future vaccines.

Revaccination among adults age 18-64 is relatively uncommon; however, the same cannot be said of the population aged 65 and older. Currently, guidelines state that PPSV23 should be given at the age of 65 even if a person has been previously vaccinated. That said, there are no definitive guidelines for the interval between these vaccinations; therefore, it is feasible that a person could receive PPSV23 at age 64 due to a pre-existing condition such as diabetes, then be revaccinated at the age of 65 just by virtue of their age. As many as 18% of adults aged 65 and over have reportedly been revaccinated, often within an interval of five years or less (Jackson, Baxter, Naleway, Belongia, & Baggs, 2009). Unlike most vaccines currently offered to adults, PPSV23 eligibility criteria are somewhat confusing even to healthcare providers (Fry, 2008; Mieczkowski, et al., 2002; & Shevlin, et al., 2002), which could explain why some

remain unvaccinated while others receive needlessly repeated PPSV23 immunizations. Moreover, there is a financial burden associated with revaccination.

The burden of revaccination cost must be assumed by someone, whether the individual or the insurance company, thus contributing to rising costs and wasteful spending in healthcare. A careful examination of this persistent oversight is, therefore, one of the recommendations of this dissertation study. With the advent of electronic personal health records, it may be possible for individuals to maintain better records of immunization moving forward. A multidisciplinary task force whose purpose was to identify barriers to PPSV23 uptake found that incomplete or inaccessible documentation was a significant problem (Rehm, File, Metersky, Nichol, & Schaffner, 2012). Although it is yet unclear whether or not electronic health records (EHR) would impact personal record keeping in a positive way, an integrated EHR with interface capabilities between healthcare facilities would unquestionably reduce duplication and eliminate some of the widespread repetition of diagnostic procedures, treatments, and preventative measures, such as immunization, currently seen in both acute and primary care settings. Recommendations for handling unknown/unsure vaccine status are discussed further in the practice section.

Refusals

PPSV23 refusers were also examined in a priori analyses. A single-item question on the VUQ asked participants, “Have you ever refused the pneumonia vaccine?” While 29 (9.8%) reported vaccine refusal, nine of them also reported having received PPSV23. Upon further consideration, the question as it was worded could not be considered mutually exclusive of actual vaccination and is therefore discussed in the

limitations section. Despite the poor performance of the refusal question, refusal reasons provided by participants, such as fear of needles and cost, (Figure 5-1) were congruent with the literature such as the study focusing on refusal reasons, whereby authors examined 500 medical records investigating PPSV23 and found that healthcare provider gender discordance, and the absence of a “usual” healthcare provider were statistically significant (OR 2.09, CI 1.07 - 4.09, p <.05, and OR 2.26, CI 1.13 - 4.49, p <.005 respectively) (Miller, Kourbatova, Goodman, & Ray, 2005).

Gender discordance between provider and subject was not addressed on the VUQ; therefore, results from the Miller, et al. study cannot be compared with this variable. Although not identical to the Miller study, participants in the pneumococcal study were asked, “Where do you typically seek care”, with response options as follows: doctor’s office, emergency department, urgent care clinic, health department, free clinic, or other. The majority of participants reportedly received care in a doctor’s office (n = 237, 80.3%), with 14 (4.7%) responding that they used the ED for care. PPSV23 refusals and care seeking locations were evaluated in post hoc analyses using chi-square analyses and did not prove significant. Nevertheless, those who typically received care at a doctor’s office refused at a rate of 10%, whereas those who received care in the emergency department or a free clinic refused at rates of 14% and 33% respectively.

Based on prior discussions reporting higher vaccine acceptance rates when a long standing trusting relationship exists between patient and provider, it is reasonable to assert that those who seek care in facilities such as the ED, where continuity of care with the same provider could not be expected, would be more inclined to refuse. With

the exception of the Miller et al. study, no other research was found linking vaccine refusals to primary care locations. In order to more fully evaluate the demographics and characteristics of vaccine refusers, a larger study with more rigor than a medical record review is, therefore, suggested and detailed in the future research section.

Age, Perceived Health, and Perceived Susceptibility

A number of studies, have asserted that perceived health and perceived susceptibility influence the likelihood of an individual engaging in preventative health behaviors (Dassow, 2005; Rimple, Weiss, Brett, & Ernst, 2006; Santibanez, et al., 2002). Perceived health is an individual's perception of his or her well-being as opposed to an objective assessment which might consider factors such as the presence of a disease process or disability (Cummings & Jackson, 2004). When an individual perceives themselves as healthy, they in turn tend to perceive themselves less vulnerable. This inverse relationship was evident in the pneumococcal study and congruent with existing research. Because perceived health and susceptibility are subjective, the mere presence of a disease process such as diabetes or COPD may or may not lead the individual to report themselves as unhealthy or vulnerable. Several studies (Glover, 2010; Hunt, 1980; Ru-Chien, et al., 2006) have emphasized the importance of obtaining subjective health status information from individuals to examine the relationship between perceived health and susceptibility and accessing preventative services.

Based on results from the SF-12v2™ portion of the VUQ, perceived health was not significantly predictive of PPSV23 uptake in bivariate analyses or the overall logistic regression model. Upon further examination of perceived health and susceptibility

analyses, a pattern was identified between age groups. Younger participants perceived themselves as healthier than older participants with a mean perceived health scores for those aged 18-25 at 47, compared with a mean score of 41.41 for those aged 65-75, and 37.09 for subjects over 75. Post hoc bivariate analyses identified statistically significant perceived health and perceived susceptibility scores between age groups. While this may not be surprising, the concern lies in the fact that all of the subjects in the pneumococcal study (even those under 65) met eligibility criteria for PPSV23 based on their preexisting disease processes. Consequently, despite their subjective interpretations of health and vulnerability, they may well be at risk for pneumococcal illnesses.

Prior to this study, research on PPSV23 uptake has largely focused on persons aged 65 and older likely because of automatic eligibility and because elderly are at increased risk of pneumococcal illnesses (Albanese, 2002; Butler, 1999). Nevertheless, if the pneumococcal study (n = 295) is representative of the African American population at large, a great percentage of persons under 65 are indeed PPSV23 eligible and potentially falling through the cracks. Based on self-reported age on the VUQ, 87 of the 295 participants were 65 or older, highlighting the importance of including the 70.5% of eligible adults who've been largely excluded in prior PPSV23 research. Intuitively, a healthy 65 year old person is far less likely to get pneumonia than a 45 year old smoker with immunological suppression, though this would be very difficult to measure. Perhaps youth creates a false sense of security with respect to perceived health and susceptibility, thus contributing to under vaccination in this particular population.

Though findings in the pneumococcal study were intuitively as expected, there is conflicting data in the literature on perceived health and age. Some studies reported that younger participants were more likely to perceive themselves in better health (Cott, Gignac, & Badley, 1999; Denton & Walters, 1999), while others, reported that perceived health actually improves with age (Damian, Ruigomez, Pastor, & Martin-Moreno, 1999; Smith, Shelley, & Dennerstein, 1994). Perhaps some of the variance is due to the wide range of instruments designed to measure perceived health. Though as previously discussed, the SF-12v2™ used in the pneumococcal study is widely accepted as a valid reliable measure of perceived health, there is also a great deal of support for a single-item question, such as the one in the BRFSS, despite its simplicity (Benyamini & Idler, 1999; Bosworth, 1999).

Examination of the literature also illuminates the fact that perceived health is a highly complex and multi-dimensional factor, with each respondent assessing his or her own health a little differently. For example, in a secondary analysis of 1485 older adults with hypertension, some adults with hypertension perceived themselves as very healthy, while still others perceived themselves as unhealthy by virtue of the fact that they didn't eat enough fruit or exercise as often as they would like. When the authors examined non-modifiable and modifiable factors thought to be predictive of lower perceived health, they found that age, SES (using education as a proxy variable), and the presence of one or more chronic illnesses accounted for much of the variance in the overall model in this older population (Lewis & Reigel, 2010).

Based on the diverse measurement options, conflicting reports in the literature, and individualized beliefs that seem to influence perceived health, it is difficult to draw

any conclusions from the findings in the pneumococcal study in regards perceived health. However, given the descriptive statistics which clearly show that younger people perceiving themselves as healthier, and less likely to be vaccinated than older participants despite universal eligibility, more research on the impact perceived health has on preventative care is sorely needed. Further, the studies supporting the use of a single-item measure for perceived health (Chandola & Jenkinson 2000; Mossey & Shapiro 1982; Ross & Wu 1995), as opposed to a questionnaire such as the SF-12v2™, create an opportunity for a comparative study between instruments. Each of these possibilities is discussed further in the recommendations for future research section.

Perceived Severity

Cumulative severity scores for pneumonia were quite high with 98.6% of respondents (*n* = 281) believing that pneumonia was very serious and could lead to death. This perception did not translate to vaccination however, which is somewhat inconsistent with findings in the literature supporting an increase in preventative health behaviors when perceived severity is high (Dassow, 2005). In an endeavor to better understand this divergent finding, the concept of fatalism was explored in the literature. Two definitions for the term fatalism were found: on one hand, fatalism is defined as the belief that a given disease (e.g. cancer) is a death sentence and therefore screening (e.g. mammogram) would not be of any benefit. The second, more relevant definition for the purposes of the pneumococcal study holds that contracting an illness or a disease is “fate” which is not something that can be planned for, prevented, or controlled (Bryant, Nakagawa, Gregorich, & Kuppermann, 2010; Spurlock & Cullins, 2006).

According to the literature, persons who embrace this premise are far less likely to engage in preventative health behaviors because they are not seen as making a difference (Spurlock & Cullins, 2006). Moreover, studies have found that African Americans, particularly women, are more likely to embrace the perception of fatalism (Mayo, Ureda, & Parker, 2001; Facione, Miaskowski, Dodd, & Paul, 2002). All of the studies on the construct of fatalism pertained to cancer screening and pregnancy, each supporting the notion that when perceived fatalism was high, preventative health behaviors were low. No studies were found on the topic of fatalism and vaccine uptake, thus highlighting a potential gap in the literature.

Theoretical Framework

The Health Belief Model (HBM) has been used extensively in research to explain or analyze preventative health behaviors, including vaccine uptake (Becker et al., 1977; Mirotznik, Feldman, & Stein, 1995). According to the Health Belief Model, motivation to engage in preventative health measures may stem from perceived disease risk (susceptibility), perceived disease severity, and overall perceived benefits (Thanavaro Moore, Anthony, Narsavage, & Delicath, 2006). The Health Belief Model does not, however, take preventative behavior awareness or knowledge into account. For example, a person may perceive pneumonia to be a very serious illness which could lead to death; however, they may be completely unaware of the availability of the PPSV23 vaccine's existence. The Health Belief Model and Precaution Adaptation Model were consequently substructed for this study based on the author's clinical experience whereby lack of awareness has been shown to impact vaccine uptake repeatedly. The

model (Figure 4-1) provided a framework on which to pin all of the constructs of interest in a manner that was logical and easy to follow.

Each dimension of the model (perceived barriers, cues, and perceived health) functioned as predicted with the exception of perceived severity which was not statistically significant in bivariate analyses or the logistic regression model. Though beliefs about severity were quite high in this study, it is quite possible that perceived susceptibility mediated perceived severity, particularly given the fact that very few (*n* = 24) considered themselves highly susceptible to pneumonia. It is also possible that the aforementioned construct of fatalism played a role in perceived severity versus PPSV23 uptake although this was not measured on the VUQ. One of the unique aspects of this dissertation is the fact that to our knowledge no research has been performed on the relationship of pneumococcal illness to Health Belief Model constructs for vaccine uptake as a preventative health behavior. Additionally, no works with substructed models from the HBM and PAPM were found despite the fact that awareness appears to play a critical role in vaccine uptake.

Lessons Learned

A number of important lessons worthy of discussion took place during the dissertation process, particularly in the data collection phase of the study. Some of the decision points and challenges will now be discussed in detail. As the researcher prepared to begin data collection, nine churches were contacted via telephone, letter, or e-mail requesting permission to conduct the pneumococcal study at their facility. Although none of the churches refused the study, seven of the nine did not follow up despite repeated attempts to reach an administrator able to consent to the process. The

two churches who granted permission for the study to take place had very different demographics with the Catholic Church having a much older population than the Baptist church. While this could likely be seen as an advantage for representativeness, the "personality" of each congregation was distinctly different and worthy of some discussion.

Each Sunday over the course of data collection, the PI and RA went to the church together. After only two Sundays, all members of the congregation at the Catholic Church who were willing to participate had done so (*n* = 78). Though prescreening flyers had been circulated and an announcement had been made after services two weeks prior to our arrival, parishioners seemed hesitant to participate. As the PI and RA stood in the lobby after services to encourage individuals to participate, the PI was greeted, but largely ignored. The RA had a much higher success rate when she approached parishioners to complete the survey. While no data were gathered to substantiate this observation, anecdotally it was noteworthy, and theoretically it seems consistent with much of the research suggesting that "outsiders" might have a difficult time recruiting subjects in the African American community (Rivera-Goba, et al., 2011; Smith, et al., 2007). In this instance, choosing an African American RA to assist with the study provided a vital link to the community of interest and seemed to enhance recruitment and participation.

Data collection at the Baptist Church was a different experience, likely due in part to the fact that the Pastor made a compelling speech to the congregation asking them to support the research and because the congregation was larger and had a younger demographic than the Catholic Church. Members of the congregation were very willing

to participate, and after only two visits to Wednesday Bible study and four visits after Sunday church services, 247 surveys had been completed. On one occasion, consent and data collection were quite challenging given the large number of participants (*n* = 79). Although the PI and RA were each on hand, answering questions as they arose was slightly more challenging than it would have been in a smaller setting. Though no significant concerns or problems arose, for future studies, the number of participants on a given day might be restricted.

Study Limitations

Results from this descriptive study had several limitations, thus results should be interpreted with caution. Sample size, instrument validity and reliability, and the descriptive nature of the study were all study limitations. The study population may not be representative of the population in general. Correlation as a statistical measure of a relationship between two or more variables informs the nature of the relationship between the variables, but does not imply causation. Receipt of pneumococcal vaccination was based on self-report and not validated. Each of these limitations will now be discussed in detail.

To determine an adequate sample size, two predictor variables were considered: awareness of vaccine and provider recommendation. From the literature it is estimated that 60% in this population are aware of the vaccine and 50% are cued by their health care provider to receive the PPSV23 vaccine (CDC, 2011; Winston et al., 2006). It was determined that a sample size of 300 would provide adequate power (i.e. power greater than .80). The power analysis was conducted using the POWER procedure in SAS for logistic regression (version 9.2, Cary, N.C.). The level of significance was set at 0.05.

Assuming an unvaccinated rate of .60 and a dichotomous predictor with prevalence between .30 and .70 (for example, between 30% and 70% of the sample report that they are aware of the vaccine), the detectable odds ratio for variable significance is at least 2.1 for a sample size of 300 with power at least .80 (Faul, et al., 2009).Thus, the sample size was still slightly small (*n* = 295) and should be considered a limitation.

Although subjects from two churches were recruited, over-sampling occurred at one of the churches due in part to the larger congregation and because of the willingness of the Pastor to allow the PI greater access. Self-selection bias was likely a limitation as well, because although subjects read a document with eligibility criteria, they were not truly pre-screened. Essentially, subjects themselves pre-screened and decided they would or would not participate. Upon examination of the survey, 26 subjects did not meet the eligibility criteria and were eliminated from the analyses. Monetary compensation may have served as a motivator for participation despite ineligibility in some cases. There was no evidence of self-selection bias immediately obvious in the study other than those who proved ineligible. In other words, subjects' age, gender, vaccine knowledge, etc. appeared fairly randomly distributed. There were no obvious patterns in the findings suggesting that one group or another was more likely to participate other than the fact that 2/3 of the subjects were female. It is well documented in the literature, however, that African American females are more likely to participate in research than males (Rich & Ro, 2002; Satcher, 2003).

In order to obtain IRB approval for the pneumococcal study, subjects had to be completely anonymous with no signature on the consent form and no identifiers on the survey itself. While the anonymous nature of the survey may have protected sensitive

health information and encouraged respondents to be more forthcoming, it also created several limitations. With no identifiers on the survey and data collection taking place at two locations (one Catholic and one Baptist church) over the course of several weeks, there was no way to guarantee that respondents didn't take the survey more than once although there was no evidence that this occurred. The VUQ survey relied entirely upon self-reported data creating a significant threat to validity. Although there were no incentives to be dishonest, inaccurate or carelessly reported data remains a distinct possibility with self-reporting; therefore, results should be interpreted with caution.

The VUQ, although constructed using three previously validated instruments, had not been tested independently prior to utilization in this study. The pilot study served as a venue to explore readability, functionality, and cultural sensitivity, however, questions were not validated using widely accepted statistical methodology such as factor analysis. Many of the questions in the VUQ were created specifically for this study and not previously tested for validity and reliability. Questions for trust and perceived health were taken entirely from validated instruments and were, therefore, of no concern. Questions to evaluate awareness, knowledge, perceived susceptibility, perceived severity, and healthcare provider recommendation were created using the HBM framework, but wording varied from study to study, so these questions were essentially untested prior to this research.

When analyzing the data, it became clear that the survey would provide valuable information for those who had received the vaccine, but limited information on those who had refused it. Although subjects had the opportunity to fill in a response when they had refused, many left this section blank. Others who had not refused the vaccine

completed one or more check boxes indicating refusal reasons, hence a measurement bias for this question is possible. More in-depth data collection, focused specifically on respondents who refused PPSV23, might have been useful in determining how best to reach this population and will likely be considered in future studies. Finally, the question pertaining to education level appeared problematic with a higher than expected number of respondents reportedly having completed graduate school. Though this question was taken directly from the BRFSS, a measurement bias is suspected, but cannot be confirmed.

Implications for Practice, Research, and Policy

At this juncture, PPSV23 uptake disparities among African American adults in the US have been reported in the literature and confirmed in this dissertation study. Although researchers could continue to collect information on PPSV23 uptake across the country, findings appear to be consistent with those reported by the CDC and Healthy People 2020. Results of this dissertation offer an array of explanations and complexities associated with PPSV23 uptake among African American adults including acceptance issues with age, gender, awareness, knowledge, trust, perceived susceptibility, and healthcare provider recommendation. Bearing this in mind, the author recommends that the aforementioned findings from this and other studies be utilized to design targeted interventions for practice, development of future research programs, and to inform policy changes all designed to increase PPSV23 uptake in the African American community. Recommendations will now be discussed in detail.

Implications for Practice

A major emphasis on information and education surrounding pneumonia prevention, risk factors, and PPSV23 vaccine uptake is essential for prevention efforts to be effective. Findings in this research clearly delineate deficits in awareness, knowledge, and healthcare provider recommendation for the vaccine. Moreover, awareness does not necessarily indicate knowledge of vaccine eligibility, risks, benefits, and immunization guidelines. It is, therefore, the author's recommendation that the confusion surrounding eligibility be assuaged not only by targeting the African American community, but the healthcare community itself. Nurses, extenders, and physicians have annual requirements for continuing education. The PI created an education module highlighting the importance of PPSV23 uptake in 2008. This module could be tailored to each audience and offered as a continuing education credit to enhance healthcare provider knowledge of PPSV23, thus producing a sense of urgency with those in a position to make an impact on the problem. Data from this research provides elements to recommend that such an education module be extended to healthcare providers on a larger scale. Integration of PPSV23 vaccine education into continuing education modules for physicians, extenders, and registered nurses, in order to bolster healthcare provider recommendations, is therefore a primary recommendation for practice.

Based on findings from this and other studies (Staffileno & Coke, 2006), African Americans have shown a high affinity for face to face communication and an emphasis on trusting relationships. With this in mind, another recommendation for future practice for public health nurses is to enlist key stakeholders such as community leaders, parish

nurses, and pastors to deliver messages to African American communities about the importance of vaccination in an effort to assuage existing fear and mistrust of outsiders. Moreover, dialogue about cultural sensitivity and the impact it may have on trusting relationships between healthcare provider and patient should begin among healthcare providers with an eye toward decreasing disparities in the African American community. Given the body of literature that supports the development of trust over time, emphasis on the importance of having a regular healthcare provider with whom the individual can build a rapport, maintain a complete and accurate health history, and become a partner in his/her preventative care and treatment regimens is also recommended.

Though smoking cessation efforts are already in place at a high level, many continue to smoke (n = 47 in this study). Development of education and smoking cessation programs targeting the African American community with an emphasis on increased risk factors for many disease processes, including pneumococcal illnesses, should be considered.

Finally, with evidence to support deficient health care among African American men, this study suggests that practitioners strive to identify the unique characteristics of this population pertaining to preventative health and develop targeted interventions to better meet their needs.

Implications for Research

A number of important findings in this dissertation study highlight the need for continued efforts to understand healthcare disparities among African Americans. First, it is recommended that researchers continue to study the construct of trust in healthcare provider, perhaps using CBPR methodology, to ask the African American community

how best to enhance trust between patient and health care providers. Rather than assuming historical influences have shaped trust/distrust, the use of semi-structured qualitative interviews to ask African Americans what specifically leads them to feel trust or distrust in their healthcare provider and the healthcare system as a whole could prove quite useful. Additionally, exploration of patterns in trust between genders and age groups in the African American community to determine if needs and priorities are different could lead to more finely tuned interventions to enhance trust. While there have been studies examining construct of trust in the African American community, a qualitative approach or perhaps CBPR methodology could uncover new information particularly between genders and age groups.

Healthcare provider education and public awareness campaigns would address the three of the significant variables (awareness, knowledge, and provider recommendation) found in this dissertation; however, the issue of trust in healthcare provider as a determinant of PPSV23 uptake would require a much more complex myriad of interventions. More research would likely be needed to better understand the construct of trust by examining whether the issue is with trust in the healthcare provider, pharmaceutical companies producing the vaccine, or the healthcare system at large.

In aforementioned studies, racial concordance appeared to enhance trust and, in turn, compliance with prescribed treatment regimens and preventative health interventions. Studies examining racial concordance and vaccine uptake were not evident in the literature; therefore it is recommended that future research be conducted to examine the relationship between racially matched healthcare providers and PPSV23 vaccine uptake.

Within the VUQ, socioeconomic status was measured using two proxy variables: education, and insurance type. Though as mentioned previously, education has often been utilized as a measure of SES, neither variable performed as expected in this dissertation study. Exploration of variables which might be better suited to measure SES could prove beneficial moving forward. Use of straightforward SES measures such as income may not be readily accessible given the cultural propensity of African Americans to keep such matters private; therefore, it is recommended that discrete measures such as possession of certain durable goods, or perhaps a more detailed question pertaining to education status be explored among African Americans. A study comparing known SES status of a group of African American adults with a series of self-reported proxy variables thought to accurately reflect SES could help inform existing methods of SES assessment moving forward.

Despite high levels of perceived severity for pneumonia, many remained unvaccinated. The construct of fatalism was reviewed briefly in the literature, and to our knowledge no studies focusing on fatalism and vaccine uptake were identified. A closer look at perceived severity and how this variable might interact with the construct of fatalism and affect vaccine uptake among African American adults is therefore recommended. If individuals believe illnesses are out of their control, preventative behaviors such as vaccination may not be considered. A mixed methods study designed to measure the degree to which fatalism influences preventative health seeking behaviors such as vaccination could highlight important cultural barriers and better prepare clinicians for discussion and communication strategies to overcome these barriers.

Florida is one of the few states where Medicaid does not cover the PPSV23 vaccine. Costs associated with a single case of pneumonia, could be measured through examination of Medicaid data. These costs would likely vary from fairly simple cases of pneumonia, to very complex cases where the patient ends up on the ventilator in the intensive care unit for a number of days. Providing policy makers with factual data on the costs associated with caring for patients with vaccine preventable pneumococcal pneumonia could lead to important changes in vaccine coverage for Medicaid recipients and will therefore be a high priority next step in this program of research.

Finally, predictors of vaccine refusal should be examined more carefully. Using the HBM, the author recommends predictor variables; susceptibility, severity, and perceived health be examined more closely with instruments that may be more sensitive than those included on the VUQ and with a larger sample size. Although this dissertation examined vaccine refusals, it was not a major focus, and more research is needed to determine how HBM constructs differentially predict PPSV23 refusals. Perhaps a focus group approach with vaccine refusers would provide more insight for targeted interventions in the African American community.

Implications for Policy Change

Findings from this dissertation may add to the body of existing knowledge on PPSV23 uptake in the African American community and strengthen the argument for policy change pertaining to vaccination guidelines, recruiting African Americans into the health care professions, public service messaging, electronic health record interfaces, and cost,. Each of these items will now be discussed briefly.

With multiple studies emphasizing confusion surrounding eligibility and vaccination criteria, the first recommendation of for policy change is the simplification of PPSV23 uptake recommendation guidelines for ease of understanding and compliance among healthcare practitioners whose recommendation for vaccine is vital. PPSV23 vaccine guidelines in other developed nations such as Canada differ slightly in that everyone over 50 is vaccine eligible. Before undertaking what could be a very costly endeavor, efforts should be made to compare incidence and prevalence of pneumococcal illnesses in countries where guidelines differ. If there is a significant difference in pneumococcal illnesses, we might consider revising guidelines to vaccinate all adults over 50 rather than 65 as well.

As previously mentioned, African Americans remain underrepresented in the healthcare professions. It is therefore recommended that policies be examined with respect to recruitment of qualified African Americans into healthcare professions in order to increase the overall percentage of African American physicians, nurses, and extenders, thus increasing the likelihood of racial concordance between patient and provider.

Cultural sensitivity among healthcare providers has been emphasized in practice for a number of years; however, there is more to be done. Inevitably, providers will sometimes be different from cultural and ethnic perspectives than the patients they serve. While cultural competence is a life-long process, certainly strides can be made to enhance communication across cultures. It is therefore recommended that policies mandating initial and ongoing training on cultural sensitivity be implemented across the healthcare disciplines.

Public health endeavors for influenza vaccination which are already largely in place could also be utilized as a spring board to enhance PPSV23 uptake. Strengthening individual and community knowledge in communities of color is critical to reduce the nearly 33% deficit in vaccine uptake. Although a public policy and messaging would likely have some impact, social networks, faith-based interventions, and grassroots efforts may prove more successful given the African American community's' cultural propensity towards word of mouth information. It is therefore recommended that public health officials utilize existing public service announcements and efforts designed to enhance influenza vaccine uptake as a platform to increase PPSV23 awareness and knowledge.

Across the country, primary, secondary, and tertiary care facilities have undertaken efforts to implement electronic health records. Though this is an important first step, there are a wide variety of EHR systems which often lack the interface capability necessary for seamless transfer of information. While programs exist to facilitate data exchange between hosts, they can be costly and have not yet been widely adopted. In order to enhance record keeping, cut costs, and avoid duplication of services such as vaccination, it is therefore recommended that policies facilitating and mandating interfaces between systems to be explored and implemented.

Finally, although not a major focus of this study, the cost of PPSV23 vaccination and how it impacts vaccine uptake should also be examined more carefully. Lau, et al. (2009) investigated H1N1 vaccine acceptance among age 18-60 in 2009 pandemic and found that 45% were likely to receive a free H1N1 vaccination, but this intention

decreased as the hypothetical cost of vaccination increased, thus hypothesizing that cost was a potential barrier.

Conclusion

A look back at statistics on vaccination reveal that in 2009, only 68.5% of patients surveyed reported had received PPSV23 in their lifetime (BRFSS, 2010). Moreover, according to Healthy People 2020, African Americans are roughly 20-30% less likely to receive the PPSV23 vaccine than their Caucasian counterparts. Given these disparities in vaccination uptake, this study sought to better understand and describe the sociodemographic and belief variables thought to influence African American adults' decisions to accept or decline PPSV23. Descriptive statistics in the pneumococcal study were strikingly similar to the Healthy People report with 119 (40.34%) vaccinated and 176 (59.66%) reportedly unvaccinated despite eligibility highlighting a persistent problem and cause for concern.

Several conclusions were reached as a result of this dissertation work including the significant relationships identified between PPSV23 uptake and demographics such as age and gender, as well as the significant relationships between PPSV23 uptake and the variables; awareness, knowledge, trust, perceived susceptibility, and provider recommendation, thus supporting the substructed theoretical framework and strengthening the overall model. Demographics intertwined with beliefs created a logistic regression model that predicted PPSV23 uptake 83.9% of the time. It is clear that the associations between demographics, health beliefs, and vaccine uptake are complex, thus creating a major challenge for researchers and healthcare professionals is to disentangle the individuals' decision making process regarding immunization into a

series of actionable items/interventions leading to increased PPSV23 uptake and decreased health disparities for pneumococcal illnesses among the African American population.

Consistent with prior research on preventative behaviors such as vaccine uptake, three dimensions of the HBM (perceived barriers, cues to action, and perceived susceptibility) were significant predictors of PPSV23 uptake. With 147 (47.8%) of respondents reporting they were unaware of the existence of PPSV23 prior to this study, adding the dimension “unaware” from the PAPM appeared to strengthen the overall model and may reflect and important finding in the endeavor to increase PPSV23 uptake and narrow the uptake disparity between African Americans and their Caucasian counterparts.

Despite the aforementioned limitations from this descriptive research, this study was the first of its kind to examine age, gender, SES, awareness, knowledge, trust, perceived health, perceived susceptibility, perceived severity, prior negative experiences with vaccines, and healthcare provider recommendation for the PPSV23 vaccine among eligible African American adults of all ages. The sample size of 295 revealed a number of statistically significant predictors for vaccine uptake and may indeed serve as a springboard for future studies where the research can focus specifically on variables with the greatest influence and predictability for this preventative health behavior.

APPENDIX A
ADMINISTRATION GUIDELINES

Pneumococcal polysaccharide vaccine (PPSV)

CDC answers your questions

William L. Atkinson, MD, MPH, and Andrew T. Kroger, MD, MPH, medical epidemiologists with CDC's National Center for Immunization and Respiratory Diseases, answer your questions on pneumococcal polysaccharide vaccine (PPSV).

For complete information on CDC's recommendations for the use of pneumococcal vaccine, go to www.immunize.org/acip

How serious is pneumococcal disease?
An estimated 40,000 cases of invasive pneumococcal disease occur annually. Case-fatality rates are high, particularly when disease results in meningitis (~30%) or bacteremia (~20%). In addition, pneumococcal pneumonia, often a secondary complication of influenza, results in an estimated 175,000 hospitalizations annually.

My patient doesn't have a record of receiving pneumococcal polysaccharide vaccine (PPSV) and can't remember if she has had it in the past. What should I do?
Vaccinate her. People with unknown vaccination status should be vaccinated.

Should all nursing home patients be vaccinated against pneumococcal disease?
Yes. Standing orders for vaccinating people admitted to long-term care facilities can help simplify the procedure (see suggested standing orders at www.immunize.org/standingorders).

In 2008, which groups did CDC add to its recommendations for vaccination with PPSV?
The CDC's Advisory Committee on Immunization Practices (ACIP) reviewed data that showed an increased risk of invasive pneumococcal disease among adults who smoked cigarettes or who had asthma. Consequently, these two groups were added to the categories of adults for whom vaccination is recommended.

My patient has had pneumococcal pneumonia. Is vaccination still necessary for him?
Yes, if he is in a group recommended for PPSV vaccination (see table). More than 90 known serotypes of pneumococcus exist; 23 serotypes are in the current vaccine. Infection with one serotype does not necessarily produce immunity to other serotypes.

Should HIV-positive patients receive PPSV?
Yes. Patients with HIV infection should be given PPSV as soon as possible after diagnosis and a one-time revaccination dose five years later (see table). The risk of pneumococcal infection is up to 100 times greater in HIV-infected people than in other adults of similar age. Although severely immunocompromised people may not respond well to the vaccine, the risk of disease is great enough to warrant vaccination even though there is a chance that the vaccine may not produce an antibody response.

Can I give other vaccines at the same time I give PPSV to a patient?
Yes. PPSV is an inactivated vaccine, which means you can give all other recommended vaccines at the same visit (using separate syringes) or at any later time with no waiting period following PPSV.

When should I vaccinate patients who are planning to have either a cochlear implant or elective splenectomy?
If time permits, give PPSV to such patients at least 2 weeks before surgery.

What needle length is recommended for administering PPSV to adults?
Pneumococcal vaccine may be given either IM or SC. Use a 1–1½" needle for IM, depending on muscle mass. For SC, use a ⅝" needle.

Some physicians in our area order PPSV every 5 or 6 years for their patients. Is this correct?
No. CDC recommends 1 dose of PPSV for most people in a lifetime and 2 doses for certain people (see table below). PPSV is a polysaccharide vaccine that does not boost well, and data do not indicate that more than 2 doses are beneficial.

Who needs to be vaccinated with PPSV?	Who needs a second dose of PPSV?
1. Vaccinate all previously unvaccinated adults age 65 years and older. 2. Vaccinate all adults who smoke cigarettes. 3. Vaccinate persons ages 2–64 years who • have chronic cardiovascular disease (e.g., congestive heart failure, cardiomyopathy), chronic pulmonary disease (e.g., COPD, emphysema, adults with asthma), or diabetes mellitus, or who are cochlear implant patients. • have chronic liver disease (including cirrhosis), are alcoholic, or have a cerebrospinal fluid leak. • live in special environments or social settings (e.g., adults ages 50–64 years who are Alaska Natives or certain American Indian populations if recommended by local health authorities). 4. Vaccinate persons ages 2–64 years with functional or anatomic asplenia (including persons with sickle cell disease or splenectomy patients). 5. Vaccinate immunocompromised persons age 2 years and older, including those with HIV infection, leukemia, lymphoma, Hodgkin's disease, multiple myeloma, generalized malignancy, chronic renal failure (including dialysis patients), or nephrotic syndrome; those receiving immunosuppressive therapy (including long-term systemic corticosteroids or radiation therapy); and those who have received an organ or bone marrow transplant.	A one-time revaccination is indicated for • All children and adults through age 64 years who are at highest risk of serious pneumococcal disease or are likely to have a rapid decline in pneumococcal antibody levels (categories 4 and 5 to the left) if 5 years (or more) have elapsed since the previous dose. • All adults age 65 years and older who were previously vaccinated with PPSV prior to age 65 years if 5 years (or more) have elapsed since the previous dose.

Technical content reviewed by the Centers for Disease Control and Prevention, December 2010.

www.immunize.org/catg.d/p2015.pdf • Item #P2015 (12/10)

APPENDIX B
PRESCREENING TOOL

You are invited to complete this brief screening paper to find out if you are eligible to participate in a research study being conducted by Carla Fry, MSN, RN. Carla is a PhD student at the University of Florida. She has been a nurse for 23 years and her research focuses on keeping people healthy. She wants to learn more about vaccine beliefs and practices among African American Adults.

As soon as you complete this screening paper, you will know if you are eligible, and you will receive information on when and where you can fill out the main survey.

If you are eligible, you will be given a survey that will take 15 minutes to complete. As a way of saying thanks, you will be given a $10.00 gift card as soon as you turn in the survey.

The survey is the only thing Carla will be asking you to complete. All of the information you list is private and you won't include your name anyplace on the survey.

Completing this one page screening tool does not mean you have to participate. You can change your mind at any time. If you have any questions, please contact Carla at the number or e-mail listed below.

Thank you very much!
Carla Fry
creola494@gmail.com
904-485-0718

Are you 65 or older?	☐ YES ☐ NO
Do you currently smoke cigarettes?	☐ YES ☐ NO
Do you have heart disease?	☐ YES ☐ NO
Do you have lung disease?	☐ YES ☐ NO
Are you diabetic?	☐ YES ☐ NO
Do you have liver disease?	☐ YES ☐ NO
Do you have sickle cell disease?	☐ YES ☐ NO
Do you have any type of cancer?	☐ YES ☐ NO
Do you have any type of immune disorder?	☐ YES ☐ NO
Do you have kidney disease?	☐ YES ☐ NO
Has your spleen been removed?	☐ YES ☐ NO
Are you currently on dialysis?	☐ YES ☐ NO
Have you had an organ transplant?	☐ YES ☐ NO
Do you have cochlear implants?	☐ YES ☐ NO
Are you currently taking radiation or chemotherapy?	☐ YES ☐ NO

That's it – you're done! If you answered YES to ANY of the questions above, AND you identify as African American, you are eligible to complete the questionnaire about vaccine beliefs and get the $10.00 gift card

APPENDIX C
VACCINE UPTAKE QUESTIONNAIRE

VACCINE UPTAKE QUESTIONNAIRE

This survey asks for your views about your health, your healthcare provider, your feelings about vaccines in general, and your knowledge about the Pneumococcal (pneumonia) vaccine. It also asks about how you feel and how well you are able to do your usual activities.

For each of the questions, please mark an ☒ in the box or boxes that best describes your answer. All questions contained in this questionnaire are strictly confidential. No information about your personal identity will be shared with anyone. ***Thank you for completing this survey!***

---

1. Gender

Male	Female
☐ 1	☐ 2

2. Race

Which one or more of the following would you say is your race? (Mark one or more.)

a American Indian or Alaska Native ☐ 1

b Asian ☐ 1

c Black or African American ☐ 1

d Hispanic or Latino ☐ 1

e Native Hawaiian or Other Pacific Islander ☐ 1

f White ☐ 1

3. Age

a 18 – 25 ☐ 1

b 26 – 35 ☐ 1

c 36 – 45 ☐ 1

d 46 – 55 ☐ 1

e 56 – 64 ☐ 1

f 65 – 75 ☐ 1

g 76 - 89 ☐ 1

h 90 and over ☐ 1

		Yes ▼	No ▼	
4.	**Is English your first/main language?**	☐ 1	☐ 2	
5.	**Are you a veteran?**	☐ 1	☐ 2	
6.	**Do you live in a nursing home or group home?**	☐ 1	☐ 2	
7.	**Do you <u>currently</u> smoke cigarettes?**	☐ 1	☐ 2	
8.	**Do you get the influenza (flu shot) every year?**	☐ 1	☐ 2	
		Yes ▼	**No** ▼	**Not Sure** ▼
9.	**Is your healthcare provider the same race/ethnicity as you?**	☐ 1	☐ 2	☐ 3
10.	**Before this study, have you ever heard of the Pneumococcal (pneumonia) vaccine?**	☐ 1	☐ 2	☐ 3
11.	**Do you know who is supposed to get the pneumonia vaccine?**	☐ 1	☐ 2	☐ 3
12.	**Do you worry that you will get pneumonia?**	☐ 1	☐ 2	☐ 3
13.	**Have you ever gotten the pneumonia vaccine?**	☐ 1	☐ 2	☐ 3
14.	**If you are <u>NOT SURE</u> if you've gotten the pneumonia vaccine, would you be willing to get it if it were offered today?**	☐ 1	☐ 2	☐ 3
15.	**Have you ever <u>REFUSED</u> the pneumonia vaccine?**	☐ 1	☐ 2	☐ 3

16. If you have ever REFUSED the pneumonia vaccine, can you tell us why? (Mark all that apply)

i I'm healthy; I didn't feel I needed it ☐ 1

j I would have had to pay for the vaccine myself; Vaccine cost too much ☐ 1

k I don't like needles ☐ 1

l My healthcare provider didn't tell me I needed it ☐ 1

m I don't trust vaccines ☐ 1

n I didn't understand the risks and/or benefits; I needed more information ☐ 1

o Other – Please describe ☐ 1

17. What is the highest grade level you have completed? (Mark only one.)

a Grade School ☐ 1

b High School ☐ 2

c GED ☐ 3

d Some College ☐ 4

e Associate's Degree ☐ 5

f Bachelor's Degree ☐ 6

g Graduate Degree ☐ 7

18. How do you pay for medical care? (Mark all that apply.)

a Private Insurance (HMO or PPO) ☐ 1

b Medicare ☐ 1

c Medicaid ☐ 1

d VA benefits ☐ 1

e TRICARE ☐ 1

f Self Pay ☐ 1

g Other – Please describe ☐ 1 _____

19. Where do you <u>most often</u> seek medical care? (Mark only one.)

a Doctor's Office ☐ 1

b Emergency Department ☐ 2

c Urgent Care Clinic ☐ 3

d Health Department ☐ 4

e Free Clinic ☐ 5

f Other – Please describe ☐ 6 _____

20. Which of the following best describes your main healthcare provider? (Mark only one.)

a Physician ☐ 1

b Physician's Assistant ☐ 2

c Nurse Practitioner ☐ 3

d Other – Please describe ☐ 4 _____

For questions 22-31, please consider your primary healthcare provider – that is, the doctor, nurse, etc. you see first for most health problems. He or she makes sure you get the care you need to keep you healthy.

	Please indicate your agreement with each of the following statements.	**Strongly Agree** ▼	**Somewhat Agree** ▼	**Neutral** ▼	**Somewhat Disagree** ▼	**Strongly Disagree** ▼
21.	**My healthcare provider will do whatever it takes to get me all the care I need.**	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
22.	**Sometimes my healthcare provider cares more about what is convenient for [him/her] than about my medical needs.**	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
23.	**My healthcare provider's medical skills are not as good as they should be.**	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
24.	**My healthcare provider is extremely thorough and careful.**	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
25.	**I completely trust my healthcare provider's decisions about which medical treatments are best for me.**	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
26.	**My healthcare provider is totally honest in telling me about all of the different treatment options available for my condition.**	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
27.	**My healthcare provider only thinks about what is best for me.**	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
28.	**Sometimes my healthcare provider does not pay full attention to what I am trying to tell [him/her].**	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

	Please indicate your agreement with each of the following statements.	Strongly Agree ▼	Somewhat Agree ▼	Neutral ▼	Somewhat Disagree ▼	Strongly Disagree ▼
29.	I have no worries about putting my life in my healthcare provider's hands.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
30.	All in all, I have complete trust in my healthcare provider.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
31.	I believe vaccines are safe.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
32.	I work around sick people so I am more likely to get sick.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
33.	I don't have enough information about the pneumonia vaccine to make a decision about whether or not I would accept it.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
34.	I consider myself to be healthy.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
35.	The pneumonia vaccine is effective in preventing pneumonia.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
36.	If I get the pneumonia vaccine, I am less likely to get pneumonia.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
37.	I believe pneumonia is serious.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
38.	I believe pneumonia could lead to death.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
39.	I get sick more easily than others.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
40.	I am at risk for getting pneumonia.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
41.	I would recommend the pneumonia vaccine to my family.	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

	Yes ▼	No ▼
42. Would you get the pneumonia vaccine if it was covered by your insurance plan?	☐ 1	☐ 2
43. Would you get the pneumonia vaccine if you had to pay for it yourself and it cost $45.00?	☐ 1	☐ 2
44. Have <u>you</u> ever gotten sick after getting any type of vaccine?	☐ 1	☐ 2
45. If you answered "Yes" to question 45, what type of symptoms did you have?	_____	
	_____	
46. If you answered "Yes" to question 45, do you believe the illness was caused by the vaccine?	☐ 1	☐ 2
47. Has <u>anyone you know</u>, other than yourself, ever gotten sick after getting any type of vaccine?	☐ 1	☐ 2
48. If you answered "Yes" to question 48, did the person believe the illness was caused by the vaccine?	☐ 1	☐ 2
49. Do you keep a written record of your vaccines?	☐ 1	☐ 2
50. No one really likes needles, but would you say you are afraid of needles?	☐ 1	☐ 2

	Yes ▼	No ▼	Not Sure ▼
51. Has your healthcare provider ever recommended that you get the pneumonia vaccine?	☐ 1	☐ 2	☐ 3
52. If the vaccine was recommended to you by your <u>doctor</u>, would you get it?	☐ 1	☐ 2	☐ 3
53. If you answered "No" to question 53, please tell us why.	_____		

	Yes ▼	No ▼	Not Sure ▼
54. If the vaccine was recommended to you by your <u>nurse</u>, would you get it?	☐ 1	☐ 2	☐ 3

55. If you answered "No" to question 55, please tell us why.

_____

56. Do you have any of the following conditions? (Mark all that apply.)

a Diabetes (either type)	☐ 1
b Heart Disease (Congestive Heart Failure or Cardiomyopathy)	☐ 1
c Alcoholism	☐ 1
d COPD	☐ 1
e Emphysema	☐ 1
f Hypertension	☐ 1
a Liver Disease	☐ 1
g Kidney Disease	☐ 1
h Cancer (any type)	☐ 1
i Sickle Cell Disease	☐ 1
j Leukemia	☐ 1
k Asplenia (Spleen Removed)	☐ 1
l Immune System Disease	☐ 1
m Cerebrospinal Fluid Leak	☐ 1
n Cochlear Implants	☐ 1
o Organ Transplant (any type)	☐ 1
p Currently on Dialysis	☐ 1
q Receiving Chemotherapy or Radiation	☐ 1

	Excellent	Very Good	Good	Fair	Poor
57. In general, would you say your health is:	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

58. The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?	Yes, limited a lot	Yes, limited a little	No, not limited at all
a Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	☐ 3	☐ 2	☐ 1
b Climbing several flights of stairs	☐ 3	☐ 2	☐ 1

59. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Accomplished less than you would like	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
b Were limited in the kind of work or other activities	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

60. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Accomplished less than you would like	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
b Did work or other activities less carefully than usual	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

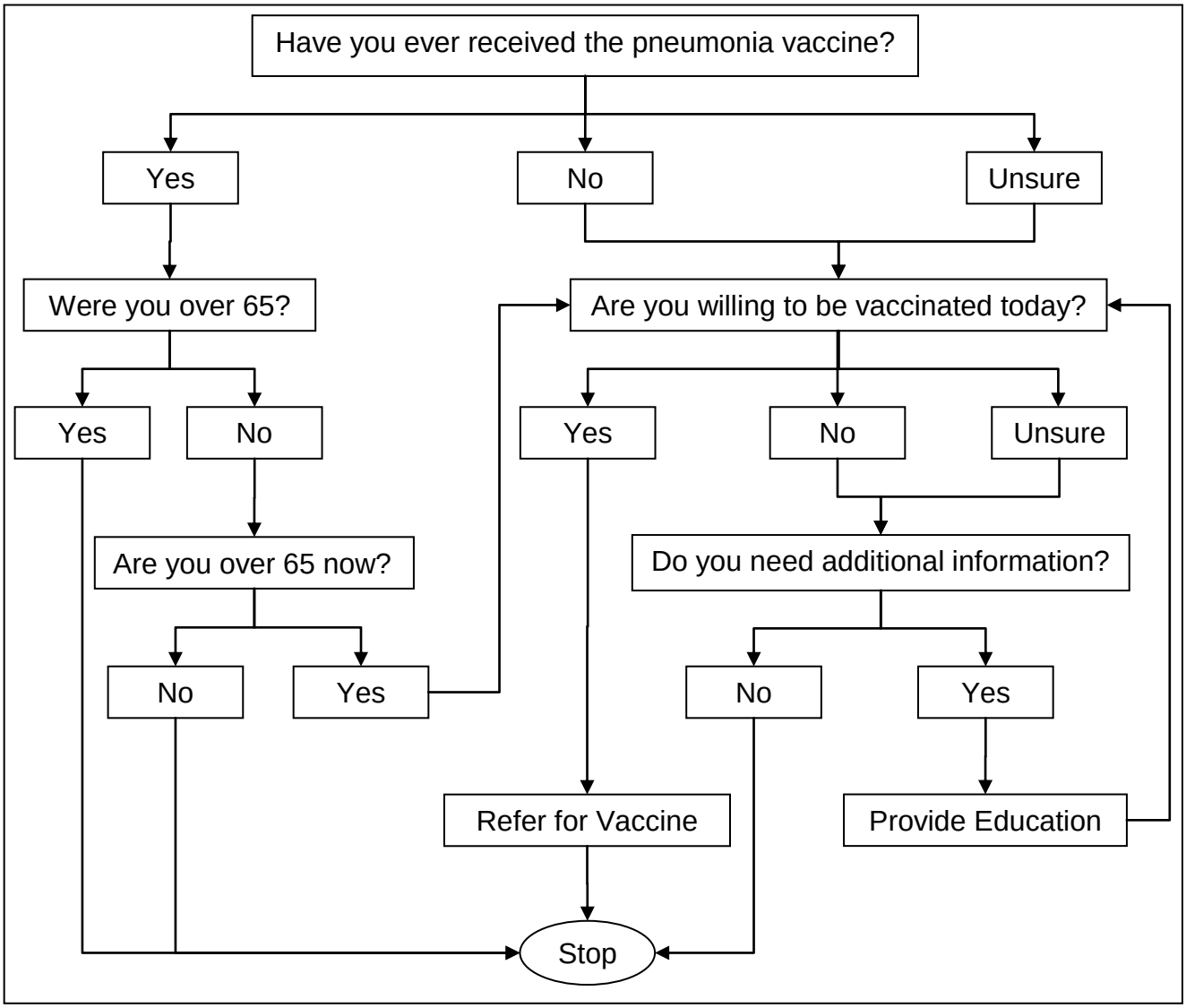
	Not at all	A little bit	Moderately	Quite a bit	Extremely
61. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

62. **These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks…**	**All of the time** ▼	**Most of the time** ▼	**Some of the time** ▼	**A little of the time** ▼	**None of the time** ▼
a Have you felt calm and peaceful?	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
b Did you have a lot of energy?	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1
c Have you felt downhearted and depressed?	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

	All of the time ▼	**Most of the time** ▼	**Some of the time** ▼	**A little of the time** ▼	**None of the time** ▼
63. **During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)**	☐ 5	☐ 4	☐ 3	☐ 2	☐ 1

Thank you for completing these questions!

APPENDIX D
VACCINE UPTAKE DECISION TREE



APPENDIX E
WAKE FOREST TRUST INSTRUMENT (FULL INSTRUMENT)

Wake Forest University Trust Scales

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See generally:

Hall M.A. Researching Medical Trust in the United States. J. Health Organization & Mgt. 20(5): 456-67; 2006.

Hall, M. A., E. Dugan, B. Zheng, and A. Mishra. Trust in Physicians and Medical Institutions: What Is It, Can It Be Measured, and Does It Matter? Milbank Q. 79(4): 613-639; 2001.

Balkrishnan, R., E. Dugan, F. Camacho, and M.A. Hall. Trust and Satisfaction with Physicians, Insurers, and the Medical Profession. Medical Care 41(9):1058-1064; 2003.

Interpersonal Trust in a Physician

10 items scored 5-1 for Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. Negatively worded items (2, 3, and 8) are reverse scored. In a national sample of 959 adults with established primary care relationships (including non-physicians), alpha = .93, mean = 40.8 (77.0 on a scale of 100), SD = 6.2 (15.5)

1. [Your doctor] will do whatever it takes to get you all the care you need.

2. Sometimes [your doctor] cares more about what is convenient for [him/her] than about your medical needs.

3. [Your doctor]'s medical skills are not as good as they should be.

4. [Your doctor] is extremely thorough and careful.

5. You completely trust [your doctor's] decisions about which medical treatments are best for you.

6. [Your doctor] is totally honest in telling you about all of the different treatment options available for your condition.

7. [Your doctor] only thinks about what is best for you.

8. Sometimes [your doctor] does not pay full attention to what you are trying to tell [him/her]

9. You have no worries about putting your life in [your doctor]'s hands.

10. All in all, you have complete trust in [your doctor].

Hall, M. A., B. Zheng, E. Dugan, K. E. Kidd, A. Mishra, R. Balkrishnan, and F. Camacho. 2001. Measuring Patients' Trust in Their Primary Care Providers. Medical Care Research & Review, 2002 Sep;59(3):293-318.

Interpersonal Trust in a Physician -- Short Form

5 items scored 5-1 for Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. Item 1 is reverse scored. In a national sample of 1045 adults with established primary care relationships (including non-physicians), alpha = .87, mean = 20.4 (77.0 on a scale of 100), SD = 3.1 (15.5).

1. Sometimes [your doctor] cares more about what is convenient for [him/her] than about your medical needs.

2. [Your doctor] is extremely thorough and careful.

3. You completely trust [your doctor's] decisions about which medical treatments are best for you.

4. [Your doctor] is totally honest in telling you about all of the different treatment options available for your condition.

5. All in all, you have complete trust in [your doctor].

Dugan, E., M. Hall, F. Trachtenberg. Development of Abbreviated Measures to Assess Patient Trust in a Physician, a Health Insurer, and the Medical Profession, BMC Health Services Research 2005, 5:64, http://www.biomedcentral.com/1472-6963/5/64

Trust in a Health Insurer

11 items scored 5-1 for Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. Negatively worded items (2, 6, 7, and 9) are reverse scored. In a national sample of 410 adults with public or private health insurance, alpha = .92, range = 11-55, mean = 36.5 (58.0 on scale of 100), SD = 7.8 (17.7).

1. You think the people at XXX are completely honest

2. XXX cares more about saving money than about getting you the treatment you need

3. As far as you know, the people at XXX are very good at what they do

4. XXX would pay for you to see any specialist you might need

5. If you asked XXX about what treatments your insurance covers, you think XXX would be totally honest with you.

6. If someone at XXX made a serious mistake, you think they would try to hide it

7. You worry there are a lot of loopholes in what XXX covers that you don't know about

8. You believe XXX will pay for everything it is supposed to, even really expensive treatments.

9. If you got really sick, you are afraid XXX might try to stop covering you altogether
10. If you have a question, you think XXX will give a straight answer

11. All in all, you have complete trust in XXX.

Zheng B, Hall MA, Dugan E, Kidd KE, Levine D. Development of a scale to measure patients' trust in health insurers. Health Services Research. 2002;37(1):187-202.

Trust in a Health Insurer – Short Form

5 items scored 5-1 for Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. Items 1 and 2 are reverse scored. In a national sample of 410 adults with public or private health insurance, alpha= .84, mean = 16.6 (58.0 on scale of 100), SD= 3.9 (19.5).

1. XXX cares more about saving money than about getting you the treatment you need

2. You feel like you need to double check everything XXX does.

3. You believe XXX will pay for everything it is supposed to, even really expensive treatments.

4. If you have a question, you think XXX will give a straight answer

5. All in all, you have complete trust in XXX.

Dugan, E., M. Hall, F. Trachtenberg. Development of Abbreviated Measures to Assess Patient Trust in a Physician, a Health Insurer, and the Medical Profession, BMC Health Services Research 2005, 5:64, http://www.biomedcentral.com/1472-6963/5/64

Trust in Doctors Generally

11 items scored 5-1 for Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. Negatively worded items (2, 7) are reverse scored. In a national sample of 502 adults, alpha = .89, range= 11-54, mean = 33.5 (51.1 on scale of 100), SD = 6.9 (15.7).

1. Doctors in general care about their patients' health just as much or more as their patients do.

2. Sometimes doctors care more about what is convenient for them than about their patients' medical needs.

3. Doctors are extremely thorough and careful.

4. You completely trust doctors' decisions about which medical treatments are best.

5. Doctors are totally honest in telling their patients about all of the different treatment options available for their conditions.

6. Doctors think only about what is best for their patients.

7. Sometimes doctors do not pay full attention to what patients are trying to tell them

8. Doctors always use their very best skill and effort on behalf of their patients.

9. You have no worries about putting your life in the hands of doctors.

10. A doctor would never mislead you about anything.

11. All in all, you trust doctors completely.

Hall, MA, Fabian Camacho, Elizabeth Dugan & Rajesh Balkrishnan, Trust in the Medical Profession: Conceptual and Measurement Issues. Health Serv. Res. 2002; 37: 1436-39.

Trust in Doctors Generally - Short Form

5 items scored 5-1 for Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. Item 1 is reverse scored. In a national sample of 502 adults, alpha= .77, mean = 15.0 (50.0 on a scale of 100), SD= 3.4 (6.8).

1. Sometimes doctors care more about what is convenient for them than about their patients' medical needs.

2. Doctors are extremely thorough and careful.

3. You completely trust doctors' decisions about which medical treatments are best.

4. A doctor would never mislead you about anything.

5. All in all, you trust doctors completely.

Dugan, E., M. Hall, F. Trachtenberg. Development of Abbreviated Measures to Assess Patient Trust in a Physician, a Health Insurer, and the Medical Profession, BMC Health Services Research 2005, 5:64, http://www.biomedcentral.com/1472-6963/5/64

Trust in Medical Researchers Generally

Scored 5-1, strongly agree to strongly disagree, with negative items (3, 5, 8, 11) reverse-coded so that higher score indicates more trust. In pilot testing with 124 adults, overall scale mean was 36.25 (50.52 on a 0 to 100 scale), with a standard deviation of 7.83 (16.32), alpha = .87. Factor model consists of one factor.

1. Doctors who do medical research care only about what is best for each patient.

2. Medical researchers have no selfish reasons for doing research studies.

3. There are some things about medical research that I do not trust at all.

4. A doctor would never ask me to be in a medical research study if the doctor thought there was any chance it might harm me.

5. Medical researchers do not tell people everything they really need to know about being in a research study.

6. The only reason doctors do medical research is to help people.

7. It's safe to be in a medical research study.

8. Some doctors do medical research for selfish reasons.

9. A doctor would never recommend something that is not the best treatment, just so he or she can study how it works.

10. Doctors tell their patients everything they need to know about being in a research study.

11. Medical researchers treat people like "guinea pigs."

12. I completely trust doctors who do medical research.

Mark A. Hall, Fabian Camacho, Janice S. Lawlor, Venita DePuy, Jeremy Sugarman, Kevin Weinfurt. Measuring Trust in Medical Researchers. Medical Care. 44(11):1048-53; 2006.

Trust in Medical Researchers Generally – Short Form

Scored 5-1, strongly agree to strongly disagree, with negative item (3) reverse-coded so that higher score indicates more trust. In a U.S. national survey of 3623 adults, overall scale mean was 12.4 (52.5 on a 0 to 100 scale), with a standard deviation of 2.7 (16.8), alpha = .72. Factor model consists of one factor.

1. Doctors who do medical research care only about what is best for each patient.

2. Doctors tell their patients everything they need to know about being in a research study.

3. Medical researchers treat people like “guinea pigs.”

4. I completely trust doctors who do medical research.

Mark A. Hall, Fabian Camacho, Janice S. Lawlor, Venita DePuy, Jeremy Sugarman, Kevin Weinfurt. Measuring Trust in Medical Researchers. Medical Care. 44(11):1048-53; 2006.

APPENDIX F
PERMISSION TO USE THE WAKE FOREST TRUST SCALE

Re: IPTS - permission to utilize instrument
Mark Hall [mhall@wfubmc.edu]

You forwarded this message on 9/10/2012 10:32 PM.

Sent: Wednesday, May 04, 2011 6:08 PM
To: Fry, Carla
Attachments: Archived attachment list (112 B)

Yes, you may use this instrument, attached.

Good luck with your work.

On 4/21/11 7:39 AM, "Fry, Carla" <cfry1@ju.edu> wrote:

Good afternoon Dr. Hall,

I'm a PhD student at the University of Florida in the College of Nursing. I am conducting a research study examining Barriers to Vaccine Uptake among African American Adults in Northeast Florida. One of the predictor variables in the study is "trust" and I would very much like to use an instrument already demonstrating validity and reliability. May I have your permission to use the IPTS for this study? Of course your work would be properly acknowledged and cited in the dissertation and I will happily send you my results upon conclusion.

If you are able to grant me permission to use the instrument, I would really appreciate it if you could send me a full copy. Thank you very much for your time and consideration. Have a great afternoon.

Carla A. Fry MSN, RN
Assistant Professor of Nursing
Jacksonville University

Connected to Microsoft Exchange

Your Health and Well-Being

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. ***Thank you for completing this survey!***

For each of the following questions, please mark an ☒ in the one box that best describes your answer.

1. In general, would you say your health is:

Excellent	Very good	Good	Fair	Poor
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

2. The following questions are about activities you might do during a typical day. Does <u>your health now limit you</u> in these activities? If so, how much?

	Yes, limited a lot	Yes, limited a little	No, not limited at all
a <u>Moderate activities</u>, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf	☐ 1	☐ 2	☐ 3
b Climbing <u>several</u> flights of stairs	☐ 1	☐ 2	☐ 3

3. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Accomplished less than you would like	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b Were limited in the kind of work or other activities	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

4. During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Accomplished less than you would like	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b Did work or other activities less carefully than usual	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

5. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

Not at all	A little bit	Moderately	Quite a bit	Extremely
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

6. These questions are about how you feel and how things have been with you <u>during the past 4 weeks</u>. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the <u>past 4 weeks</u>…

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
a Have you felt calm and peaceful?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
b Did you have a lot of energy?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
c Have you felt downhearted and depressed?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

7. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

All of the time	Most of the time	Some of the time	A little of the time	None of the time
☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Thank you for completing these questions!

APPENDIX H
SF-12V2™ LICENSE AGREEMENT

QualityMetric

NON-COMMERCIAL LICENSE AGREEMENT
Office of Grants and Scholarly Research (OGSR)

License Number: QM008558

Effective Date: May 11, 2011

Licensee Name: **Carla Ann Fry**

Licensee Address: 605 N Covered Bridge Rd Unit 3 Saint Johns, Fl 32259

Approved Purpose: Non-commercial academic research – Unfunded Student

Barriers to Vaccine Uptake
Study Name:
Study Type: Unfunded Student

Therapeutic Area: Wellness & Lifestyle

Royalty Fee: None, because this License is granted in support of the non-commercial Approved Use below

Other Definitions: As indicated on Appendix B "License Agreement – Details", including without limitation: Licensed Surveys, Modes, Fees, Administrations, Services, Approved Languages and (if applicable) License Term

Licensee accepts and agrees to the terms of this Non-Commercial License Agreement (the "Agreement") from the Office of Scholarly Grants and Research (OGSR) of QualityMetric Incorporated ("QM") as of the Effective Date.

Subject to the terms of this Agreement, including the QualityMetric Non-Commercial License Terms and Conditions attached as Appendix A: (a) QM grants to Licensee, and Licensee accepts, a non-exclusive, non-transferable, non-assignable, non-sublicensable worldwide license to use, solely for the Approved Use and during the License Term, the Licensed Surveys in the authorized Modes and Approved Languages indicated on Appendix B and to administer the Licensed Surveys only up to the Approved Administrations (and to make up to such number of exact reproductions of the Licensed Surveys necessary to support such administrations) in any combination of the specific Licensed Surveys and Approved Languages and Modes and to use any related software provided by QM and (b) Licensee agrees to pay the Fee and other applicable charges in accordance with the attached invoice.

Capitalized terms used in this Agreement and not otherwise defined herein shall have the meanings assigned to them in Appendix A. The appendices attached hereto are incorporated into and made a part of this Agreement for all purposes.

EXECUTED, as of the Effective Date, by the duly authorized representatives as set forth below.

QualityMetric Incorporated [QM]	**Carla Ann Fry** [Licensee]
Signature: Benjamin M. Algeo	Signature:
Name: Benjamin M. Algeo	Name: Carla A. Fry
Title: Controller	Title: MSN, RN, PhD Student Univ. of Florida
Date: 13 May 2011	Date: 5/11/11

APPENDIX A

QUALITYMETRIC NON-COMMERCIAL LICENSE TERMS AND CONDITIONS

Attached to and Incorporated into License No. QM008558

No Commercial Use of Data - Licensee agrees to use the data resulting from Licensee's administration of the Licensed Surveys only for the Approved Use and related academic or scientific uses. Licensee agrees not to use such data for any other purpose or to provide such data to any commercial entity or to any entity for commercial purposes.

License Fees and Payment Terms – Licensee agrees to pay the Fee and all other charges on the subsequent invoice, upon receipt. All amounts are stated in, and all payments shall be in, U.S. Dollars. Licensee shall be responsible for all taxes relating to all fees and charges. Such fees and charges are exclusive of any sales taxes, value added taxes, duties, or other withholding.

License Term and Termination – This Agreement shall be effective until end of the License Term, after which this Agreement and the licenses granted here under shall terminate. Notwithstanding the foregoing, QM may terminate this Agreement at any time upon in the event of a material breach by Licensee or its personnel of this Agreement that is not cured within thirty (30) days following notice to Licensee.

Administration by Students and Third Parties – Students of Licensee may use and administer the Licensed Surveys, subject to such students' execution of QM's Acknowledgement by Students, available by request. A third party service provider may administer the Licensed Surveys on behalf of Licensee, subject to such third party's execution of QM's Acknowledgement By Agent, available by request. However, in all such cases, Licensee shall not be relieved of its obligations, and Licensee shall be responsible for any breach hereof by such student or third party.

Trademark and Copyright Notices – Licensee agrees to reproduce the copyright and trademark notices included with the Licensed Surveys on all reproductions of the Licensed Surveys permitted hereunder, including electronic reproductions and representations.

Records – Licensee shall maintain accurate records, in all material respects, containing information sufficient to verify Licensee's compliance with this Agreement, including as applicable, but not limited to, records of the number of reproductions of the Licensed Survey(s) made, the location of and/or confirmation of the destruction of such reproductions, the number of administrations of the Licensed Surveys performed, and the use(s) made of the data resulting from Licensee's administration of the Licensed Surveys.

Proprietary Rights – Licensee acknowledges that the Licensed Surveys, copyright in the Manuals, and all intellectual property rights related thereto ("Survey Materials"), shall be and remain at all times the property of QM. Licensee shall have no right, title or interest in the Survey Materials except for the limited license described herein. Licensee shall not use, modify, reproduce, or transmit any of the Survey Materials except as expressly provided hereunder in connection with the Approved Use. If the Approved Use includes administration of the Licensed Surveys in physical form, Licensee is authorized to make exact reproductions of the Licensed Survey(s) sufficient to support such administrations.

Ownership of Survey Results Data – Notwithstanding the foregoing, the parties agree that all results of Licensee's administration of the Licensed Survey(s) shall be the property of Licensee.

Confidentiality; Injunctive Relief – Licensee acknowledges that the Survey Materials are valuable assets of QM and that the value of the Survey Materials would be significantly impaired by the unauthorized distribution or use of them. Licensee shall ensure that the Survey Materials are not used for unauthorized purposes or by unauthorized persons, and shall promptly report any such unauthorized use to QM. Licensee acknowledges that, in the event of any material breach of this paragraph by the Licensee, money damages would not be a sufficient remedy, and that QM shall, to the extent permitted by applicable law, be entitled to equitable relief, including injunction. Such relief shall be in addition to all other remedies available at law or in equity.

Disclaimer of Warranty – Licensee understands and acknowledges that complex and sophisticated products such as the Survey Materials are inherently subject to undiscovered defects. QM cannot and does not represent or warrant to Licensee that the Survey Materials are free from such defects, that operation of the Survey Materials will be uninterrupted or error free,

5/11/11

or that its results will be effective or suitable with respect to any particular application. GOODS AND SERVICES HEREUNDER ARE PROVIDED AS-IS, AND QM MAKES NO REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, ARISING BY LAW OR OTHERWISE WITH RESPECT TO SUCH GOODS OR SERVICES OR THIS AGREEMENT, AND DISCLAIMS ALL WARRANTIES INCLUDING WITHOUT LIMITATION ANY REPRESENTATIONS OR WARRANTIES AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT OR OTHERWISE.

LIMITATION OF LIABILITY – REGARDLESS OF WHETHER ANY REMEDY SET FORTH HEREIN FAILS OF ITS ESSENTIAL PURPOSE, IN NO EVENT SHALL EITHER PARTY'S TOTAL LIABILITY FOR ALL CLAIMS ARISING HEREUNDER (EXCEPT FOR INTELLECTUAL PROPERTY INDEMNIFICATION, BREACH OF CONFIDENTIALITY OBLIGATIONS AND CASES OF GROSS NEGLIGENCE OR WILLFUL MISCONDUCT) EXCEED THE AMOUNT OF THE FEES PAID BY LICENSEE TO QM HEREUNDER. FURTHER, IN NO EVENT SHALL QM BE LIABLE TO LICENSEE OR ANY THIRD PARTY FOR ANY SPECIAL, PUNITIVE, INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, ARISING FROM ANY CLAIMED BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT LIABILITY IN TORT, OR ANY OTHER LEGAL THEORY, EVEN IN QM HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. SUCH EXCLUDED DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, LOST PROFITS, COST OF ANY SUBSTITUTE GOODS OR SERVICES, LOST BUSINESS INFORMATION AND DATA, AND BUSINESS INTERRUPTION.

Additional Terms for Use of QM Software – The following additional terms apply to any software provided by QM to Licensee in connection with this Agreement ("Software"). Licensee may install and use one copy of the Software on a single computer, and except for making one back-up copy of the Software, may not otherwise copy the Software. The Software may not be shared or used concurrently on different computers. Licensee may not reverse engineer, decompile, or disassemble the Software, nor attempt in any other manner to obtain the source code. The Software and the algorithms it contains are proprietary information of QM. Licensee shall not attempt to circumvent any function of the Software that limits its use to a certain number of administrations of the Licensed Surveys or to a certain time period. Licensee may not rent or lease the Software to any other person.

Miscellaneous – This Agreement constitutes the entire and exclusive agreement between the parties and supersedes all previous communications or agreements, either oral or written, with respect to the subject matter hereof. This Agreement may not be modified or amended except by an instrument in writing signed by both parties. The Appendices attached hereto are incorporated into and made a part of this Agreement for all purposes.

Notices, copies of notices or other communications shall be sent to a party at the address set forth on the first page of this Agreement. All notices shall be effective upon delivery of the notice at such address.

Any waiver of any breach or default under this Agreement must be in writing and shall not be deemed a waiver of any other or subsequent breach or waiver. Failure to delay by either party to enforce compliance with any term or condition of this Agreement shall not constitute a waiver of such term or condition.

If any provision is this Agreement is determined to be invalid or unenforceable, the remaining provisions of this Agreement shall not be affected thereby and shall be binding upon the parties hereto, and shall be enforceable, as though the invalid or unenforceable provision were not contained herein.

In the event a Licensed Survey or associated QM intellectual property is exported outside of the United States by Licensee, both parties agree that Licensee is obligated and solely responsible for ensuring compliance with all applicable import and export laws and regulations of the United States of America and any applicable foreign jurisdictions. Licensee shall indemnify, defend and hold harmless QM (including payment of all reasonable costs, fees, settlements and damages) with respect to any suits or proceedings brought against QM arising from Licensee's export of a Licensed Survey.

This Agreement and performance hereunder shall be governed in accordance with the laws of the State of New York, but excluding New York choice of law principles. With respect to any dispute arising in connection with this Agreement, Licensee consents to the exclusive jurisdiction and venue in the state and federal courts located in New York City, New York.

This Agreement may be executed in multiple counterparts, each of which shall be deemed an original and all of which shall be deemed the same agreement

5/11/11

Very Important - Please Read

NO formatting or editing changes to the survey

In order to obtain licensing from Licensor no changes can be made to the survey forms. Any format and/or language changes have the potential to affect the survey data received. Therefore, to maintain the validation and integrity of the SF Health Surveys, **no language or formatting changes** allowed. The format of the survey is scientifically engineered to facilitate accurate and unbiased data, as well as keeping the SF Health Survey in a visual format that is comprehensible to the patient/participant, including those who may be impaired and/or elderly. **You should administer the survey in the exact format you will receive it in. The only item Licensee may add is a header with patient identification and / or administration information. If you do wish to add a header please ask for a sample copy of the survey to edit and then submit this to your Account Representative for review prior to signing this License Agreement.** Once the licensing process is completed, you will receive a clean set of Survey Forms in a word and .pdf. file. These are the forms you will administer. **Please do not use any forms you may already have access to as the ones we send you are the most current versions.**

• • •

5/11/11

APPENDIX B

QualityMetric Incorporated

LICENSE AGREEMENT - DETAILS

Licensee: University of Florida
Carla Ann Fry
605 N Covered Bridge Rd
Unit 3
Saint Johns, Fl 32259

License Number: QM008558

Amendment to: N/A

License Term: 08/15/11 to 08/14/12

Master License Term: N/A

Approved Purpose
Barriers to Vaccine Uptake

Study Name:
Protocol:
Govt. ID:
Study Type: Unfunded Student
Clients Reference:

Licensed Surveys (Modes) and Services:

Item	Description	Mode of Admin	Quantity	Fees
PROJ01	Project Registration, includes 1st language	Paper	1	
ES0170	SF-12v2 Health Survey, Standard Recall	Paper	1	

Approved Languages:
United States (English)

ADM012	Subjects Enrolled		200	
ADMINS	Administrations (200 persons with 1 admin)		200	
SS040	Scoring Software 4.0		1	
SS045	SF-12v2: Score the 8 Domains & 2 Summary Measures		200	
SS997	MSE (Missing Score Estimator)		200	
EM038	SF-12v2 Admin Guide e-manual		1	

Approved Languages:
United States (English)

Unfunded Student Discount

Quote expires 6/9/11

TOTAL FEES: 0.00 USD

Payment Terms: Due on Receipt

APPENDIX I
IRB - PILOT STUDY

UF | Institutional Review Board
UNIVERSITY *of* FLORIDA

Health Center Institutional Review Board

FWA00005790

PO Box 100173
Gainesville FL 32610-0173
Tel: (352) 273-9600
Fax: (352) 273-9614

MEMORANDUM

DATE: November 16, 2011

TO: Carla Ann Fry, MSN, RN
605 N Covered Bridge Rd Unit 3
St. Johns, FL 32259

FROM: R. Peter Iafrate, Pharm.D.
Chairman, IRB - 01

SUBJECT: EXEMPTION for IRB #569-2011

TITLE: EXEMPT: ADDRESSING PNEUMOCOCCAL VACCINE UPTAKE AMONG AFRICAN AMERICANS- PILOT STUDY FOR QUESTIONNAIRE READABILITY

Because the only involvement of human subjects in this study met one or more of the Exempt categories (46.101[b]) listed below, your exemption request was granted on November 14, 2011.

If this project changes in any way from what was originally submitted, you MUST submit those changes to the IRB for review.

Thank you for keeping the IRB informed about your research, thereby allowing us to keep accurate files. If the IRB staff can be of any further assistance, please contact the IRB office at (352) 273-9600.

Exempt #2: Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures, or the observation of public behavior, so long as confidentiality is maintained. If both of the following are true, exempt status can not be granted: (a) Information obtained is recorded in such a manner that the subject can be identified, directly or through identifiers linked to the subject, and (b) Subject's responses, if known outside the research, could reasonably place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability or reputation.

cc: IRB file

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APPENDIX J
IRB - FULL STUDY

UF | Institutional Review Board
UNIVERSITY *of* FLORIDA

Health Center Institutional Review Board

FWA00005790

PO Box 100173
Gainesville FL 32610-0173
Tel: (352) 273-9600
Fax: (352) 273-9614

MEMORANDUM

DATE: November 16, 2011

TO: Carla Ann Fry, MSN, RN
605 N Covered Bridge Rd Unit 3
St. Johns, FL 32259

FROM: R. Peter Iafrate, Pharm.D.
Chairman, IRB - 01

SUBJECT: EXEMPTION for IRB #570-2011

TITLE: EXEMPT: ADDRESSING PNEUMOCOCCAL VACCINE UPTAKE AMONG AFRICAN AMERICANS IN THE US

Because the only involvement of human subjects in this study met one or more of the Exempt categories (46.101[b]) listed below, your exemption request was granted on November 14, 2011.

If this project changes in any way from what was originally submitted, you MUST submit those changes to the IRB for review.

Thank you for keeping the IRB informed about your research, thereby allowing us to keep accurate files. If the IRB staff can be of any further assistance, please contact the IRB office at (352) 273-9600.

Exempt #2: Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures, or the observation of public behavior, so long as confidentiality is maintained. If both of the following are true, exempt status can not be granted: (a) Information obtained is recorded in such a manner that the subject can be identified, directly or through identifiers linked to the subject, and (b) Subject's responses, if known outside the research, could reasonably place the subject at risk of criminal or civil liability or be damaging to the subject's financial standing or employability or reputation.

cc: IRB file

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APPENDIX K
ELEMENTS OF CONSENT - PILOT STUDY

UNIVERSITY OF FLORIDA

Appendix B

College of Nursing
Department: Adult and Elderly

PO Box 100197
Gainesville, Florida 32610-0197
Office: (352) 331 1457

PNEUMOCOCCAL VACCINE BELIEFS AND PRACTICES

I am a PhD student at the University of Florida in the college of nursing, and I am conducting a study on pneumococcal vaccine beliefs and practices among African American adults in Jacksonville, Florida. I can be reached at 904-485-0718 or via e-mail: creola494@ufl.edu. My faculty advisor is Dr. Jeanne-Marie Stacciarini and she can be reached by calling 352-331-1457 or e-mailing her at: jeannems@ufl.edu. Although this study will not benefit you directly, the information gained from it may help us to better understand why African American adults choose to accept or decline vaccinations.

If you decide to take part in this study, you will be giving us your opinion about a survey created to collect information on vaccine beliefs and practices. The survey will be used in the near future for a larger study, so it is important that we get the wording right and find out how long it takes to complete. To accomplish this, we will first ask you to complete a survey as we keep track of the time. You will not be turning this copy in, so your answers will be completely private. Next, we will give you the same survey to write on. You should make notes on the survey letting us know if anything is confusing, might need to be worded differently, or even be deleted. After you've made comments on the survey, we will have a group discussion about the survey, what might need to be changed, and how you think other members of the congregation would feel about completing it when the future study begins. We will collect the survey you make comments on, so please don't put your name on it or answer any of the questions. We will also be asking you about how best to recruit potential participants in the future study, the best times to get people to complete the survey, and which type of gift card we should use for participants in the future study. The questions and discussion should take no longer than 90 minutes and lunch will be provided. All of the information you provide will be kept completely private: notes will be taken, but they will not have your name on them, and there will be no coding that could link your answers to your identity. The only risk is that answering the questions may be upsetting to you by reminding you of a difficult time in your life, but this is not anticipated.

If you do not want to take part, you can stay and enjoy lunch, then leave at any time. Also, even if you decide to take part, you are free to change your mind at any time during the survey or discussion and to stop answering the questions. If you have any questions

about your rights as a research subject, you can phone the Institutional Review Board at 352-846-1494.

We are able to pay you $20.00 in the form of a gift card for taking part in this study.

Thank you for your time in reading this letter and thinking about being in this study. If you have any questions, please call me at any time.

Sincerely,

Principal Investigator

APPENDIX L
ELEMENTS OF CONSENT - FULL STUDY

UF UNIVERSITY of FLORIDA

College of Nursing
Department of Health Care Environments & Systems

101 S Newell Drive
PO Box 100187
Gainesville, FL 32611
352-273-6375
352-273-6577 Fax

PNEUMOCOCCAL VACCINE BELIEFS AND PRACTICES

Dear Potential Participant,

I am a PhD student at the University of Florida in the college of nursing, and I am conducting a study on pneumococcal vaccine beliefs and practices among African American adults in Jacksonville, Florida. I can be reached at 904-485-0718 or via e-mail: creola494@ufl.edu. My faculty advisor is Dr. Jeanne-Marie Stacciarini and she can be reached by calling 352-273-6499 or e-mailing her at: jeannems@ufl.edu. Although this study will not benefit you directly, the information gained from it may help us to better understand why African American adults choose to accept or decline vaccinations.

To be eligible to complete the survey, you need to be at least 18 and meet one or more of the following conditions:

- **You are 65 or older**
- **You have diabetes**
- **You currently smoke cigarettes**
- **You have high blood pressure**
- **You have congestive heart failure or cardiomyopathy**
- **You have lung disease (COPD or Emphysema)**
- **You have sickle cell disease**
- **You have kidney disease or are on dialysis**
- **You have liver disease**
- **You have a condition which affects your immune system such as cancer, or HIV.**
- **Your spleen has been removed**

If you decide to take part in this study, you will complete a survey created to collect information on vaccine beliefs and practices. The questions should take no longer than 20 minutes to complete. When you finish the questions, you will place the survey in an envelope, seal it, and then drop it into a lock box. The researchers will be available while you are completing the survey to answer questions or help you with any part of the process. All of the information you provide will be kept completely private: your name will never be collected, and there will be no coding that could link your answers to your identity. The only risk is that answering the questions may be upsetting to you by reminding you of a difficult time in your life, but this is not expected. Nothing further will be asked of you. This is a one-time survey.

The Foundation for The Gator Nation

An Equal Opportunity Institution

UF UNIVERSITY of FLORIDA

If you read this letter and decide you do not want to take part, you are under no obligation to do so. Also, even if you decide to take part, you are free to change your mind at any time and stop answering the questions or choose not to turn the survey in. If you have any questions about your rights as a research subject, you can phone the Institutional Review Board at 352-846-1494.

We are able to pay you $10.00 in the form of a gift card for taking part in this study. We will provide you with this gift card immediately after you complete the survey.

Thank you for your time in reading this letter and thinking about being in this study. If you have any questions, please call me at any time.

Sincerely,

Principal Investigator

The Foundation for The Gator Nation

An Equal Opportunity Institution

APPENDIX M
INVITATION TO PARTICIPATE - PILOT STUDY

Dear Mrs. X,

I am a nurse and a doctoral student at the University of Florida conducting a study to learn about African American adults' beliefs about the pneumococcal vaccine (sometimes known as the pneumonia vaccine).

To learn about vaccine beliefs, I will be asking volunteers to complete a survey that will take about 15 minutes. They will not put their name on the survey and all of the information will be private. When they finish, they will be given a $10.00 gift card for their time.

Before I start the study, I need to get 12 members of the congregation to take the survey and give me their opinion to make sure it is easy to understand and nothing is missing.

You have been selected to participate because you are a key member of the church community and I value your opinion.

My research assistant, Sylvia Roberts, and I will be holding a meeting right after church services on Sunday, Month Date, at 12:30 pm.

During the meeting, I will explain the study, ask you sign a consent form, and ask you to fill out the survey. After you complete the survey, I'm going to ask you some questions about it to see what you think might need to be changed before it is given to others.

The meeting will take 2 hours (we'll be done by 2:30 pm). We will provide lunch and give you a $20.00 gift card for your participation. If you are able to attend, please call me (Carla Fry) at 904-485-0718 by Month Date.

Thank you for considering attending the meeting. Your input will help me learn more about vaccine beliefs among African Americans, and my goal is to help provide services to the community based on the survey results.

After the study is over, if you would like a summary of the results, I will be happy to provide them to you.

Sincerely,

Carla A. Fry MSN, RN Principal Investigator

PhD Student, University of Florida School of Nursing

APPENDIX N
PILOT STUDY QUESTIONS AND SUMMARY RESPONSES

Questions for participants	***Summary Responses - quotes from participants***
What do you think about the appearance of the survey? Is there anything you would change?	*The survey looks good. Can you make it in color?*
Was the font size (writing) large enough to read easily?	*Yes, the font size is fine.*
Was did you think about the length of the survey and the time it took to complete?	*It was long. Is there something you can take out?*
Did any of the questions make you feel uncomfortable?	*None of the questions made [us] uncomfortable.*
Did you have trouble understanding any of the questions? If so, which ones?	*See above. In-text.*
Were any of the questions too personal? If so, which ones?	*None of the questions were too personal as long as the survey is anonymous.*
Were there any questions that you felt you needed to explain your answer? If so, which ones, and what type of information would you have written?	*Only the ones where you already have blanks need to be explained.*
Knowing the purpose of the study, is there anything else you would ask? If so, what, and why?	*No. There is nothing else to ask.*
Do you think members of the congregation would be willing to complete the survey? Why or why not?	*Yes. Members of the congregation will be willing especially with the gift card.*
There are a couple of questions whereby you have the choice of answering yes, no, or unsure. One example is when you are asked, “Have you ever received the pneumonia vaccine?” Would you keep the “unsure” check box or just stick with yes and no? In other words, do you think everyone will know for sure if they’ve been vaccinated?	*Keep it [unsure]. Not everyone will remember if they have had the vaccine.*
A $10.00 gift card will be provided to participants who complete the survey. Do you think this is a fair amount of compensation for their time? Given the choice, which type of gift card (gas, food, or cash) would you prefer?	*It’s a fair amount. A card from Winn Dixie would be good.*

Questions for participants	***Summary Responses - quotes from participants***
If we were to ask you questions about your income (individual or household), would you answer these questions? Why or why not?	*No. This is too personal.*
When the study is complete, the PI and RA will offer a health screening event as a way to thank the congregation for their participation. What types of services would you most like to see (ie. Blood pressure checks, blood sugar checks, influenza and pneumococcal vaccine offerings, pamphlets on stroke prevention, etc.).	*Blood pressure and blood sugar checks would be good.*
In addition to flyers, and word of mouth, can you think of any other good recruitment strategies? In addition to the two churches, are there other areas where you would recruit participants? If so, where?	*Word of mouth will be enough if the pastor announces it.*
What would you like the researcher to know about your community? What makes your congregation stand out, feel proud, etc.?	*We have a lot of people who've been coming to this church for years. We are a very tight community.*
What role does your faith play in health related matters? Do you think we should ask any questions about this in the survey?	*We do pray to God about our illnesses and that it be his will to keep us healthy.*
Do you think having a researcher who is not African American will hinder the study or make it difficult to get participants?	*No, not as long as she is respectful and kind.*
Does having a research assistant who is African American make you more inclined to participate? If so, why or why not?	*It will be nice to have her [RA] because she knows us and knows the church.*
What do you think the major health problems are in your community?	*Diabetes and high blood pressure.*
When is the best time to reach the most people with the survey?	*Right after church services and bible study on Wednesdays and Sundays.*
Should we schedule appointments for survey completion?	*No. People won't keep their appointments. Just come after church and get the whole group.*

Questions for participants	***Summary Responses - quotes from participants***
A few of the questions have a place for open-ended responses. Would you retain these in the survey or do you think they might be confusing?	*Keep them so we can explain our answers.*
Do you think people will be worried about their privacy? If so, what can we do to make sure they feel comfortable?	*No, not as long as we don't sign the surveys.*
What comes to mind when we mention the term "cultural sensitivity"? Do you have any concerns about cultural differences between the researcher and the participants? If so, what?	*It's about understanding how we're different and how we're the same.*
Is there anything else you would add to the survey?	*No.*
Do you have any other ideas or suggestions for the study?	*Just to tell us about the results.*

APPENDIX O
PILOT STUDY GUIDE

Welcome and Introduction: PI and RA to introduce and speak briefly on background.

Background: The pneumococcal vaccine (sometimes known as the pneumonia vaccine) is recommended for all adults 65 and older AND people under 65 with certain chronic illnesses, like diabetes and heart disease. Many African Americans are eligible for the vaccine, but do not get it for reasons we're not sure of. Unfortunately, more African Americans become sick and die from pneumonia every year than their Caucasian counterparts.

Purpose: The nurse researcher wants to find out more about whether or not African Americans know about the vaccine and how they decide whether or not to accept it.

By learning more about the reasons African Americans choose to be vaccinated, the researcher hopes to reach out to those who have not yet been vaccinated and at risk for getting pneumonia through education and trusting relationships between the healthcare provider and the client.

Procedure: The study will begin on Month/Date/Year and end on Month/Date/Year. During that time, African American adults over the age of 18 can complete the study:

- Sundays immediately following church service from 12:30 to 2:00 pm
- Wednesday mornings after Bible study.

Individuals will be asked to complete the questionnaire which will take approximately 15 minutes. If they agree to participate, they will sign the consent form and receive the instructions and questionnaire.

When they have finished the questionnaire, they will place it in a sealed envelope and then place it in a locked box in the community room where the researchers will then provide a $10.00 gift card to the participant thanking him or her for their time.

Meeting Objectives: We're meeting with a small group of people today to explain the study, review the consent process, have everyone complete the survey, and then get your feedback on the questions and the process. I believe it is important to make sure I'm asking you questions that are respectful, easy to read, easy to understand, and not too time consuming. I also want to make sure I get good quality data so the study is meaningful.

- *RA provides copy of meeting objectives to all present.*

I want to encourage you to speak your mind, tell me if you think there are any issues with the consent process or the questionnaire so I can fix them before the main study

begins. You know much more about the members of the congregation than I ever will, so your opinion is very valuable.

While you're having your lunch, we'll pass out the consent form to have you read and sign it. The consent form will not be turned in, and your name will never be associated with your answers. The same will be true in the main study. If, after reading the consent, you decide not to do the questionnaire, that's not a problem at all. You can enjoy your lunch and stay as long as you like.

- *RA hands out consent form*

_____***PURPOSE COMPLETED*** _____

- *All consent forms distributed and read (instruct participants to keep).*
- *Provide all participants with a copy (not signed or collected).*

After everyone finishes the questionnaire, we will have a brief discussion about the questions, recruiting people to take the survey, the type of gift card most preferred, and whether or not you think members of the congregation would like a health fair after the study is complete. If you have any questions at all while you're completing the questionnaire, please don't hesitate to raise your hand or come up and Sylvia or I will help you.

- *RA hands out questionnaire*
- *All questions are fielded*

_____***CONSENT COMPLETED*** _____

- *RA times completion of questionnaire and documents results*
- *PI and RA to assist, answer questions.*

_____***QUESTIONNAIRE COMPLETED*** _____

- *PI performs respondent interview*

- *RA records conversation digitally if permission granted and on paper*

RESPONDENT INTERVIEW COMPLETED – THANK PARTICIPANTS AND PROVIDE GIFT CARDS

LIST OF REFERENCES

Albanese, B., Roche, J., Pass, M., Whitney, C., McEllistrem, M., & Harrison, L. (2002). Geographic, demographic, and seasonal differences in penicillin-resistant streptococcus pneumoniae in Baltimore. *Clinical Infectious Diseases*, 34, 15-21.

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BIOGRAPHICAL SKETCH

Carla Ann Fry began her career in the medical field in 1985 when she joined the United States Army as a Medic. During her time in the military, Carla worked as a medic with the fourth infantry division prior to attending West Point Preparatory Academy and the US Army School of Practical Nursing. Upon completion of six years in the military, Carla went back to school at Kent State University where she would complete her associate then subsequently her bachelor's degree to become a registered nurse. During her time as an LPN and RN, Carla worked at the bedside as a critical care nurse in the Coronary Care Unit, Medical and Surgical Intensive Care Units, Trauma Centers, a Burn Unit, and the Cardiac Catheterization Lab. In 2004 when Carla relocated to Jacksonville, Florida, she had the privilege of assisting with the opening of a new state of the art, all electronic medical center. At that time, she returned to school to complete her master's degree in Nursing with a minor in Education. In 2008, Carla was accepted into the PhD program at the University of Florida as a Maren Fellow. She left her role at Baptist Medical Center South as the Education Coordinator and began a career at Jacksonville University as an Assistant Professor of Nursing where she remains today. Presently Carla teaches critical care theory, research, information management, and a variety of clinicals. Carla still loves direct patient care so she maintains her skills by working prn in an Intensive Care Unit. When she isn't teaching or caring for others, Carla enjoys spending time with her ten year old daughter and friends swimming, snorkeling, fishing, sailing, travelling, and exploring new restaurants.