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Correlates of Influenza Vaccination Uptake Among Older Adults

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This is to certify that the doctoral dissertation by

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MSN/FNP, State University of New York, 2000

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Dissertation Submitted in Partial Fulfillment of

the Requirements for the Degree of

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Abstract

Seasonal influenza is associated with significant morbidity and mortality among older adults, aged 65 and older. Since vaccination is the single most effective preventive measure against seasonal influenza, clinicians and senior citizen center administrators need a better understanding of the perceptions of older adults concerning the reason for poor influenza vaccine uptake. The purpose of this study was to identify perceived factors that may be associated with poor influenza vaccination uptake among older adults. The health belief model (HBM) guided the study. The research questions examined perceptions predicting the odds of influenza vaccination uptake among older adults. This quantitative cross-sectional study consisted of administration of a newly developed 33-item questionnaire to a convenience sample of 147 older adult participants. A 2-week reliability test-retest on 50 participants indicated the instrument had moderate internal consistency ($\alpha \geq 0.7$). Paired-sample t tests were not significant ($p > .05$), indicating that participants provided reliable responses across time. Ordinal regression analysis indicated that all HBM constructs were significantly associated (susceptibility, barriers, benefits, cues to action, and self-efficacy $p = .000$; severity $p = .002$) with frequency of influenza disease and recency of influenza vaccine uptake within 1 year. The social change implications from this study may help to improve vaccination uptake among older adults by providing senior public health decision makers and direct care clinicians with informed knowledge on perceptions and barriers that may play a role in influenza vaccination decision-making among older adults.

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Dedication

To my children, Fikisha and Keshia, and my grandson Maximilian, I thank you for always believing in me and supporting me while I pursue my dreams. Many thanks to Dr. Isenalumhe, who has been my greatest support throughout my education. Special thanks to Annemarie Charles, my dearest friend, for her endless love and encouragement. To my father who has passed on, “I am grateful for your continuous teaching about the importance of perseverance and believing in my dreams.”

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Chapter 1: Introduction to the Study

Introduction

Seasonal influenza is a contagious airborne respiratory disease that spreads from person to person during episodes of coughing or sneezing or through contact with frequently handled infected surfaces (Centers for Disease Control and Prevention [CDC], 2012-2013). A group of influenza viruses, Types A, B, and C, cause the influenza disease. These viruses continuously keep changing; every few decades, a new version of the influenza virus emerges in the human population, causing serious global outbreaks of disease associated with severe complications, hospitalizations, and death among older adults (CDC, 2012-2013). The influenza outbreaks can also contribute to social disruption and economic loss among the population.

This study was conducted because the knowledge gained may help clinicians to better understand contributing factors associated with decreased influenza vaccine uptake among the elderly in order to identify strategies that improve influenza vaccine uptake among older adults. The social change implications in this study are to improve influenza vaccine uptake among older adults and to provide senior public health decision makers and direct care clinicians with informed knowledge of the benefits and limitations of influenza screening and immunization for the older adult population. Other major study sections included in this chapter are background, problem statement, purpose, research questions, theoretical framework, nature of the study, definition of terms, assumptions, scope and limitations, and the significance of the study.

Background of the Study

A seasonal influenza outbreak usually occurs in the United States in late fall through early spring, causing severe illnesses and death, especially among the elderly and children (CDC, 2012). Although influenza affects all ages, older adults are particularly vulnerable because they often have chronic illnesses, which put them at a greater risk for influenza complications, including pneumonia (Molinari et al., 2007). Influenza and pneumonia is the seventh leading cause of death among the elderly (Centers for Medicare and Medicaid Services (CMS), 2011), and the annual rate of influenza-associated death among ages 65 and older is 45,321 deaths per 100,000 persons (United States Census Bureau, 2011).

Individuals with chronic conditions, such as congestive heart failure, asthma, or diabetes, are particularly at risk for higher incidence, severity, and complications of influenza attack (CDC, 2013-2014). Although the U.S. government set a national goal of achieving a 90.0% annual immunization rate for persons over 65 (Healthy People, 2010), the national rate continues to be at a staggering low for this population (CDC, 2012). The burden of influenza related illnesses and death from these diseases is greater in Brooklyn and New York City, which is higher than the nation as a whole (CMS, 2011; SUNY Downstate Medical Center, 2010). A survey carried out among Brooklyn residents reported that influenza and pneumonia combined is the third leading cause of death (CMS, 2011) in Brooklyn (SUNY Downstate Medical Center, 2010). The influenza vaccine is the most effective in protecting individuals from influenza viruses and related complications (CDC, 2012). The report from the survey indicated that 46.2% of Brooklyn

residents over the age of 65 did not receive the annual influenza vaccine compared to those living in New York City (SUNY Downstate Medical Center, 2010). Three out of the 11 Brooklyn neighborhoods with a higher percentage of persons 50 to 65 years and older and never received the influenza vaccine were selected for this study. The three selected areas with a higher percentage of low influenza vaccine uptakes were Bedford Stuyvesant-Crown Heights, 62.7%, Canarsie-Flatlands, 72.3%, and East New York, 69.8%. The pneumonia hospitalization rates per 100,000 for people age 65 in the three selected neighborhoods were Bedford Stuyvesant-Crown Heights, 160.0, Canarsie-Flatlands, 100.3, and East New York, 181.4 (Healthcare Association of New York State; HANYS, and Structured Psychotherapy for Adolescents Responding to Chronic Stress; SPARCS. 2008). Influenza and pneumonia death rates for these areas in 2000 and 2007 were Bedford Stuyvesant-Crown Heights, 29.0 and 36.6, Canarsie-Flatlands, 21.8 and 16.5, and East New Yok, 30.0 and 31.6 (Equerry: Vital Statistics Mortality Data Sets, New York City Department of Health and Mental Hygiene; NYCDOHMH, 2009).

There is a gap in knowledge among clinicians in how they handle the influenza epidemic among older adults. Due to this epidemic, there is an urgent need to evaluate the perception of the older adults concerning influenza vaccine uptake. Such evaluations may also help clinicians to identify appropriate strategies in reaching the older adult population who are at a greater risk for severe complications and death from influenza. There is an ongoing need for influenza vaccine planning for the older adult population.

Problem Statement

CDC (2013, 2014) recommended the yearly influenza vaccine as one of the first and most important steps in protecting individuals against the seasonal influenza viruses. The seasonal influenza vaccine protects against the three influenza viruses to prevent unnecessary hospitalizations and premature deaths among older adults (CDC 2012, 2013). Researchers have indicated that many older adults do not obtain the influenza vaccine despite the many publicized strategies used to promote the importance of immunization among this age group (Evans, Prout, Prior, Tapper-Jones, Butler, 2007; Ward & Draper, 2008). Few researchers have focused on identifying the perceptions and determinants of seasonal influenza vaccination among older adults (Kohlhammer, Schnoor, Schwartz, Raspe, & Schäfer, 2007; Nagata et al., 2013). Perception about health plays a critical role in disease consequences (Nagata et al., 2013). Few studies have addressed the underlying perception of emerging older adults as it relates to the threat of influenza and the importance of getting the annual influenza vaccine. In addition, clinician/patient communication is a contributing factor but has not been fully explored among this age group. In this study, the perceptions of older adults in receiving the influenza vaccine and clinician/patient communication about the seasonal influenza vaccine are examined. The key constructs of the health belief model (HBM) and sociodemographic factors guided the identification of reasons for poor uptake of the influenza vaccine among older adults in three areas in Brooklyn, New York where the vaccine uptake is low.

Purpose of the Study

The purpose of this study was to identify perceived factors that may be associated with poor influenza vaccination uptake among older adults. Using a quantitative approach, I intended to identify older adults' perception about the seasonal influenza vaccine. Increased uptake of the influenza vaccine can decrease influenza related complications and death among the older adults.

Nature of the Study

This was a quantitative descriptive study involving cross-sectional data from a group of respondents 65 years and older in the three selected senior citizen centers in Brooklyn, New York. The data collected were consistent with understanding the perceptions of older adults that contributed to poor uptake of the seasonal influenza vaccination. In addition, data collection identified whether clinician and patient communication were contributory factors for receiving the influenza vaccination. The independent variables for this study included the full HBM constructs: perceived susceptibility, perceived severity, perceived barriers, perceived benefits, perceived cues to action, perceived self-efficacy, and the mediating demographic factors related to poor uptake of influenza vaccine among older adults. The dependent variables are recency of influenza vaccine uptake ($\leq$ 1 year) and frequency of influenza disease (number of infections within the last year). The covariates consisted of demographic factors such as gender, age, ethnicity, knowledge, income, employment status, and location and were used to measure with accuracy those variables that formed the basis for this research.

The sample included 147 participants. The study sample was selected from three senior centers that provide both clinical and recreational services. Thus, random sampling and availability of individual respondents were not feasible as planned. Instead, participants were selected as a convenience sample consisting of older adult clients who came into the center and agreed to participate in the study. Participants were interviewed and recorded until the required sample of 147 respondents was obtained.

Research Questions and Hypotheses

A new HBM scale, Health Belief Model Scale (HBMS) was created based on a review of past studies that used the HBM. The research questions and the hypotheses were based on the review of existing literature on seasonal influenza uptake among older adults and studies that previously used the HBM. To investigate the perceptions of older adults about the influenza vaccine uptake, the constructs of the HBM and sociodemographic factors were the focus of the research questions (Glanz, Champion, & Strecher, 2002). Research Questions 1 through 4 sought to assess participants' perceptions of severity, risk, susceptibility to the seasonal influenza virus and vaccine, and vaccine benefits and barriers (Coe, Gatewood, Moczygemba, Goode, & Beckner, 2012; Glanz, Rimer, & Lewis, 2002). Research Questions 5 through 7 sought to assess mediating factors that include demographic variables (age, gender, ethnicity, and occupation) associated with the perceptions of the influenza vaccine (Lenzi, Wiens, Grochocki, & Pontarolo, 2011). Mediator factors also included self-assessment of the ability to successfully accept the influenza vaccine and external influences such as media advertisement and flyers; information sorted by older adults or information provided by

clinicians, family, caregivers, or persuasive communications; and personal experience that led to the uptake of the influenza vaccine.

Research Question 1. Is there a significant relationship between older adults perceived susceptibility to the seasonal influenza and frequency and recency of vaccine?

$H1_0$: There is no significant relationship between older adults perceived susceptibility to the seasonal influenza and frequency and recency of vaccine.

$H1_A$: There is a significant relationship between older adults perceived susceptibility to the seasonal influenza and frequency and recency of vaccine.

Research Question 2. Is there a significant relationship between older adults perceived severity to seasonal influenza based on CDC influenza guidelines?

$H2_0$: There is no significant relationship between older adults perceived severity to seasonal influenza based on CDC influenza guidelines.

$H2_A$: There is a significant relationship between older adults perceived severity to seasonal influenza based on CDC influenza guidelines.

Research Question 3. Is there a significant relationship between older adults perceived benefits and the positive consequences of the annual seasonal influenza vaccine uptake?

$H3_0$: There is no significant relationship between older adults perceived benefits and the positive consequences of the annual seasonal influenza vaccine uptake.

$H3_A$: There is a significant relationship between older adults perceived benefits and the positive consequences of obtaining the annual seasonal influenza vaccine.

Research Question 4. Is there a significant relationship between older adults perceived barriers and discouragement concerning the uptake of the seasonal influenza vaccine?

$H4_0$: There no significant relationship between older adults perceived barriers and discouragement concerning the uptake of the seasonal influenza vaccine.

$H4_A$: There is a significant relationship between older adults perceived barriers and discouragement concerning the uptake seasonal influenza vaccine.

Research Question 5. Is there a significant relationship between older adults perceived cues to action and health care providers' persuasive communications about seasonal influenza vaccine?

$H5_0$: There is no significant relationship between older adults perceived cues to action and health care providers' persuasive communications about seasonal influenza vaccine.

$H5_A$: There is a significant relationship between older adults perceived cues to action and health care providers' persuasive communications about seasonal influenza vaccine.

Research Question 6. Is there a significant relationship between older adults perceived self-efficacy and the ability to successfully obtaining the seasonal influenza vaccine?

$H6_0$: There is no significant relationship between older adults perceived self-efficacy and the ability to successfully obtaining the seasonal influenza vaccine.

$H6_A$: There is a significant relationship between older adults perceived self-efficacy and the ability to successfully obtaining the seasonal influenza vaccine.

Research Question 7. Is there a significant relationship between full HBM constructs plus mediating demographic factors such as age, gender, ethnicity, occupation, and older adults' perceptions of the seasonal influenza vaccine?

$H7_0$: There is no significant relationship between full HBM constructs plus mediating demographic factors such as age, gender, ethnicity, occupation, and older adults' perceptions of the seasonal influenza vaccine.

$H7_A$: There is a significant relationship between full HBM constructs plus mediating demographic factors such as such as age, gender, ethnicity, occupation, and the elderly perceptions of acceptance of the seasonal influenza vaccine.

Research Question 8. Is there significant relationship between influenza vaccine recency and influenza disease among older adults?

$H8_{0:}$ There is no significant relationship between influenza vaccine recency and influenza disease among older adults.

$H8_{A:}$ There is a significant relationship between influenza vaccine recency and influenza disease among older adults.

Research Question 9. Is there a significant relationship between influenza disease frequency and influenza vaccine uptake among older adults?

$H9_{0:}$ There is no significant relationship between influenza disease frequency and influenza vaccine uptake among older adults.

$H9_{A:}$ There is a significant relationship between influenza disease frequency and influenza vaccine uptake among older adults.

Theoretical Base

The HBM was developed in the 1950s by Hochbaum, Rosenstock, and Kegels, a group of public health researchers, in response to a health screening program for tuberculosis (as cited in Rosenstock, 1966). The model was originally designed to predict behavioral responses to the treatment received by acutely or chronically ill patients; however, in recent years, the model has been used to predict general health behaviors (Ogden, 2007). To accommodate evolving evidence that knowledge and perceptions played a role in personal responsibility, the model was amended (Glanz, Lewis, & Rimer, 2002). The HBM suggests that the belief in a personal threat together with the belief in the effectiveness of the proposed behavior will predict the likelihood of that behavior (Rosenstock, Strecher, & Becker, 1988). The HBM was used in many psychological and medical studies to help determine an individual's health thoughts, behaviors, and wellness (Glanz, Rimer, & Lewis, 2002). Applying the HBM to this study has helped in providing context of the older adults' perceptions of the influenza vaccine.

The major theoretical propositions of the HBM are based on core assumptions that health-related actions are taken when a person believes that a negative health condition can be avoided. In addition, a positive expectation exists that taking a recommended action will prevent a negative health condition or that a recommended health action can be successfully taken comfortably and with confidence (Glanz et al., 2002). The six constructs of the HBM are perceived susceptibility, perceived severity,

perceived benefits, perceived barriers, cues to action, and self-efficacy. The four constructs, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers, represent the perceived threat and net benefits, which account for a person's readiness to act. Two constructs that represent the challenges of changing habitual unhealthy behaviors are cues to action, or activation of readiness and stimulate an overt behavior, and self-efficacy, which represents a person's confidence in the ability to perform an action successfully (Rosenstock et al., 1988). These theoretical propositions of the HBM supported the hypotheses and are discussed further in Chapter 2.

Operational Definitions

Demographic mediating factors: Refer to modifying variables such as age, sex, race, ethnicity, and education that may interfere with influenza vaccine uptake indirectly by affecting perceived susceptibility, benefits, barriers, cues to action, and self-efficacy (Glanz, Marcus Lewis, & Rimer, 1997; Glanz, Rimer, & Viswanath, 2008).

Frequency of influenza disease: Measurement of the most recent episode of influenza disease within 1 year or less (CDC, 2013).

Health belief model: The health belief model (HBM) was one of the first health behavior theories developed in the 1950s by a group of U.S. Public Health Service social psychologists to explain the reasons why only few people participated in health screening programs. Since then, the HBM has been widely used in a variety of health behavior research. The HBM addresses the three distinct areas of perception: perceptions of the threat posed by a health problem (susceptibility, severity), the benefits of avoiding the

threat, and factors influencing the decision to act (barriers, cues to action, and self-efficacy; National Cancer Institute; NCI 2005).

Influenza complications: Complications of influenza can include bacterial pneumonia, ear infections, sinus infections, dehydration, and worsening of chronic medical conditions, such as congestive heart failure, asthma, or diabetes (CDC 2012 - 2013).

Influenza disease: Defined as an infectious respiratory disease caused by the influenza viruses, Types A, B, and C. Types A and B are known as human influenza viruses that cause seasonal influenza disease almost every winter in the United States. Influenza virus Type C causes mild respiratory illnesses and is not thought to cause influenza epidemics (CDC, 2012).

Influenza vaccine: The mandatory vaccine administered to protect against the three influenza viruses. The various types of influenza vaccines available are the trivalent inactivated vaccine (TIV) and the live-attenuated influenza vaccine (LAIV). There are three different influenza vaccines available: a regular influenza vaccine approved for people ages 6 months and older, a high-dose influenza vaccine approved for people 65 and older, and an intradermal influenza vaccine approved for people 18 to 64 years of age (CDC 2012-2013; Food and Drug Administration (FDA), 2012).

Influenza virus: The CDC 2013-2014 has reported three types of influenza viruses: Types A, B, and C. Type A and B are human influenza viruses that cause seasonal the seasonal influenza disease almost every winter in the United States. Influenza Type C causes mild respiratory illnesses and is not thought to cause influenza

epidemics. Influenza A viruses are divided into subtypes based on two proteins on the surface of the virus: the hemagglutinin (H) and the neuraminidase (N). The current subtypes of the influenza A virus that have been identified in humans are influenza A (H1N1) and influenza A (H3N2) viruses (CDC 2009). There is no provision for describing distinct subtypes of influenza B and C viruses. The existence of antigenic variation among influenza B strains is well established, but the available information shows that a division into subtypes is not warranted (World Health Organization (WHO), 1990).

Older adults: For the seasonal influenza immunization administration, the elderly is described as the group of people aged 65 or older because they are disproportionately affected by the influenza related complications (Sullivan, Jacobson, & Poland, 2010).

Perceived barriers: An individual's opinion of what is preventing from making the decision to adopt a new behavior that can protect and prevent influenza disease (Glanz et al., 1997).

Perceived benefits: An individual's beliefs about the safety and effectiveness of taking the influenza vaccine to reduce risk of getting influenza and the related complication (Glanz et al., 2002).

Perceived cues to action: A trigger that is necessary for prompting engagement in the decision-making process to accept a recommended influenza vaccine (Glanz et al., 1997).

Perceived self-efficacy: An individual's perception of his or her competence to successfully act in seeking the influenza vaccine (Glanz et al., 1997; Glanz et al., 2008).

Perceived severity: An individual's beliefs about the seriousness of influenza disease and how to avoid it (Glanz et al., 1997; NCI, 2005).

Perceived susceptibility: An individual's beliefs about the chances of getting influenza disease (Glanz et al., 1997; NCI, 2005).

Recency of influenza vaccine uptake: Measurement of the most recent influenza vaccine uptake within 1 year or less (CDC, 2013).

Assumptions

The assumptions are necessary in the context of this study because it is presumed that the study is objective, generalizability is possible, and other studies can be replicated from this study.

The following are the assumptions of this study:

- Participants have answered the interview questions appropriately by giving a true and sincere representation of their perceptions of influenza disease and influenza vaccine.
- Participants have answered the interview questions and provided appropriate answers that most closely represent their current influenza vaccination status.
- The HBM has been an adequate model to describe the participants' perceptions of the influenza disease and the influenza vaccine.
- The senior citizen centers have been an adequate setting for the study.
- The research instrument used in this study was adequate and appropriate to capture the data needed to describe and categorize the participants' perception of influenza disease and influenza vaccination.

Limitations

In every study, there is a possibility of limitations. Since I used a cross-sectional design, there is a possibility that there can be a limitation with the strength of the internal validity. Additional limitations included (a) self-reporting for seasonal influenza vaccination status, (b) participants' responses to demographic and instrument questions only, (c) male and female participants aged 65 and older and who are enrolled in the selected senior centers in Brooklyn, New York, (d) self-evaluation type of assessment of the instrument, and (e) voluntary participation from both males and females aged 65 and older who attended the selected senior centers in Brooklyn, New York. The possible biases that could influence study outcomes were nonresponses. To minimize this type of bias, the sample size was large enough to estimate the prevalence of the influenza vaccine uptake among the older adults in the selected demographic areas of Brooklyn.

Delimitations

The de-limitations of this study are as follows:

1. This study was restricted to seniors who were identified as age 65 or older.
2. This study was restricted to participants recruited through the three senior centers in Brooklyn.
3. This study was restricted to seniors who read and write English.
4. This study was restricted to seniors free of cognitive impairment and who could independently make appropriate decisions.

5. The study was generalized to all three senior centers because the older adults are of different racial/ethnic backgrounds, which are similar for each of the representing senior centers.

Significance of the Study

This study contributes to the body of knowledge related to perceptions of older adults concerning seasonal influenza vaccine uptake. Identifying health care providers' communication with their patients about the importance of the influenza vaccine safety and effectiveness can increase the vaccine uptake among this age group. Because older adults are a high-risk group, such information may be valuable to encourage older adults to receive the influenza vaccination and therefore significantly reduce the incidence, complications, cost, and death from influenza and associated conditions. The potential implications for positive social change bounded by the scope of this study are providing senior public health decision makers and direct care clinicians with informed knowledge of the benefits and limitations of influenza screening and immunization of the older adult population and bringing about improvement in communication between clinicians and their patients about the importance of the annual seasonal influenza vaccine.

Summary and Transition

Influenza is a common respiratory illness that affects all humans when they are exposed to the influenza virus. Older adults are particularly vulnerable because they are in the high-risk category due to their age and existing chronic health conditions (CDC, 2012-2013). According to the CDC (2010), the annual influenza vaccine is the best method for preventing influenza. However, despite the various methods of

communication used to raise awareness about the benefits of the influenza immunization, the immunization rate remains low among older adults. In this study, I examined factors associated with influenza vaccination among older adults in Brooklyn, New York. The purpose of the study was to determine what factors contribute to the decision to obtain the influenza immunizations among older adults.

The HBM was used as the theoretical framework for this study because it supported the problem, purpose, background, research questions, and research design decisions, such as the method of inquiry and data collection. Chapter 2 contains a review of relevant literature pertaining to factors influencing vaccination status among older adults.

Chapter 2: Literature Review

Overview

The purpose of this study was to identify perceived factors that may be associated with poor influenza vaccination uptake among older adults. Despite the availability of the influenza vaccine, the number of older adults who should be protected from influenza disease by uptake of the influenza vaccine is far below the national health goals (CDC, National Center for Health Statistics, 2009). A review of relevant literature indicated that influenza related complications, hospitalization, and death among older adults is greater in Brooklyn and New York City, which is due to a decline in uptake of the influenza vaccine among older adults (SUNY Downstate Medical Center, 2010). Using the HBM, I sought to understand older adult motivation and decision-making about obtaining the influenza vaccine.

This literature review, focused on the six constructs of the HBM: perceived susceptibility to influenza, perceived severity of influenza, perceived benefits of accepting the influenza vaccine, perceived barriers to obtaining the influenza vaccine, cues to action (Shahrabani & Benzion, 2012). These constructs relate to the strategies to activate readiness such as primary caregivers' communication and reminders about vaccine importance and availability, providing information to promote awareness. An additional construct of the HBM is self-efficacy, which focuses on the confidence in the participant's ability to take an action in obtaining the influenza vaccine. In addition to these HBM related constructs, timing of receipt of influenza vaccine (recency) within 1

year and frequency of influenza disease within the current season are important determinants of prevention.

The findings in the literature are presented according to the construct of the HBM. The HBM literature synthesis is preceded with an overview of influenza and its complications, influenza vaccine guidelines and recommendations, vaccine effectiveness, side effects, contraindications, recommendations, and economic impact of influenza disease. A review of current literature was done as well as its application to this study. The literature review follows and includes studies on influenza vaccine uptake among older adults both at national and international levels.

Literature Search Strategy

An extensive search was conducted, using key words such as *older adults*, *health belief model*, *influenza, influenza complication, influenza vaccine, influenza viruses, perception, perceived severity, perceived susceptibility, perceived benefits, perceived barriers, cues to action, self-efficacy, demographic mediating factors, frequency of influenza disease,* and *recency of influenza vaccine uptake within 1 year or less.* The scope of literature reviewed included literature from 2007 to 2014; however, since the HBM is a sentinel model, some of the literature reviewed dates to the 1960s. The types of literature and sources searched were PubMed: biomedical literature citations and abstracts, including Medline--articles from medical and peer-reviewed journals including abstracts, PubMed Central, and other full-text resources that provided free, full text journal articles. The United States National Library of Medicine (NLM) at the National Institutes of Health was accessed; Google Scholar, a freely accessible web search engine

with full text of scholarly literature of various publishing formats and disciplines, including peer-reviewed online journals, scholarly books, and articles from scholarly publishers in the United States and other continents of the world.

Theoretical Foundation

The HBM was one of the first social cognition models developed in the 1950s (Janz & Becker, 1984) to evaluate the uptake of preventive health services and to predict health behavior change (Rosenstock, 1966). Further development of the HBM was done to accommodate the evolving evidence that was generated within the healthcare community about the role knowledge and perceptions played in a person's personal responsibility about health (Glanz et al., 2002). In recent years, the HBM was used to predict more general health behaviors (Ogden, 2007).

The HBM was systematically evaluated by established criteria in evaluating health behaviors. Since health behaviors are evaluated in this study, the HBM was considered a better model to explore the hypotheses of this study to show that there is a relationship among perceived reasons for limited uptake of the influenza vaccine (Glanz, Marcus Lewis, & Rimer, 1997). The key constructs of the HBM are perceived susceptibility-- individual's opinion of chances of getting a condition, perceived severity beliefs about the seriousness of a condition and its consequences, perceived benefits--beliefs about the effectiveness of taking action to reduce risk or seriousness, perceived barriers--beliefs about the material and psychological costs of taking action to prevent the disease, cues to action--factors that activate readiness to change the behavior, and self-efficacy--confidence in one's ability to take action (Glanz, Rimer, & Lewis, 2002). The

HBM also focuses on other determinants such as demographic variables that include age, sex, race/ethnicity, income, education, and place of residence as well as personality. These determinants may indirectly influence how people perceive their risk to diseases (Becker, Champion 1984; Eisen, Zellman, & McAlister 1992; Glanz et al., 2002; Janz & Becker 1984, Rosenstock, & Slack 1974; 1985; Walter et al., 1992).

The HBM was used as the theoretical base for this study to explain and predict health behaviors by focusing on the attitudes and beliefs concerning why older adults do not obtain the influenza vaccine. In relation to this study, the constructs of the HBM and the perceived threat of influenza were analyzed, along with the perceived decision to participate in health-seeking behavior of receiving the influenza vaccine.

The delineation of assumptions appropriate to the application of the HBM for this study are that people fear disease, and the health actions are motivated by the degree of their fears and benefits that will bring about behavior change (Becker et al., 1974; Champion 1984; Eisen et al., 1992; Janz & Becker 1984, 1985; Walter et al., 1992). Each of the key constructs of the HBM was analyzed in three parts: (a) the individual's perceptions of the threat posed by a health problem (susceptibility, severity), (b) the benefits of avoiding the threat, and (c) factors influencing the decision to act (barriers, cues to action, and self-efficacy; Janz, & Becker, 1984).

The HBM was selected for this study because it predicts preventive health behavior by examining belief patterns, and it focuses on the relationship between health behaviors and the perception of using available health services. It was largely tested empirically, and its application may help public health and health care professionals to

develop appropriate strategies to help the older adults in making informed decisions about the uptake of the influenza vaccine. In addition, the HBM was selected for this study to examine whether health care professionals' recommendations about the seasonal influenza vaccination were significant predictors of patients' intention to get vaccinated the vaccine. Figure 1 explains the theoretical preposition of the HBM and provides a way to understand and predict how an individual may behave in relation to his or her health and how he or she may comply with preventive health care practices.

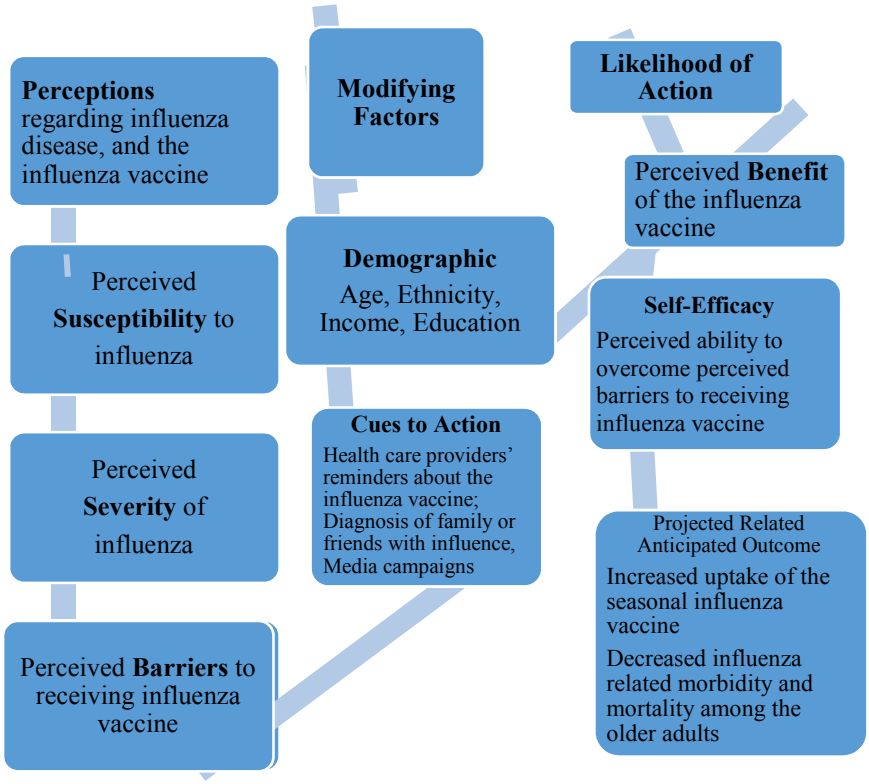

Figure 1: Uptake of Seasonal Influenza Vaccine among Older Adults based on the new health belief scale model for influenza vaccine uptake.

Epidemiology of Seasonal Influenza

The seasonal influenza disease occurs annually in the United States and other temperate zones during the late fall through early spring (CDC, 2010; World Health Organization (WHO), 2009). Hospitalizations and deaths occur among the high-risk population to include the elderly and other high-risk groups (CDC, 2010). The mortality indicator for all ages exceeded the epidemic threshold because these rates are higher when compared to the same time last season (CDC 2013-2014).

Worldwide, the influenza epidemic resulted in about 3,000,000 to 5,000,000 cases of severe illness, and about 250,000 to 500,000 deaths (CDC, 2012; WHO, 2009). Influenza together with pneumonia is the eighth leading cause of death in the United States and the fifth leading cause of death among those 65 years old and older (Kochanek, Xu, Murphy, Miniño, & Kung, 2011) while it is the third leading cause of death in New York City New York City Department of Health and Mental Hygiene (NYCDHMH), 2010). Most of these deaths are associated with influenza complications, which occur among people age 65 or older (CDC, 2012-2013, WHO, 2009). The CDC (2010) reported that over a period of 31 seasons, between 1976 and 2007, the estimates of influenza associated deaths in the United States ranged from a low of about 3,000 to a high of about 49,000 people. Influenza and pneumonia deaths increase with age. More than 85% of deaths from influenza and pneumonia occurred among people over 65 in Brooklyn and the rest of New York City (State University of New York (SUNY) Downstate Medical Center, 2010).

To estimate the health burden associated with the circulation of influenza viruses, the CDC uses a 7-component national surveillance system for influenza that includes virologic, influenza-like illness, hospitalization, and mortality data. These data were used in statistical models to estimate the possible impact of future pandemics influenza occurrences. Improving surveillance of influenza helps the CDC and their partners in different parts of the world including the United States in monitoring the various strains of influenza that are currently circulating. This type of evidence is needed to detect the type of circulating viruses, which contribute to appropriateness of the influenza vaccines that are produced (CDC, 2010).

Every year the occurrences of seasonal influenza place a heavy demand on the economy and healthcare resources due to the increase in health care consultations, hospitalizations, clinical complications, and patient treatment that are seen particularly in the high-risk groups (CDC, 2013). Molinari, et al. (2007) reported that the economic burden of influenza on the society has been estimated to be $87.1 billion each year, which includes an average of $10.4 billion in direct medical costs. Unlike countries in the temperate regions of the world, in some tropical countries, influenza viruses circulate throughout the year with one or two peaks during rainy seasons (WHO, 2009).

Pathophysiology of Seasonal Influenza, Regulation, and Influenza

Seasonal influenza is an acute contagious respiratory infectious disease caused by a member of the Orthomyxovirus family, which includes influenza virus A, B, or, to a much lesser extent, C (CDC, 2013-2014). Several studies reported that the influenza virus could be transmitted through several distinct mechanisms, such as large droplets from an

infected person, aerosols, and direct contact with contaminated hosts and surfaces (Brankston et al. 2007; Tellier 2009; Weber & Stilianakis, 2008). Seasonal influenza causes mild to severe illness, which causes hospitalization and can lead to death (CDC, 2013-2014; WHO, 2009). Influenza virus is usually replicated in the epithelial cells throughout the respiratory tract, with the virus being recoverable from both the upper and lower respiratory tract of people naturally or experimentally infected (Wright, Neumann, & Kawaoka, 2007). The influenza virus is different from a cold (CDC, 2012). Influenza symptoms usually occur suddenly once a person is infected with the influenza virus (CDC 2013). The CDC (2013) reported that some or these symptoms are usually reported by persons infected with the seasonal influenza virus are fever and chills, cough, sore throat, runny or stuffy nose, muscle or body aches, headaches, and fatigue. Other symptoms reported are vomiting and diarrhea, which is more common in children than adults. Although fever is one of the most common symptoms reported, not everyone with influenza will have a fever (CDC, 2012-2013, WHO, 2009).

Most people who are infected with the seasonal influenza virus will recover in a few days to less than 2 weeks, but many will develop complications such as pneumonia, which can be life threatening and result in death (CDC, 2012-2013; WHO, 2009). Influenza can occur at any age, but some people are at a higher risk of developing serious influenza-related complications, including people 65 years and older, people of any age with certain chronic medical conditions such as asthma, diabetes, or heart disease, pregnant women, and young children (CDC 2012). The most common complications reported because of the seasonal influenza are pneumonia, bronchitis, and sinus and ear

infections. Influenza complications are worst among people with chronic health problems (CDC 2010; National Center for Biotechnology Information (NCBI), 2009). People with asthma may experience asthma attacks while those with chronic congestive heart failure may have worsening of a condition that is triggered by the influenza (CDC, 2013). However, the most frequent serious influenza complication is pneumonia, which is categorized into four different types: primary influenza pneumonia, secondary bacterial pneumonia, pneumonia due to unusual pathogens in immune-compromised hosts, and exacerbations of chronic pulmonary diseases (CDC, 2013; WHO, 2009). The most common bacterial pathogens reported are Streptococcus Pneumoniae, Staphylococcus Aureus, and Haemophilus *Influenzae*, which act synergistically with the influenza virus through the increased binding and invasion of bacteria, increased viral replication, and modification of the host inflammatory response (CDC, 2012; Rothberg, Haessler, & Brown, 2008).

The severity of the influenza virus can vary widely from one season to another depending on the circulating influenza viruses, influenza vaccine(s) availability, the number of people vaccinated, and how well the influenza vaccine matched circulating influenza viruses (CDC, 2013). Many people die from seasonal influenza each year in the United States (CDC, 2012). A report in the CDC 2010 provided updated estimates of the range of influenza-associated deaths that occurred in the United States during the 3 decades prior to 2007. These estimates indicated that influenza-associated deaths ranged from 3,000 to 49,000 between 1976 and 2007 (CDC, 2010). Death certificate data and weekly influenza virus surveillance were used to estimate how many flu-related deaths

occurred among people whose underlying cause of death was listed as respiratory or circulatory disease on their death certificate (CDC MMWR 2010, 1057-1062).

The most important method of controlling the seasonal influenza is the annual influenza vaccination, considered the best method for preventing and controlling seasonal influenza (CDC, 2012). In addition, the role the annual influenza vaccine plays a key strategy in assisting the population in preparing for pandemic influenza outbreaks (CDC, 2012). Since influenza is a very infectious disease, older adults, children under the age of 2, and the population with chronic diseases such as diabetes, kidney failure, cardiopulmonary, and immunocompromised diseases are prone to suffer severely from influenza (CDC, 2013). In addition, people who are morbidly obese and American Indians/Alaskan Natives have been classified in recent studies as high risk groups for influenza complications (Jain, Bairoch, Duvaud, Phan, Redaschi, Suzek, Martin, McGarvey, Gasteiger, 2009; Morgan et al., 2010). The effects of the serious outcome of influenza on older adults require that they must receive the influenza vaccine as recommended by the CDC (2014).

The Health Belief Model

The HBM has been applied in many psychological and medical studies all over the world with varying success to problems about explaining, predicting, and influencing behavior (Janz & Becker, 1984). The health belief model to date remains of the most widely used and well-tested models for explaining and predicting health-related behaviors (Carpenter, 2010). Since the health belief model has been used in the past to

predict a wide variety of health-related behaviors such as screening for early detection of asymptomatic diseases and immunizations uptake it was a suitable fit for this study.

According to Janz, Marshall, Becker (1984) the constructs of the health belief model; perceived susceptibility, perceived severity, perceived benefits, perceived barriers, perceived cues to action and perceived self-efficacy are proposed to vary between individuals and their engagement in health-related behaviors such as getting screened for asymptomatic diseases and immunization uptake. The model has also been applied to many studies to understand the participants' responses to symptoms of disease, compliance with their medical regimens, and lifestyle behaviors changes in areas such as sexual risk behaviors and behaviors related to chronic illnesses (Janz, Marshall, Becker, 1984; Glanz, Rimer, Viswanath, 2008).

Rosenstock (1974) and Janz, Marshall, Becker (1984) reported that the health belief model suggests that the interventions based on the perceived health behavior may aim to increase perceived susceptibility to a disease and perceived severity of a health condition by providing education about prevalence and incidence of disease, estimates of risk, and information about the medical, financial, and social consequences that may change the health-related behaviors. Perceived benefits of action, perceived barriers to action, and perceived self-efficacy may predict the engagement or lack of engagement in an health-promoting behavior while the construct cue to action, must be present to trigger the required health-promoting behavior (Carpenter, 2010). Other areas that are represented on the health belief model and need evaluation when using the model are the modifying

demographic factors outside that may prevent the individual engagement in the desired health behaviors (Janz, Marshall, Becker, 1984).

A survey conducted in a dwelling community of older adult Greeks who were having routine access to medical care, identified main reasons and barriers for influenza vaccine uptake. These included recommendations from health care professionals, beliefs about the benefits of influenza vaccination, having a relative who delivered the vaccine, younger than 75 years old, having unpleasant reactions in the past, lack of adequate information about the side effects of influenza vaccine, and vaccine shortages (Raftopoulos, 2007).

Banach, Ornstein, Factor, and Soriano (2012) reported that factors associated with refusal of the influenza vaccine was positively associated with female gender, African American (Black) race, and living alone; while non-acceptance was negatively associated with dementia. Studies have reported that after educational sessions about breast self-examination and clinical examination, practice rates increased (Hajian, Vakilian, Najabadi, Hosseini, Mirzaei, 2011). Another study reported that those who indicated that prior vaccination against seasonal influenza reported significantly higher H1N1 vaccination intentions than those who had not been vaccinated (Gidengil, Parker, Zikmund-Fisher, 2011).

The HBM was successfully used in a study to determine the effectiveness of the HBM on nutrition education among Type 2 diabetic patients attending Iranian Diabetes Association seminars and reported knowledge scores increased in the intervention group

compared to the control group after the intervention was carried out (Sharifirad, Entezari, Kamran, Azadbakht, 2009).

Influenza Vaccination Uptake Among Older Adults in Brooklyn, New York

New York City Community Health Survey carried out over two-years in Brooklyn New York was based on the Healthy People 2010 initiative. This initiative set national goals of achieving a 90 percent rate of immunization against pneumococcal pneumonia for persons over 65. The survey findings indicated that immunization rates were far below the national goal for those reported in a national survey. The report from the survey indicated that 50% of respondents over the age of 65 in New York City and 56% of Brooklyn residents had never been vaccinated (Community Health Survey, 2008).

The factors as indicated that increased the likelihood of being hospitalized with pneumonia among the older adults were low immunization rates, underlying health conditions, and poor access to preventive services. Higher hospitalization rates for people over 65 were observed in several neighborhoods with a greater percentage of older adult residents. The hospitalization rate when compared by race and ethnicity indicated that among the over-65 age group, African Americans (Blacks) had a higher hospitalization rates, followed by Hispanic, European Americans (Whites) residents, Asian and Pacific Islanders who had lower rates. However, the report indicated Brooklyn had lower rates of hospitalization for pneumonia than the rest of New York City except for African Americans (Blacks) Brooklyn residents (2008 Community Health Survey).

Seasonal Influenza Vaccine Guidelines

The CDC 2010 reported that older adults age 65 years and older are at greater risk of serious influenza complications compared to young, healthy adults. 90 percent of seasonal influenza-related deaths and more than 60 percent of seasonal influenza-related hospitalizations in the United States each year occur among people age 65 years and older (CDC, 2010). Prevention and immediate treatment of influenza among the older adults may decrease the risk of influenza-associated complications, hospitalization and death (CDC, 2012-2013).

Influenza vaccination remains one of the most effective defenses against the influenza infection and its associated complications (CDC, 2009). The CDC Advisory Committee on Immunization Practices (ACIP) recommends the use of influenza vaccine for the prevention and control of influenza (CDC, 2010). High-risk groups recommended to receive the influenza vaccine are disabled, people in nursing homes, older adults 65 years or older, and individuals with chronic medical conditions. In addition, other groups such as pregnant women, health care workers, those with essential functions in society, as well as children from ages six months to two years are also included in this recommendation (CDC's Advisory Committee on Immunization Practices [ACIP], 2009; WHO, 2009).

Without preference, the CDC has recommended two types of influenza vaccine for people 65 and older: a regular trivalent inactivated vaccine (TIV) and the Fluzone High-Dose vaccine (add citation CDC, 2013). TIV is administered intramuscularly in the deltoid muscle. Fluzone High-Dose is designed specifically for people age 65 years and

older. Fluzone High-Dose vaccine contains a higher dose of antigen than regular influenza shots, and this may give older people a better immune response to the vaccine (CDC, 2013).

The most common adverse events reported to TIV Vaccine Adverse Event Reporting System (VAERS) in adults included injection-site reactions, pain, fever, myalgia, and headache. The TIV VAERS review identified no new safety concerns; however, the most common serious adverse event reported after receiving TIV VAERS in adults was Guillain-Barré Syndrome (GBS) (CDC, 2012-2013). According to the CDC (2012-2013), the potential association between TIV and GBS has been an area of ongoing research. Injection-site reactions and systemic adverse events among older adults are most frequently reported after vaccination with the Fluzone High-Dose Sanofi Pasteur (CDC, 2012-2013). When compared with a standard dose of Fluzone, Sanofi Pasteur vaccines which contained 45 mcg HA and the Fluzone High-Dose Sanofi Pasteur which contains 180 mcg of Hemagglutinin HA antigen the side effects of Fluzone High-Dose Sanofi Pasteur were typically milder and transient (CDC, 2012-2013).

Seasonal Influenza Treatment Guidelines

The CDC 2012-2013 recent report on seasonal influenza hospitalization shows an increase in hospitalization and death among the older adults. The influenza-associated hospitalization rate for persons 65 and older was 82 per 100,000, an increase from 69.8 per 100,000 during the prior week. When compared to the same time last season, which was milder, the influenza-associated hospitalization rate for persons 65 and older remains within the expected prediction for a moderately severe season (CDC 2012-2013). Among

laboratory-confirmed influenza hospitalizations, 50% of those hospitalized have been among persons 65 and older (CDC 2012-2013). Influenza-associated mortality indicators also increased sharply among all age groups this season with 80 percent of cumulative deaths had occurred among people 65 years or older.

The CDC has recommended antiviral treatment as an adjunct therapy to reduce the duration of illness and complications associated with influenza. The antiviral therapy is recommended for all persons 65 and older with suspected influenza, regardless of the severity of illness. Treatment of antiviral therapy must be given immediately, preferably within 48 hours after illness onset. Among hospitalized patients, treatment should be initiated on admission regardless of onset of symptom. In addition, CDC 2012-2013 has recommended that the decision to initiate antiviral treatment should be done regardless of vaccination status and clinicians should not wait on laboratory confirmation of influenza before initiating antiviral therapy (CDC 2012-2013).

The CDC has recommended the use of Oseltamivir or Zanamivir as the primary antiviral agents for the prevention and treatment of influenza in the United States during the 2012-2013 influenza season (CDC, 2012-2013). The CDC reported resistance to Oseltamivir and Zanamivir among circulating influenza viruses is currently low, but this finding can change since antiviral resistance can emerge during or after treatment in patients who are immunosuppressed (CDC, 2013-2014). Both Oseltamivir and Zanamivir are chemically related antiviral medications known to have activity against both the influenza A and B viruses. The best clinical outcome occurs when the antiviral therapy is administered early, within 48 hours of influenza illness onset (CDC, 2013-2014).

Reported adverse events of Oseltamivir are nausea, vomiting, Sporadic, transient neuropsychiatric events to include self-injury or delirium which was mainly reported in a study done among Japanese adolescents and adults (CDC, 2013-2014). Adverse event that were reported for Zanamivir were diarrhea, nausea, sinusitis, nasal signs and symptoms, bronchitis, cough, headache, dizziness, and ear, nose and throat infections. Oropharyngeal or facial edema was reported as an allergic reaction to Zanamivir (CDC, 2013-2014).

The Economic Impact of Influenza

The influenza epidemic continues to pose a serious economic impact on our society due to increase cost in health care for persons infected with the influenza virus, loss of productivity and death from influenza complications. Mao, Yang, Qiu, and Yang (2012) mapped county-level economic impacts of seasonal influenza in the U.S. on four county-based strategies. They suggested that prioritizing counties with high attack rates would produce the greatest cost-benefits annual economic impacts of seasonal influenza since the cost varied from $13.9 thousand to $957.5 million across U.S. counties, with a median of $2.47 million. Using important contributors such as hospitalization costs, lost productivity from missed work days and lost lives another study has reported that the total economic burden of annual influenza epidemics using projected statistical life values amounted to $87.1 billion (Molinari, Ortega-Sanchez, Messonnier, et al. 2007).

Many studies have focused on the cost-effectiveness of seasonal influenza vaccination among the older adults age 65 years and older and reported that vaccination is cost effective if taken by older adults because it decreases doctors' visits and

hospitalization (Postma, Baltussen, Palache, Wilschut, 2006). Other published studies have reported that influenza vaccination is likely to be cost-effective, however the results of these studies have found to be dependent on some key assumptions used in the economic evaluations (Newall, Kelly, Harsley, Scuffham, 2009).

Key Constructs

The HBM was applied to this study to predict the perception of the older adults concerning the influenza vaccine uptake. HBM scale constructs that served as the independent variables are: perceived susceptibility; perceived severity, perceived barriers, perceived benefits, and perceived cues to action, perceived self-efficacy, and mediating demographic factors. The dependent variables are recency of influenza vaccine uptake and frequency influenza disease within one year or less which represented the efficacy and effectiveness of influenza vaccination for possible outcome measures, including the prevention of influenza infection. As a general method of addressing perceived beliefs of the older adults and the efficacy and effectiveness of influenza vaccination, the literature review offers a useful structure for understanding a wider range of previous research findings on belief perception in similar situations.

Perceived Susceptibility to Influenza Disease

Perceived susceptibility is an individual's beliefs about the chances of getting influenza (Glanz, Marcus Lewis, & Rimer, 1997; NCI, 2005). In this study, perceived susceptibility is expressed in two forms those who believe they will benefit if they took the influenza vaccine because it will protect them from influenza and its complications and those who believe if they took the influenza vaccine they will get influenza. The aim

of the clinician is to identify their patients' 'belief about the chances of getting influenza when patients are not yet vaccinated, and tailor information about influenza vaccination based on their patients' behaviors. This can help patients to develop an accurate perception of their own risk if they do not take the influenza vaccine (Glanz, Rimer, & Lewis, 2002). Researchers have used the HBM to examine the factors associated with the intention to undergo specific health guidance using health insurance union members of a company in Japan and reported that perceived threat and net benefit were related to intention and net benefit had a stronger correlation with intention than did perceived benefit and barriers (Yamamoto, Mizoshita, and Akamatsu, 2002). Prior influenza vaccination was associated with higher perceived risk for influenza than unvaccinated; while those without prior influenza vaccine were unlikely to believe that they would get influenza (Brewer & Hallman, 2006; Mayo & Cobler, 2004; Nowalk, Zimmerman, Shen, Jewell & Raymund, 2004; Santibanez et al., 2002; Tabbarah et al., 2005; Telford & Rogers, 2003; Willis & Wortley, 2007; Zimmerman, Santibanez et al., 2003). Other studies have shown that individuals who were resistant to influenza vaccination were concerned about the susceptibility of vulnerable family members, and were willing to get vaccinated to protect the health of someone they cared about (Bardenheier et al., 2006; John & Cheney, 2008).

Perceived Severity of Influenza Disease Seriousness

Perceived severity is an individual's belief about the seriousness of influenza disease and how to avoid it (Glanz, Marcus Lewis, & Rimer, 1997; NCI, 2005). During discussion with patients about the importance of influenza vaccination, clinicians must

specify the consequences of influenza and recommend the influenza vaccine, which is the most important preventive method available. Studies have reported that perceived severity is particularly important when susceptibility beliefs are high. Some studies argued that perceived severity cannot be used by itself as a significant predictor of influenza vaccination (Armstrong, Berlin, Schwartz, Propert, & Ubel, 2001; Blue & Valley, 2002; Brewer & Hallman, 2006). Other studies have reported that individuals whether they were vaccinated or unvaccinated, saw influenza infection as a serious illness, particularly for persons their own age (Chi & Neuzil, 2004; Lindley, Wortley, Winston, & Bardenheier, 2006). Ho, Huang, Huang, et al. 2008 examined the risk of adverse effects of special interest in persons vaccinated against seasonal influenza compared with unvaccinated persons aged 65 and above. They reported that vaccination was related to decreased risk for hospitalization.

Perceived Benefit to Influenza Immunization

Perceived benefit is the beliefs about the safety and effectiveness of taking the influenza vaccine to reduce risk of getting influenza disease and the related complication (Glanz, Rimer, & Lewis, 2002). The role of the clinician is explaining to their patients the potential positive results that may occur if they receive the influenza vaccine, how they can go about getting the vaccine, places where the vaccine is available, and reminding patients about the appropriate time to take the influenza vaccine (Glanz, Rimer & Lewis, 2002).

One of the most important benefits is the effectiveness of the vaccination why the vaccine is given every year is to reduce the risk or seriousness of influenza (CDC,

20010). Several studies have reported that perceived effectiveness of the influenza vaccine is one of the most consistent predictors of influenza vaccination uptake (Brewer & Hallman, 2006; Tabbarah et al., 2005). Müller and Szucs (2007) reported the three most frequent reasons why the elderly accepted the influenza vaccine were: influenza was a serious illness which people wanted to avoid, having received advice from the primary care physician or nurse to be vaccinated and not wanting to infect family and friends. Chiatti, Barbadoro, Lamura, Pennacchietti et al. (2011) surveyed a group of older adults Italian to examine the determinants of vaccine uptake. Their findings indicated that being over 85-years old and suffering from a severe chronic disease were the strongest determinants of vaccine uptake while relying on neighbors' support or on privately paid home help was also associated with a higher likelihood of vaccine uptake.

Perceived Barriers to Influenza Immunization

Perceived barriers is an individual's opinion of what is stopping him or her from making the decision to adopt a new behavior that can protect and prevent influenza disease (Glanz, Marcus Lewis, & Rimer, 1997). Individuals who oppose the influenza vaccination are more likely to report experiencing vaccination side effects or getting sick from the influenza vaccination (Brewer & Hallman, 2006; Chi & Neuzil, 2004; John & Cheney, 2008; Lindley et al., 2006; Mayo & Cobler, 2004; Tabbarah et al., 2005; Winston, Wortley & Lees, 2006; Zimmerman, Santibanez et al., 2003). Previous studies have also documented knowledge barriers (Gosney, 2000; Lindley et al., 2006; Ritvo et al., 2003), and concern about safety of influenza vaccination are some of the predictors of poor vaccine uptake (Allison et al., 2010; Chen et al., 2011; John & Cheney, 2008;

Lindley et al., 2006; Telford & Rogers, 2003; Willis & Wortley, 2007; Wray et al., 2007). One study reported that despite these findings, about 48% of older adults who had concerns about the effectiveness of the influenza vaccine and 37% of those who believed that the influenza vaccine causes illness agreed to vaccinate to protect others (Bardenheier et al., 2006). Earlier studies have reported that some individuals who were not vaccinated believed that there were some benefits to vaccination; however, there were more concerns about costs over the benefits of the vaccine (Bardenheier et al., 2006; Chi & Neuzil, 2004; Nowalk et al., 2004; Zimmerman, Santibanez, et al., 2003). Clinicians' role in helping to minimize such barriers is to reassure patients about the vaccine safety and effectiveness, which can assist in correcting any misinformation. Many barriers to immunization have been reported. Johnson, Nichol and Lipczynski (2008) reported that among the most common barriers to immunizations were lack of physician recommendations and mistaken assumptions while other reasons cited by healthcare providers were side effects, fear of needles, and lack of insurance coverage as reasons and practice issues, such as lack of an effective reminder system. Müller and Szucs (2007) reported that reasons for not accepting the vaccine among older adults who were never vaccinated included not expecting to contract influenza and not having considered vaccination as preventive measure.

Cues to Action to Influenza Immunization

Cues to action are a trigger that is necessary for prompting engagement in decision-making process to accept the recommended influenza vaccine (Glanz, Marcus Lewis, & Rimer, 1997). The cues to action are strategies to activate readiness which can

be described as events either bodily symptoms such as a physical symptom of a health condition or environmental such as media publicity that motivate people to act (Janz and Becker, 1984). In applying cues to action, health care practitioners' role is to promote awareness by providing appropriate information and continuous reminders to patients to bring about health behavior change (Janz and Becker, 1984). This construct of the HBM has not received attention in many studies although it plays an important role in health behavior changes; however, cues to action can be an important practice strategy. Studies have reported that health care provider recommendations were associated with higher rates of influenza vaccination uptake (Allison et al., 2010; Chen et al., 2011; Mayo & Cobler, 2004; Winston et al., 2006) which are primarily one of the contributory factors for influenza vaccine uptake (Bardenheier et al., 2006; Chi & Neuzil, 2004; Nowalk et al., 2004; Winston et al., 2006). It has also been reported that to receive the influenza vaccination, a provider recommendation about the vaccination was more likely to help with the vaccine uptake (Bardenheier et al., 2006; Chi & Neuzil, 2004; Lindley et al., 2006; Wray et al., 2007). Some earlier studies have reported that family members' recommendations were considered another reason for effective vaccine uptake (Nowalk et al., 2004; Zimmerman, Nowalk, et al., 2003; Zimmerman, Santibanez, et al., 2003). Earlier studies have also reported that these recommendations were effective in the influenza vaccine uptake (Mayo & Cobler, 2004). Physician and other clinicians' recommendation and reminder systems for the influenza vaccine are associated with increases in vaccination rates significantly (Anderson, Goeree, Sebaldt, Donald, Lohfeld, et al., 2008). Such practice strategies can be cost-effective in preventing the

complications of influenza. Studies have reported that that many physicians and other healthcare providers do not routinely recommend influenza vaccines to their adult patients, despite evidence showing that the clear majority of patients will receive vaccinations if their health-care provider recommends them (Johnson, Nichol, & Lipczynski, 2008; Schwartz, Neale, Northrup, Monsur et al., 2006).

Self-Efficacy to Influenza Immunization

Self-efficacy is the confidence and the ability to make successful informed decisions Glanz, Rimer & Lewis, 2002). Fewer studies related to influenza vaccination examined the role of self-efficacy, perhaps because vaccination is a simple, time-limited behavior that does not require lifestyle adjustments or changes to complex health behaviors such as adhering to an exercise program or eating a healthier diet (Brewer & Rimer, 2008; Champion & Skinner, 2008). Earlier studies have reported that in the case of influenza vaccination, self-efficacy does not appear to be an important determinant of influenza vaccination among adults (Chapman & Coups, 1999). Clinicians can incorporate the construct of self-efficacy in helping their patients to build their confidence by providing training, guidance and positive reinforcement about the influenza vaccine (Glanz, Rimer & Lewis, 2002). Such confidence can be evaluated by discussion with patients about their experience with prior influenza vaccine, which may build confidence, decrease doubts, and help to eliminate barriers. Clinicians can also incorporate discussion in the form of a brief anonymous survey after a skill building session to elicit questions or concerns that may remain on the patient's mind (Glanz, Rimer & Lewis, 2002).

Patient education and recommendation for the influenza vaccination by clinicians can address any doubts and misinformation patients may have. Zimmerman et al. (2003) reported that patient education and recommendation for the influenza vaccination by healthcare providers can help to increase the likelihood of patients receiving the vaccines by eliminating misconceptions, vaccine-related concerns and myths. Research have found that healthcare providers can increase vaccination rates among the older adults by critically addressing patients' concerns about the possible side effects and interaction with other medication they may be taking to manage chronic illnesses (Wray, Jupka, Ross et al., 2007; Wray, Jupka, Ross et al., 2009).

Demographic Mediating Factors to Influenza Immunization

Demographic mediating factors refer to modifying variables such as age, sex, race, ethnicity, and education that may interfere influenza vaccine uptake indirectly by affecting perceived susceptibility, benefits, barriers, cues to action and self-efficacy (Glanz, Marcus Lewis, & Rimer, 1997; Glanz, Rimer, Viswanath (2008). Influenza is a preventable health problem affecting the older adults that can lead to serious medical complications (CDC, 2014). Many individuals do not embrace the health benefits associated with influenza vaccination and they continue to doubt the vaccine the vaccine safety which can contribute to the hesitancy of vaccine uptake (Yaqub et al., 2014). For people to make changes in their health beliefs about the influenza vaccine, they must believe that the changes will benefit their health and that they can make such changes (Zimmerman, et al., 2003). By counseling older adult patients and acknowledging their fear and susceptibility to influenza can help them to make changes in their behavior,

which will motivate them to make informed decisions (Johnson, Nichol, Lipczynski, 2008). Older adults are already aware that increased age and history of chronic diseases place them at increased risk for influenza and the related complications. There are also those who are not aware of their risk and there will be an increase need for health behavior change among this group. Individuals with different methods of learning might be influenced by different cues, such as television influenza vaccine commercials, flyers and posters with influenza vaccine messages, influenza vaccine campaign, advice from family and friends, education and reminders from healthcare providers, and their own personal reasons, such as a loved one who suffered with influenza or have already taken the influenza vaccine. Dexter, Teare, Dexter, Siriwarden, Read, (2012) reported that the independent factors associated with performance that predicted higher vaccination rate for at-risk patients which included clear leadership, effective communication about performance and methods used to identify and contact eligible patients were independently associated with significantly higher rates of flu vaccination. Banach, Ornstein, Factor, Soriano, 2012 reported that the association between social, demographic and health-related characteristics and influenza vaccine refusal among people ages 65 and over were positively associated with female gender, African American (Black) race, and living alone. Chiatti, Barbadoro, Lamura, Pennacchietti, et al 2011 surveyed a group of Italian to determine influenza vaccine uptake and reported that being unmarried and living in larger households were risk factors for lower immunization rates among elderly Italians.

Recency of Influenza Vaccine Uptake

Recency refers to measurement of the most recent influenza vaccine uptake within one year or less (CDC, 2013). Influenza vaccine is required every year for two reasons: (1) the body's immune response from vaccination declines over one year, so an annual vaccine is needed for optimal protection; and (2) the influenza viruses are constantly changing causing the formulation of the influenza vaccine to reviewed and updated each year based on the circulating viruses (CDC, 2011). Every year the influenza disease places many at risk older adults for influenza complications and hospitalizations (CDC, 2013). Studies have shown that recency of influenza vaccine uptake within one year or less has proven to be safe and effective in preventing influenza and its complication among the (CDC, older adults 2010). Studies have reported that there is an age-related decline in immune responses in the older adults causing a greater susceptibility to infection and reduced responses to vaccination (Skowronski, Tweed & Serres, 2008). Other studies have indicated that a low protective effect of the influenza vaccine suggest a decline in vaccine effectiveness in the older adults over time post vaccination therefore annual influenza immunization of high-risk populations against influenza remains the most important preventive method (Castilla, Martinez-Baz, Martinez-Artola et al., 2013)

According the CDC (2013), antibodies against the influenza viruses begin to appear one to two weeks after receiving the influenza vaccine and last for several months, and sometimes even up to one year. Since the immune response to the influenza vaccine declines in a year or less and the influenza virus is constantly changing, the CDC (2013)

recommended that for optimal protection, the annual influenza vaccine is needed each year. Songa et al. (2010) compared long-term immunogenicity of influenza vaccine among older and younger adults during an interval period of 1, 6, and 12 months after vaccination. The findings indicated that neuroprotection rates at 1-month post-vaccination ranged from 70.1% to 90.3% depending on the age group and influenza vaccine virus strain; at 6-months post-vaccination, seroprotection rates for all three strains had declined significantly in older adults (p <0.01). Low pre-vaccination HI titer (<1:40) and advanced age were associated with early decline of HI titers, falling below seroprotective levels around 6 months after vaccination (Songa et al., 2010)

Frequency of Influenza Disease

Frequency of Influenza disease refers to measurement of the most recent episode of influenza disease within one year or less (CDC, 2013). Influenza vaccine is one of the most recommended method of reducing influenza complication, hospitalization and death among the older adults CDC, 2013). The uptake of influenza vaccine uptake within a year or less can decrease the frequency of influenza disease among the older adults (CDC, 2010). According to the CDC (2013), the efficacy of the influenza vaccine is measured by comparing the frequency of influenza illness among persons vaccinated and those who have not been vaccinated with the influenza vaccine. Studies have indicated that those who had received the influenza vaccine in a year or less had a decrease incidence in influenza and its complication. Although immune response to the influenza vaccine declines in a year or less the vaccine is still effective in preventing complications and death among older adults (CDC, 2013). It has been reported that the influenza vaccine is

50%–60% effective in preventing hospitalization and 80% effective in preventing death (CDC, 2012). A survey carried out in Genesee County, Michigan during the influenza outbreak from 1982–1983 to evaluate unvaccinated nursing home residents. Findings from this survey indicated that unvaccinated older adult residents were four times more likely to die than were vaccinated older adults' residents (CDC, 2010).

Literature Providing Differing Views

The effectiveness of the influenza vaccine is a concern that is debatable among many researchers. Although the influenza vaccination provides some protection and may prevent complications due to pneumonia, hospitalizations, and death, the effectiveness is variable. Reports from a recent systematic review and meta-analysis of influenza vaccine protection identified that there was 59% effectiveness of the trivalent influenza vaccine in adults aged 18 to 65 years and a higher effectiveness (83%) of the live-attenuated vaccine (LAIV) in children (Osterholm, Kelley, Sommer, & Belongia, 2012). Another study reported that influenza vaccination was associated with a 27% reduction in the risk of hospitalization for pneumonia or influenza and a 48% reduction in the risk of death (Nichol, Nordin, Nelson, Mullooly & Hak, 2007). Simonsen et al. (2009) argued that although placebo-controlled randomized trials show influenza vaccine is effective in younger adults; few trials have included older adults, and especially those who are at least 70 years, which accounts for three-quarters of all influenza-related deaths.

Literature on Methodology

Many the literature reviewed were both qualitative and quantitative in nature and they investigated personal characteristics which were thought to be predictors of

influenza vaccine uptake, such as age, sex, comorbidity, educational level, income and specific area of residence (Dexter, Teare, Dexter, Siriwarden, Read, 2012). Several studies used telephone survey to identify predictors of and barriers to vaccine uptake (Böhmer et al., 2012; Banach, Ornstein, Factor, & Soriano, 2012; Johnson, Nichol, & Lipczynski, 2008). Many quantitative studies used the Likert scales, open ended and closed ended questions, and self- report for vaccination status to measure constructs for factors (Johnson et al., 2008; Santibanez et al., 2010). Coe, Gatewood et al. (2012) used anonymous, self-administered questionnaire based upon the HBM to assess participants' perceptions of severity, risk, and susceptibility to the novel H1N1 influenza virus and/or vaccine. Other predictors identified were prior experience, concerns about the vaccine, perceived risk and advice and information from clinicians and caregivers (Johnson, Nichol, Lipczynski, 2008; Schwartz, Neale, Northrup, Monsur et al. 2006). However, since the main goal of this research is to use the HBM to identify the individuals' perception of the influenza vaccine, studies that focused on the health beliefs, attitudes, perceptions and subjective experiences of older adults were most beneficial to this study (Chiatti, Barbadoro, Lamura, Pennacchietti, et al 2011; Müller, and Szucs, 2007; Raftopoulos, 2007; Gidengil, Parker, Zikmund-Fisher, 2011; Banach, Ornstein, Factor, Soriano, 2012).

Summary and Transition

The literature reviews for this study introduced the background of the study, problem statement, its effect on the older adults, influenza virus and its complications among the elderly. The research review demonstrated the importance of recommendations and guidelines for influenza control among the older adults, guidelines and recommendation for management of influenza among the older adults, barriers that have been identified to explain why the older adults may not receive the seasonal influenza vaccine. Some inconsistencies in the recommendations for influenza management among the older adults were identified, the specific perceptions regarding diagnosing and treating seasonal influenza has only been briefly explained. This study contributes to gaps in the literature by addressing older adults' perceptions, beliefs and adherence to influenza vaccine recommendations and the importance of clinician/ communication about the seasonal influenza vaccine. Most clinicians are in the position to have a major influence on their patients since they have developed a trusting relationship. Establishing better communication and reminders may assist in increasing influenza vaccine uptake by the older adults. With the increasing healthcare costs related to influenza epidemic and its complications among the older adults, and the increasing number of older adults in our society warrant there is an urgent need for this research. The HBM is used in this study as a theoretical guide for predicting influenza vaccine uptake among the older adults and therefore guides this research methodology. The rationale for this study was developed to identify significance of the perception of participants involved and explain how the research plans were carried out. The study's

conceptual background and methodology were defined based on the constructs of the HBM. The design for this study was chosen based on existing literature about influenza vaccine uptake among older adults.

Chapter 3 begins with a brief discussion of the steps used in the literature review. It describes in detail the: study design, sample, setting, data collection procedures, and data analysis. Protection of human participants and limitations of the study are also addressed.

Chapter 3: Research Method

Introduction

The purpose of this study was to identify perceived factors that may be associated with poor influenza vaccination uptake among older adults. In this quantitative study, I developed a new scale to measure the HBM constructs associated with influenza vaccine. In this chapter, the study design, sample, setting, data collection procedures, and data analysis are discussed. Protection of human participants and limitations of the study are also addressed.

Research Design and Approach

This was a descriptive study using a quantitative cross-sectional design where self-administered questionnaires were used. In this study, I identified the correlation between patients' perception of the severity of the influenza epidemic and the importance of the influenza vaccine uptake. Based on the nature of this study, a cross-sectional approach was appropriate because the intention of this study was to determine whether there is a relationship between older adults' perceptions of influenza epidemic and the importance of the annual uptake of the influenza vaccine.

In this study, I explored older adult perceptions of the influenza epidemic and how these perceptions guide the likelihood of obtaining of the seasonal influenza vaccine as well as the effects of contribution of providers' communication in helping to raise the awareness about the influenza vaccine. The questionnaire was designed to provide a quantitative display of the participants' perception that guides their behaviors in obtaining the seasonal influenza vaccine.

The independent variables are the HBM constructs: perceived susceptibility, perceived severity, perceived barriers, perceived benefits, perceived cues to action, perceived self- efficacy, and mediating demographic characteristics including gender, age, educational level, annual income, and place of residence. The dependent variables were recency of influenza vaccine uptake and frequency of influenza disease within 1 year or less, which represented the efficacy and effectiveness of influenza vaccination for possible outcome measures, including the prevention of influenza infection.

Setting and Sample

The purpose of this section is to discuss the setting, the sample selection, sample size calculation and rationale, and eligibility criteria. The study took place in three senior citizens center in the suburban areas of Brooklyn, New York. The area is populated with approximately 40% African Americans, 20% Hispanics, 10% Asians, and 30% European American (Whites).

The sample consisted of 147 participants from three senior citizen centers suburban area of Brooklyn, New York. A convenience sample was used since random sampling and availability of individual respondents may not be feasible. Older adult clients who were members of the selected senior centers and agreed to participate in the study were selected until the required sample of 147 respondents was obtained. Inclusion criteria consisted of (a) men and women, (b) ages 65 years and older, (c) English speaking, (d) oriented to person, time, and place, (e) members of the selected senior citizen centers, and (f) able to understand the English language. I prescreened the participants who responded to the request to participate in the study for eligibility prior to

data collection. Prescreening consisted of explaining to each participant about the nature of the study and by signing the consent form that they were agreeing to participate in the study. Participants were asked again if they still wished to continue in the study; once they agreed to participate in the study, they were interviewed. I then set up the participant to begin completing the questionnaires/surveys.

Justification for Choice of Methodology

A quantitative cross-sectional study design was used to measure the factors and provide descriptive statistical findings on a selected population of elderly who attended three senior centers in Brooklyn, New York. Another reason for selecting this design was to better explain the hypotheses and determine the correlation between the independent and dependent variables. According to Creswell (2009), quantitative strategies quantify relationships between variables and emphasize mathematical measurement, using statistical analysis. The survey approach used a 33-item group administered questionnaire where participants answered the questions using a 5-point Likert scale (1-*Strongly Disagree* to 5-*Strongly Agree*) and provided answers to open ended and closed ended questions concerning their perception of influenza vaccine uptake.

Instrumentation and Materials

Development of a New Survey

The review of the literature did not identify surveys measuring perceptions of older adults concerning using the HBM, but it was important for me to identify the perceptions of older adults based on the HBM. The closest instrument prototype was Champion's Health Belief Scales for Mammography Screening, 1997. The newly created

survey instrument was developed using information from the literature on previous research studies that have used the HBM. The questions were initially created after reviewing other studies that investigated many topics using the HBM, concerning the perception of older adults' perception about vaccine uptake. The HBM was used to evaluate older adults' perception of influenza disease and vaccine uptake questions that were categorized based on the six constructs of the HBM: perceived susceptibility, perceived benefit, and perceived seriousness, perceived barriers, cues to action, and self-efficacy, and demographic mediating factors. Recency of influenza vaccine uptake and frequency of influenza infection within 1 year or less were included in the instrument questionnaire. The survey instrument consisted of a 33-item questionnaire. A total of 25 questions were based upon the constructs of the HBM, six questions were based on demographic mediating factors, one question was based on the frequency of influenza disease, and one question was based on recency of influenza vaccine uptake. Questions 1 through 4 were developed to assess the subject's perceived severity to seasonal influenza. Questions 5 through 7 were developed to assess perceived susceptibility of seasonal influenza. Questions 8 through 14 addressed perceived clinical barriers to seasonal influenza vaccination. Questions 15 through 17 addressed perceived benefits of the influenza vaccine. Questions 18 to 21 addressed cues to action concerning a reminder from clinicians and family members as well as information from posters, books, or television. Question 22 through 25 addressed perceived self-efficacy concerning confidence in obtaining the seasonal influenza vaccine. Five questions concerning demographics mediating factors, age, gender, race/ethnicity, and estimated annual

income, were also used in the survey. Also, two questions concerning recency of influenza vaccine uptake and frequency of influenza disease were assessed. Each section of the questionnaire used a 5-point Likert scaled response set (1--*strongly disagree,* 2–*disagree*, 3--*neither agree nor disagree,* 4–*agree*, 5--*strongly agree*) except for frequency of the influenza disease that was measured using 0 to 4 or more times, and recency of influenza vaccine uptake was measured using *never* to *most recent*. The survey did not contain any identifiable patient information.

Validity and Reliability

Since this was a newly constructed scale, there were concerns about the methodological issues of validity and reliability of the scale. To address the methodological issues of validity and reliability of the scale, an expert review panel was asked to assess and revise the survey prior to official data collection. To improve the instrument validity, all feedback from the expert panel concerning the instrument was discussed among the group and corrections were made.

The reliability of the instrument was determined by measuring internal consistency (Cronbach's alpha) and a test-retest reliability (correlation coefficient). Test-retest reliability was tested by administering identical versions of the scale items at two different occasions under the same conditions after 2 weeks. The degrees of similarity between the two test-retest reliability measurements were determined by computing a correlation coefficient. For the reliability analysis, 50 older adult volunteer participants were asked to retake the survey 2 weeks after the first administration.

Expert Panel Review Process

The expert panel who reviewed the survey questionnaire for validity and reliability were selected using the criteria based on education, profession, and experience with research. Three medical doctors and three nurse practitioners were selected to participate in the expert panel review. The expert panel provided timely feedback, and the survey was revised based on the consensus of the group. An overview of the purpose of the study and the constructs of the HBM and mediating factors were presented to group members to ensure that all members were familiar with the aim of the instrument's development. The group was asked to evaluate the survey questions for face validity. Group members were given a copy of a draft questionnaire. The Expert Review Panel form (Appendix D) was provided to each member to review with a section for their written editorial comments. Changes to the survey were based on the expert panel suggestions, and they were asked to review the revised survey (Appendix D). The timeframe for this process was 30 days. The Expert Review Panel members were instructed to be candid and provide comments that truly reflected how they felt. A journal was kept to record individual member input. The instrument was refined during each meeting until a consensus was reached on the content of the instrument and the validity of the items.

Final Survey Instrument

The finalized survey instrument included 33 structured questions (Appendix D). A total of 25 questions were based upon the constructs of the HBM and demographic mediating factors. Four questions assessed perceived severity to seasonal influenza.

Three questions assessed perceived susceptibility of seasonal influenza. Seven questions addressed perceived clinical barriers to seasonal influenza vaccination. Three questions addressed perceived benefits of the influenza vaccine. Four questions addressed cues to action concerning reminders from clinicians and family members and information from posters, books, or television. Four questions addressed perceived self-efficacy concerning confidence in obtaining the seasonal influenza vaccine. Five questions concerning demographics mediating factors such as age, gender, race/ethnicity, and estimated annual income, was used for the survey. In addition, two questions concerning recency of influenza vaccine uptake and frequency of influenza disease were assessed. Each section of the questionnaire used a 5-point Likert scaled response (1--*strongly disagree,* 2–*disagree*, 3--*neither agree nor disagree,* 4–*agree*, 5--*strongly agree*) except for frequency of the influenza disease that was measured using 0 to 4 or more times and recency of influenza vaccine uptake that was measured using *never* to *most recent*. The survey did not contain any identifiable patient information.

HBM Constructs and Survey Items

Perceived susceptibility was based on the participants' subjective perception of the risk of acquiring influenza and the variation of the person's feelings of personal vulnerability to influenza infection. Perceived severity assessed the participants' feelings on the seriousness of contracting the influenza infection and whether if left untreated, there is a possibility of related complications. The extent to which feelings about influenza severity may affect a person to consider the medical consequences varies, such as hospitalization from complications or death, and social impact on family life and other

social relationships. Perceived benefits assessed the participants' perception of the effectiveness of the influenza vaccine to reduce the threat of influenza infection. The course of action the participant would take to prevent influenza infection disease was in consideration and evaluation of both perceived susceptibility and perceived benefit, such that the person would accept the recommended health action if it was beneficial. Perceived barriers assessed participants' perceived beliefs about the obstacles to the uptake of the influenza vaccine. There is wide variation in perceived barriers that leads to a cost/benefit analysis; therefore, the person may weigh the effectiveness of the influenza vaccine against the perceptions that it may be expensive or dangerous because of side effects, causes unpleasantness such as pain, be time-consuming, or be inconvenient. Cue to action assessed the stimulus needed to trigger the decision-making process to accept a recommended influenza vaccine. These cues can be advice from healthcare practitioners, illness of a family member, a newspaper article, and television commercials. Self-efficacy assessed the level of participants' confidence in their ability to successfully receive the influenza vaccine. Demographics mediating factors were age, gender, race/ethnicity, estimated annual income, and place of residence. The dependent variables were the frequency of influenza disease within 1 year or less and recency of influenza vaccine uptake within 1 year or less.

Analytical Process of Correlating Variables

Each research question was answered by testing the corresponding hypotheses. The variables used for hypothesis testing included the independent variables, which were the perceptions of older adults' beliefs about the influenza disease and influenza vaccine

uptake as a preventive method, and the dependent variables, which were the frequency of influenza disease within 1 year or less and recency of influenza vaccine uptake within 1 year or less.

Scoring of Independent and Dependent Variables

Independent variable perceived susceptibility was scored 1 to 5 on a subscale of four items with an ordinal range of 4 to 20. Independent variable perceived severity was scored 1 to 5 by a subscale of three items with an ordinal range of 3 to 15. Independent variable perceived barrier was scored 1 to 5 by a subscale of six items with an ordinal range of 3 to 15. Independent variable perceived benefit was scored 1 to 5 by a subscale of three items with an ordinal range of 3 to 15. Independent variable perceived cues to action was scored 1 to 5 by a subscale of four items with an ordinal range of 4 to 20. Independent variable perceived self-efficacy was scored 1 to 5 by a scale of four items with an ordinal range of 4 to 20. The six mediating demographic variables are presented in Table 1, including gender, age, race, educational attainment, income, and place of residence.

The dependent variables for this study are frequency of influenza disease and recency of influenza vaccine. The measures of frequency of influenza disease and recency of influenza vaccine consisted of derived binomial distribution (1 = infection $\leq$ 1 year; 0 = everyone else). The responses to the questions were indicated as numerical values with increasing numbers indicating increased agreement regarding the variable. Tables 1, 2, and 3 illustrate the type of variables, description of the level of agreement each survey questions, type of statistical analysis, and values of the response categories.

Table 1

Independent Variables for Hypotheses Testing

Variable	Description	Type	Values
Perceived Susceptibility	Likelihood of getting influenza disease	Logistic Regression Odds Ratios and 95% Confidence Intervals	1=Strongly Disagree 2=Disagree 3=Neither Agree nor Disagree 4=Agree 5=Strongly Agree
Perceived Severity	Impacted if they were affected by influenza disease	Logistic Regression Odds Ratios and 95% Confidence Intervals	1=Strongly Disagree 2=Disagree 3=Neither Agree nor Disagree 4=Agree 5=Strongly Agree
Perceived Benefits	The benefits and effective the influenza vaccine	Logistic Regression Odds Ratios and 95% Confidence Intervals	1=Strongly Disagree 2=Disagree 3=Neither Agree nor Disagree 4=Agree 5=Strongly Agree
Perceived Barriers	The difficulties encounter in taking the obtaining the influenza vaccine	Logistic Regression Odds Ratios and 95% Confidence Intervals	1=Strongly Disagree 2=Disagree 3=Neither Agree nor Disagree 4=Agree 5=Strongly Agree
Cues to Action	The prompts that are needed to move the person into the state where they are ready to take the influenza vaccine.	Logistic Regression Odds Ratios and 95% Confidence Intervals	1=Strongly Disagree 2=Disagree 3=Neither Agree nor Disagree 4=Agree 5=Strongly Agree
Self-Efficacy	The confidence and belief in their own ability to take the influenza vaccine	Logistic Regression Odds Ratios and 95% Confidence Intervals	1=Strongly Disagree 2=Disagree 3=Neither Agree nor Disagree 4=Agree 5=Strongly Agree

Table 2

Dependent Variables for Hypotheses Testing

Variable	Description	Type	Values
Frequency	Number of times had influenza in past year	Logistic Regression Binomial distribution 1=# infections ≤ 1 year; 0=everyone else	0=0 times 1=1 time 2=2 times 3=3 times 4=4 or more times
Recency	Last time the influenza vaccine was received	Logistic Regression Binomial distribution; 1=within the year; 0=everyone else	1=Never 2=> 3 years 3=2-3 years ago 4=Last year 5=This year

Table 3

Demographic Variables for Descriptive Analysis and Hypotheses Testing

Variable	Type	Values
Gender	Nominal	1=Male 2=Female
Age	Ordinal	1=65-69 2=70-74 3=75 or greater
Race/Ethnicity	Nominal	1=European Americans (Whites) 2=African American (Black) 3=Hispanic 4=Asians 5=Other, specify: _____
Education	Ordinal	1=Grade School 2=Some High School 3=High School Diploma/GED 4=Some College 5=Bachelor Degree 5=Graduate/Professional Degree
Place or residence	Nominal	1=Family house 2=Own house alone 3=Residence for senior citizens 4=Other, specify
Income	Ordinal	1=Under $10,000 2=$10,000 - $19,999 3=$20,000 - $29,999 4=$30,000 - $39,999 5=$40,000 - $49,999 6=$50,000 - $59,999 7=$60,000 or above.

Protection of Human Participants

Walden IRB Approval

Each senior center was contacted and approvals by the directors were acquired before carrying out the survey. The data collection began after IRB approval was obtained on February 3, 2015 (IRB # 02-04-15-0145747). The participants in the study were older adults, aged 65 and older and fall under the vulnerable category of human participant protection requiring a full board review and approval. The IRB at Walden determined the appropriate human rights protection of the participants. Maintaining confidentiality and privacy of participants and securing informed consent were important to maintain the integrity of this study. Each participant received a consent form at the beginning of the survey describing the study and explaining that participation was voluntary. Those participants who voluntarily agreed to participate in the survey proceeded with the consent. Participants only used initials of first and last names on the authorization form before screening was done. All research data will be stored for 5 years and will be destroyed after such time.

Screening for Dementia

The prevalence of dementia increases from less than 1% among people 65 years of age or younger, to an estimated 3–11% among those 65-84 years old, and to around 33% of those aged 85 years and older (Boutsani, et al., 2003; Lobo, et al. 2000; Rocca, et al. 1990; Skoog, et al. 1993). Studies have also reported that cognitive impairment, not dementia (CIND), is even more common, with an estimated prevalence of around 17% in people 65 years and older (Graham, Rockwood, Beattie, et al. 2003). To maintain the

integrity of this study the General Practitioner Assessment of Cognition (GPCOG) (Brodaty et al., 2002) was used as a brief four to five minutes screening test for cognitive impairment of all participants who voluntarily agreed to participate in the study. Prior to the GPCOG-screening participants signed an authorization form. The participants' GPCOG screening evaluation contained the following cognitive test items: time orientation, clock drawing, reporting a recent event and a word recall task. A GPCOG-participant score of 9 indicates no cognitive impairment and was used as an inclusive criterion for the study. If a GPCOG-participant score is between 5 and 8, the GPCOG-informant interview was administered but these participants were not included in the study. During the informant interview the informant was asked about the older adults' memory of recent conversations, misplacing objects, word finding difficulties, ability to manage money, ability to manage medication, and need for travel assistance. A GPCOG-participant score of 4 or lower or a GPCOG-informant section score of 3 or lower suggests cognitive impairment (Brodaty et al., 2002). Each older adult participant who received the cognitive screening score of nine or more and voluntary agreed to participate in the study received a consent form and consent explanation sheet that described the study and explained that participation or the completion of the survey was voluntary.

Anonymity

Participant anonymity was achieved through using initials of first and last names in the consent form. The raw data were managed only by me and no participant contact information was available about this survey. Before proceeding with the survey each participant was informed that they have the right to stop the survey at any time if they

had any doubts. Since this research was not an invasive procedure there was no foreseeable harm to the participants in this study. Although the participants may not have personally benefited from this study, the study may provide valuable information for improvement in influenza vaccine uptake among the older adults.

Test-Retest Participation

All participants of the test-retest component of the study were asked to volunteer to take the survey two times, at the initial meeting and again two weeks later. If participants agreed, they checked "yes" on the question and enter their e-mail address. The e-mail was used to contact those participants two weeks later. The purpose of the GPCOG and the reason for doing the screening were explained to all participants who volunteered to participate in the GPCOG.

Data Collection

The survey was conducted at each of the three sites using the same method until a sample of 147 participants was obtained. Data was collected from May through July, 2015. The survey took about 30 to 45 minutes to complete. I introduced myself to the prospective participant who volunteered to participate in the study and explained the purpose of the survey, how the survey would be distributed, the steps participants would take to complete the survey, the screening and consent processes, privacy and confidentially, the research variables, and data management. Participants were asked to answer survey questions in the same order as the items were printed. Extra care was taken during the data collection phase to ensure completeness of self-report and prevention of the occurrence of missing data. Before surveys were collected, the questionnaire was

examined for completeness and accuracy, and participants were asked to complete any missing questions.

Statistical Analyses

Data were entered directly into Microsoft Excel using keystrokes. Each entry was rechecked to prevent and identify data entry errors. Data were imported from Excel to SPSS (Statistical Product and Service Solutions) version 21. Range and frequency checks were used to ensure that none of the variables were outside the range of possible values. Data collected from the survey were tabulated for analysis using SPSS to identify frequencies, and correlation coefficients. The data related to each hypothesis are presented separately and analyzed as follows:

Research Question 1. Is there a significant relationship between older adults 'perceived susceptibility to the seasonal influenza and frequency and recency of vaccine?

H10: There is no significant relationship between older adults perceived susceptibility to the seasonal influenza and frequency and recency of vaccine.

H1A: There is a significant relationship between older adults perceived susceptibility to the seasonal influenza and frequency and recency of vaccine.

Statistical Plan: Independent Variable = Perceived susceptibility; Dependent Variables = Frequency of influenza vaccine uptake and Recency of influenza vaccine. Statistical analysis was ordinal logistic regression used on multiple independent variables to predict influenza disease, recency of influenza vaccine uptake, and frequency of influenza disease based on older adults' perceived susceptibility. Null hypothesis was rejected if $p < .05$.

Research Question 2. Is there a significant relationship between older adults perceived severity to seasonal influenza based on CDC influenza guidelines?

H20: There is no significant relationship between older adults perceived severity to seasonal influenza based on CDC influenza guidelines.

H2A: There is a significant relationship between older adults perceived severity to seasonal influenza based on CDC influenza guidelines.

Statistical Plan: Independent Variable = Perceived severity; Dependent Variables = Frequency of influenza vaccine uptake and recency of influenza vaccine. Statistical analysis was ordinal logistic regression analysis used on multiple independent variables to predict influenza disease, influenza vaccine uptake, frequency and recency of influenza vaccine based on older adults' perceived severity. Null hypothesis was rejected if $p < .05$.

Research Question 3. Is there a significant relationship between older adults' perceived benefits and the positive consequences of the annual seasonal influenza vaccine uptake?

H30: There is no significant relationship between older adults' perceived benefits and the positive consequences of the annual seasonal influenza vaccine uptake.

H3A: There is a significant relationship between older adults' perceived benefits and the positive consequences of obtaining the annual seasonal influenza vaccine.

Statistical Plan: Independent Variable = Perceived benefits; Dependent Variables = Frequency of influenza vaccine uptake and recency of influenza vaccine. Statistical analysis was ordinal logistic regression analysis used on multiple independent variables

to predict influenza disease, influenza vaccine uptake, and recency of influenza vaccine based on older adults' perceived benefits. Null hypothesis was rejected if $p < .05$.

Research Question 4. Is there a significant relationship between older adults' perceived barriers and discouragement concerning the uptake of the seasonal influenza vaccine?

H40: There no significant relationship between older adults perceived barriers and discouragement concerning the uptake of the seasonal influenza vaccine.

H4A: There is a significant relationship between older adults' perceived barriers and discouragement concerning the uptake seasonal influenza vaccine.

Statistical Plan: Independent Variable = Perceived barriers; Dependent Variables = Frequency of influenza vaccine uptake and recency of influenza vaccine. Statistical analysis was ordinal logistic regression analysis used on multiple independent variables to predict influenza disease, influenza vaccine uptake, and recency of influenza vaccine based on older adults' perceived barriers. Null hypothesis was rejected if $p < .05$.

Research Question 5. Is there a significant relationship between older adults' perceived cues to action and health care providers' persuasive communications about seasonal influenza vaccine?

H50: There is no significant relationship between older adults' perceived cues to action and health care providers' persuasive communications about seasonal influenza vaccine.

H5A: There is a significant relationship between older adults' perceived cues to action and health care providers' persuasive communications about seasonal influenza vaccine.

Statistical Plan: Independent Variable = Perceived cues to action; Dependent Variables = Frequency of influenza vaccine uptake and recency of influenza vaccine. Statistical analysis was ordinal logistic regression analysis used on multiple independent variables to predict influenza disease, influenza vaccine uptake, and recency of influenza vaccine based on older adults perceived cues to action. Null hypothesis was rejected if $p < .05$.

Research Question 6. Is there a significant relationship between older adults' perceived self-efficacy and the ability to successfully obtaining the seasonal influenza vaccine?

H60: There is no significant relationship between older adults' perceived self-efficacy and the ability to successfully obtaining the seasonal influenza vaccine.

H6A: There is a significant relationship between older adults' perceived self-efficacy and the ability to successfully obtaining the seasonal influenza vaccine.

Statistical Plan: Independent Variable = Perceived self-efficacy; Dependent Variables = Frequency of influenza vaccine uptake and recency of influenza vaccine. Statistical analysis was ordinal logistic regression analysis used on multiple independent variables to predict influenza disease, influenza vaccine uptake, and recency of influenza vaccine based on older adults' perceived self-efficacy. Null hypothesis was rejected if $p < .05$.

Research Question 7. Is there a significant relationship between full HBM constructs plus mediating demographic factors such as age, gender, ethnicity, occupation, and older adults' perceptions of the seasonal influenza vaccine?

H70: There is no significant relationship between full HBM constructs plus mediating demographic factors such as age, gender, ethnicity, occupation, and older adults' perceptions of the seasonal influenza vaccine.

H7A: There is a significant relationship between full HBM constructs plus mediating demographic factors such as such as age, gender, ethnicity, occupation, and the elderly perceptions of acceptance of the seasonal influenza vaccine.

Statistical Plan: Independent Variable = HBM constructs and mediating demographic factors; Dependent Variables = Frequency of influenza vaccine uptake and recency of influenza vaccine. Statistical analysis was ordinal logistic regression analysis used on multiple independent variables to predict influenza disease, influenza vaccine uptake, and recency of influenza vaccine based on older adults' perceptions and demographic factors. Null hypothesis was rejected if $p < .05$.

Research Question 8. Is there significant relationship between influenza vaccine recency and influenza disease among older adults?

H80: There is no significant relationship between influenza vaccine recency and influenza disease among older adults.

H8A: There is a significant relationship between influenza vaccine recency and influenza disease among older adults.

Statistical Plan: Independent Variable = Perceived susceptibility; Dependent Variables = Frequency of influenza vaccine uptake and Recency of influenza vaccine. Statistical analysis was ordinal logistic regression analysis used on multiple independent variables to predict influenza disease, influenza vaccine uptake, and recency of influenza vaccine based on older adults' perceived susceptibility. Null hypothesis was rejected if $p < .05$.

Research Question 9. Is there a significant relationship between influenza disease frequency and influenza vaccine uptake among older adults?

H90: There is no significant relationship between influenza disease frequency and influenza vaccine uptake among older adults.

H9A: There is a significant relationship between influenza disease frequency and influenza vaccine uptake among older adults.

Statistical Plan: Independent Variable = Perceived susceptibility; Dependent Variables = Frequency of influenza vaccine uptake and Recency of influenza vaccine. Statistical analysis was ordinal logistic regression analysis used on multiple independent variables to predict influenza disease frequency, influenza vaccine uptake, and recency of influenza vaccine based on older adults' perceived susceptibility. Null hypothesis was rejected if $p < .05$.

Threats to Validity

Threats to External Validity

The study was carried out at three senior centers in Brooklyn, New York and these locations may not be representative of all older adults. The sample was purposive and nonprobabilistic. The study sought to test a newly developed instrument and provide information about influenza uptake among Brooklyn seniors. Since age played a major factor causing the effect of the influenza vaccine to vary from one individual to the other, then age differences between the sampled older adult participants and the general population would lead to a biased estimate of the average influenza vaccine effect in that population. In this study, such bias was corrected by a simple re-weighing procedure: The age-specific effect in the older adult subpopulation was computed using the average age distribution in the general population which gave an unbiased estimate of the average influenza vaccine treatment effect in the general population.

Threats to Internal Validity

Some elderly might misinterpret the instructions on how to complete the survey. The direction on how to complete the survey was read twice to each older adult and each older adult could ask for help or ask questions while completing the survey before proceeding to answer the survey questions. Completing the survey questionnaire took 30 to 45 minutes and the survey was administered in the mornings before other activities to prevent shift in focus due to tiredness or fatigue. Participants were allowed extra time if they requested to complete answering the questions.

Dissemination of Findings

The growing rate of influenza and its complications among older adults is a public health concern (CDC, 2013). Recent reports from the CDC, 2013-2014 indicate that the influenza hospitalization rates among persons 65 and older increased greatly while 80 percent of cumulative influenza-associated deaths occurred among this age group. There is a direct request for better influenza surveillance to assist in controlling the impact of influenza and to identify vaccine improvement, which is important for influenza complication prevention among older adults (PAHO, WHO, 2013).

The goal of health care professionals and policy makers is to reduce the rate of influenza among the older adults. The study results were shared with the New York State Department of Health and local health departments in Brooklyn, NY. The results of the study will be submitted for publication in peer-reviewed journals such as *American Journal of Public Health* and other nursing journals. In addition, the outcome of the study can contribute to the gap in literature about the importance of annual uptake of influenza vaccine as the main method of prevention of influenza disease and its complication among the older adults.

Summary and Transition

The study design, sample, setting, data collection procedures, and data analyses were discussed in this chapter. Protection of human participants and limitations of the study were also addressed in this chapter. A quantitative cross-sectional design was used to identify the prevalence of seasonal influenza vaccine uptake among the older adults. The study made use of a convenience sample of older adults who attended the three

selected senior centers in Brooklyn, NY. Data were collected using a 33-item questionnaire based on the HMB concepts, demographic mediating factors, frequency of influenza disease, and recency of influenza uptake.

The questionnaire consisted of items related to the six constructs of the HBM plus mediating demographic factors to identify the perception of the elderly concerning the seasonal influenza vaccine. In addition, frequency of influenza disease and recency of influenza vaccine uptake were evaluated. Understanding factors that influence influenza uptake among older adults, awareness can increase among primary care providers and other clinicians regarding the importance of routine influenza vaccine reminders and recommendations. Chapter 4 provides the results of the survey and statistical analysis of the final interview.

Chapter 4: Results

Introduction

The purpose of this study was to identify perceived factors that may be associated with poor influenza vaccination uptake among older adults. The HBM guided this study. This quantitative study was used to answer nine research questions to evaluate older adult perceptions of annual seasonal influenza vaccine and factors that may contribute to poor influenza vaccine uptake. A new instrument was developed, and test-retest reliability was analyzed among a small sample of older adult participants. A survey approach was used for the data collection. In this chapter, factor analysis to measure the newly created HBM constructs is described. Descriptive analysis illustrates the demographic characteristics of the sample participants. The examination of correlations of older adult perceived health beliefs, recency of influenza vaccine, and frequency of influenza disease are reviewed. In addition, logistic regression analyses performed to test the hypotheses are discussed between HBM model predictors of frequency and recency of influenza disease within the last years.

Characteristics of Participants

Participants who spoke and read English were recruited from the three senior centers using a convenience sample approach. Data were collected from May through July 2016. The survey took about 30 to 45 minutes to complete. The total number of participants who consented to the survey was 162, of which 15 were excluded from the analysis because they did not meet the research criteria due to cognitive impairment as evidenced by the inability to think clearly, concentrate, and recall new information. The

findings presented reflect a final sample of 147. Table 4 shows the demographic distribution of the participants, by gender, age, and race, highest level of education, annual income, and place of residence. Most the sample were female (74%) and between the ages of 65 to 70 (77%). Most the participants identified themselves as members of minority groups, including 40% African Americans, 28% Hispanics, 6% Asians, and 26% European Americans. About a third of the sample had at least some college education, and 45% had a household income under $10,000. Most of the participants in the sample lived independently either alone in their own home (38.4%) or in senior citizen housing (33%).

Table 4

Frequency of Demographic Characteristics of Participants (n=147)

Variable	Frequency	Percent
Gender		
Male	38	25.8
Female	109	74.2
Age		
65 -70	113	76.9
70- 75	31	21.1
75 or greater	3	2.0
Race		
European Americans	38	25.9
African Americans	59	40.1
Hispanic	31	27.9
Asians	9	6.1
Highest Education		
Grade School	18	12.1
Some High School	29	19.7
High School Diploma/GED	24	16.3
Some College	16	10.9
Bachelor Degree and higher	30	20.4
Annual Income		
Under $10,000	66	44.9
$10,000 - $19,999	59	40.1
$20,000 - $29,999	22	15.0
Type of Residence		
Family house	43	29.3
Own house alone	55	38.4
Residence for senior citizens' home	49	33.3

Pilot Test Results

Reliability Test Retest Analysis

The survey was administered twice to 50 older adult participants who volunteered to retake the survey 2 weeks after their initial survey. According to Trochim (2008), the test-retest reliability is used to assess the consistency of a measure at two different time periods. Paired-samples *t* tests were run on the different construct items susceptibility, seriousness, barriers, benefits, cues to action, and self-efficacy (see Tables 5, 6, 7, 8, 9, and 10). The comparison of the mean perceptions across the two-time periods (perceived seriousness, susceptibility, barriers, benefits, and cues to action) resulted in a probability greater than 0.05, indicating that there were no significant differences between the administration times. The lack of differences in the two test administration times indicated that the instrument was reliable and was adequate for the survey.

Perceived Susceptibility

The construct of perceived susceptibility is an individual's perception about the chances of getting the influenza disease, a serious disease, which may later lead to the motivation to adopt the appropriate health behavior to decrease the risk of getting influenza. I tested the susceptibility construct with three items, using a 5-point Likert scale with response categories being *strongly disagree* to *strongly agree* and scored 1 to 5, with 0 for missing answers. A factor analysis was computed with the three perceived susceptibility items that indicated that there were no significant differences between the two test administration times. Table 5 shows the paired-samples *t* test of test-retest reliability of perceived susceptibility.

Table 5

Paired Samples t-test for Test-Retest Reliability of Perceived Susceptibility

Scale items	Test 1 mean(SD)	Test 2 mean(SD)	Correlations	Mean differences	*p*	*t*
If I get the seasonal influenza virus I will get sick.	4.82(.440)	4.70(.610)	.472	.094	.292	1.076
If I get the seasonal influenza virus I will lose income.	4.89(.349)	4.84(.444)	.387	.119	.099	1.705
If I get the seasonal influenza virus other members in my home will get sick.	4.30(1.016)	4.04 (1.00)	.156	.229	.258	1.156
If I get the seasonal influenza virus I will die	4.78(.439)	4.68(.610)	.460	.092	.293	1.074

Perceived Severity

The construct of perceived severity refers to the participants' perception about the seriousness of influenza disease and its prevention. The perceived threat of influenza disease among older adults is a serious health concern. I tested the 4-item perceived seriousness construct, using a 5-point Likert scale with response categories ranging from *strongly disagree* to *strongly agree* and scored 1 to 5, with "0" for missing answers. Although some mean differences are negative as indicated, the correlations and *p* values showed reliability. Therefore, correlation between the test and retest administration times

were reliable. Table 6 shows the paired-samples *t* test of test-retest reliability between perceived seriousness and influenza vaccine

Table 6

Paired Samples t-test for Test-Retest Reliability of Perceived Severity

Scales	Test 1 mean(SD)	Test 2 mean(SD)	Correlations	Mean differences	*p*	*t*
I am at risk for getting the seasonal influenza virus	4.08(.930)	4.06(.716)	.773	-.026	.804	-.256
My family members are at risk for getting the seasonal influenza virus.	4.27(.643)	4.44(.546)	.445	-.207	.040	-2.150
I feel knowledgeable about my risk of getting the seasonal influenza virus.	4.88(.392)	4.79(.425)	**.**046	**.**086	.184	.185

Perceived Benefit

The construct of perceived benefit refers to participants' perception about the safety and effectiveness of taking the influenza vaccine to reduce the risk of getting influenza disease and the related complications. I tested three perceived benefit items using a 5-point Likert scale with response categories being *strongly disagree* to *strongly agree* and scored 1 to 5, with 0 representing missing answers. This subscale was reliable

because as indicated there were no significant differences between the times of administration of the two tests. Table 7 displays the results of the paired-sample *t* test for each item in the benefit subscale, which shows the correlations and *p* values reliability.

Table 7

Paired-Samples t-test of Test-Retest Reliability of Perceived Benefits

Scale items	Test 1 mean(SD)	Test 2 mean(SD)	ρ	Mean differences	*p*	*t*
If I receive the seasonal influenza vaccine, I will not get sick from the seasonal influenza virus	2.45(1.064)	2.79(1.220)	.396	-.333	.095	-1.711
If I receive the seasonal influenza vaccine it will prevent complications from the seasonal influenza disease	2.88(1.064)	2.57(.914)	.623	.310	.026	2.308
Seasonal influenza vaccines are safe.	2.45(.999)	2.40(.862)	.542	.049	.738	.340

Perceived Barriers

The construct of perceived barriers refers to participants' opinion of what is stopping them from making the decision to get the influenza vaccine that can protect and prevent influenza disease. I tested the barriers construct with seven items using a 5-point Likert scale with response categories being *strongly disagree* to *strongly agree* and scored 1 to 5, with 0 representing missing answers. This subscale was reliable, as there were no significant differences between the two test administration times. Table 8 displays the results of the paired-sample *t* test for each item in this benefit subscale. As noted below, some mean differences are negative, but the correlations and *p* values show reliability.

Table 8

Paired-Samples t-test of Test-Retest Reliability of Perceived Barriers

Scale items	Test 1 mean(SD)	Test 2 mean(SD)	ρ	Mean differences	*p*	*T*
I will have side effects from the seasonal influenza vaccine.	4.89(.349)	4.80(.408)	.617	.068	.184	1.356
I will get sick from the seasonal influenza vaccine.	2.89(1.168)	2.89(1.111)	.693	024	.864	.173
I will die from the seasonal influenza vaccine.	2.55(.987)	2.68(1.162)	.444	-.070	.691	-.401
The seasonal influenza vaccine will be painful.	4.10(.749)	4.00(.946)	.639	.049	.675	.423
The seasonal influenza vaccine will be expensive.	2.01(.782)	2.06(.924)	.620	.000	1.000	
It is inconvenient to get the seasonal influenza Vaccine	1.80(.850)	1.88(.762)	.787	.070	1.000	.001
There is a shortage of the seasonal influenza vaccine	1.89(.931)	1.95(.740)	.493	.000	.600	.536

Perceived Cues to Action

Cues to action are the factors that trigger that are necessary for prompting engagement in the decision-making process to accept the recommended influenza vaccine. I tested the cues to action construct using a five point Likert scale with response categories being strongly disagree to strongly agree and scored 1-5 with 0 representing missing answers This subscale was reliable, as there were no significant differences. Table 9 below shows the paired-samples t-test of test-retest reliability of perceived cues to action about influenza vaccine.

Table 9

Paired-Samples t-test of Test-Retest Reliability of Perceived Cues to Action

Scale items	Test 1 mean(SD)	Test 2 mean(SD)	ρ	Mean differences	*p*	*t*
I will take the seasonal influenza vaccine if my doctor or my nurse said it is important	1.95(.812)	1.98(.723)	.197	-.048	.757	-.315
I will take the seasonal influenza vaccine if a family member or significant other said it is important	2.65(1.160)	2.60(1.204)	.506	.049	.798	.264
I will take the seasonal influenza vaccine if I see a TV ad that said it is important	2.04(.812)		2.16(1.034)	-.120	.398	-.870
I will take the seasonal influenza vaccine if the interdisciplinary team at my clinic reminds me.	4.18(1.059)	4.30(.865)	.643	.359	.262	.674

Perceived Self-Efficacy

The perceived self-efficacy construct measures the participants' perception and the competence to successfully take an action in seeking the influenza vaccine. In this

case the elderly who received information about the influenza vaccine from close friends and relative, the media or health care providers were motivated to receive the influenza vaccine. This increased the knowledge and confidence to obtain the influenza vaccine. I tested the four perceived self-efficacy subscales using a five point Likert scale with response categories being strongly disagree to strongly agree and scored 1-5 with 0 representing missing answers. The correlation between the two test administration times shows reliability. Table 10 below shows the paired-samples t-test of test-retest reliability of perceived self-efficacy about influenza vaccine uptake.

Table 10

Paired-Samples t-test of Test-Retest Reliability of Perceived Self-Efficacy

Scale items	Test 1 mean(SD)	Test 2 mean(SD)	ρ	Mean differences	*p*	*t*
I am confident that I can obtain the seasonal influenza vaccine	3.72(.935)	3.90(.901)	.550	-.199	.165	-1.434
I am confident that my day to day performance will not be adversely impacted by taking the seasonal influenza vaccine	3.70(.793)	3.58(1.001)	.485	.124	.406	.844
I am confident that the seasonal influenza vaccine I will take will not exposed me to any side effects or death	4.10(.980)	4.22(.858)	.615	-.144	.268	-1.190
I am confident that seasonal influenza vaccine will help to prevent me from getting the seasonal influenza throughout the influenza season.	3.20(1.135)	3.29(1.200)	.178	-.170	.480	-.726

To estimate test-retest reliability, I administered the same test to the same group of 50 elderly participants on two different occasions. The amount of time allowed

between measures was two weeks. Based on the results of the two tests the value of the correlation was considered satisfactory. The results therefore demonstrated that the items in the instrument have good test-retest reliability and moderate to good construct validity for all items.

Factor Analysis

An Exploratory Factor Analysis (EFA) was done using SPSS to measure the reliability of the constructs that reflected the perceived behavior of older adults related to influenza vaccine uptake (IBM, SPSS). The process used for conducting the EFA involved three stages: Extraction, Rotation and Interpretation (IBM, SPSS). During the extraction process I looked at the process of determining how many factors within the data set best explained the observed covariation matrix. The appropriate number of factors to extract was determined by Eigenvalues and Scree plot. Since I was interested in explaining as much variance in observed indicators with the fewest latent factors, I decided to retain only those latent factors with sufficiently high eigenvalues. All the factors that were retained had an eigenvalues value above 1.

The other alternative method used was inspecting the scree plot to determine the appropriate number of factors to retain and to correctly consider the relative size of the eigenvalues rather than the absolute size. Rotation was done to maximize the factor loadings for the items that best measure their respective factor. The interpretation of the data was done by naming the factors to provide a meaningful understanding of the common feature among the relevant items.

Cronbach's alpha was calculated to measure internal consistency to see how closely the set of items were related as a group. In addition to measuring internal consistency, Cronbach's alpha was used to test items and the average inter-correlation among the items to provide evidence that the scale is appropriate. Table 10 below shows the Cronbach's alpha coefficients. Since Cronbach's alpha reliability coefficient normally range between 0 and 1, with 0.7 being acceptable, all constructs were retained.

Table 10

Cronbach's Alpha Coefficients of Health Belief Model Subscales

Health belief model Subscales	Cronbach's alpha coefficients based on standardized items
Susceptibility	.810
Severity	.710
Benefits	.875
Barriers	.729
Cues to action	.802
Self-efficacy	.836

Source: Newly developed influenza vaccine uptake scale

Assumptions

It is assumed that the nonparametric tests measured the relationship between variables and the residuals are normally and independently distributed. Assumptions can be made that descriptive statistics appropriately characterized the sample. Assumptions were made prior to data analysis that the data were screened for linearity,

homoscedasticity, normality, and multicollinearity. It was assumed that based on the analyses result there was lack of collinearity among the independent variables. Assumptions were made during the planning phase of the study to generalize the sample and the sample was representative of the population of older adults who attended the three senior centers in Brooklyn, New York. Assumptions associated with factor analysis showed that the data were analyzed using descriptive statistics, factor analysis, ordinal regression and correlation coefficient. It can also be assumed that data was assessed for missing values and adequate sample size. The test retest paired-sample *t*-tests reliability assumes that consistency of assessment of the test remained stable across time. Assumptions indicated that each independent variable can be assigned to the dependent variables. In addition, it was assumed that ordinal logistic regression was adequate to analyze the hypotheses predictor variables. It was assumed that the dependent and independent variables had ordinal levels of measurement. Since the independent variables did not highly correlate to each other, it can be assumed that the ordinal logistic regression analyses were adequate and correct.

Research Questions and Hypotheses

Nine specific research questions were addressed in this study. The results of the statistical analyses are presented in this section. The ordinal logistic regression analyses were performed to test the best set of predictor variables based on constructs of the HBM to identify the outcomes of older adult influenza vaccine uptake frequency and recency.

My intention for this first research question was to determine if there was a significant relationship between older adult perceived susceptibility to seasonal influenza and frequency and recency of vaccine uptake.

1. Is there a significant relationship between older adults 'perceived susceptibility to the seasonal influenza and frequency and recency of vaccine?

   $H1_0$: There is no significant relationship between older adults' perceived susceptibility to the seasonal influenza and frequency and recency of vaccine. This hypothesis was not supported.

   $H1_A$: There is a significant relationship between older adults' perceived susceptibility to the seasonal influenza and frequency and recency of vaccine. This hypothesis was supported based on the following results.

There were four specific items combined in the perceived seriousness construct. Ordinal logistic regression statistics were run between this construct, cue to act, and self-efficacy and the two dependent variables recency of influenza vaccine. The model fit for the null hypothesis can be rejected as the observed significance for the severity construct and self-efficacy construct resulted in a $p = .002$ and the severity construct and cues to action resulted in a $p = .000$.

The parallel lines for seriousness were tested using the predictor variables susceptibility, cues to action and self-efficacy. The null hypothesis of parallelism for risk and cues to action, ($p = 1.000$, -2 log likelihood 168.984) do not have sufficient evidence to reject the null hypothesis indicating that ordinal regression using the log-log function is appropriate for these data. The null hypothesis of parallelism for risk and self-efficacy,

(p = .480, -2 log likelihood 160.588) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data.

2. Is there a significant relationship between older adults perceived severity to seasonal influenza based on CDC influenza guidelines?

$H2_0$: There is no significant relationship between older adults perceived severity to seasonal influenza based on CDC influenza guidelines. This hypothesis was not supported based on the following results

$H2_A$: There is a significant relationship between older adults perceived severity to seasonal influenza based on CDC influenza guidelines. This hypothesis was supported based on the following results

Examination of the data suggests that there are significant associations between the severity construct questions and the dependent variables. There were five specific items combined in the severity construct. Ordinal regression statistics were run between this construct, predictor variables, cues to action and self-efficacy and the two dependent variables. The model fit null hypothesis can be rejected as the severity construct and self-efficacy construct is a determining factor which resulted in a high degree of significance (p = .000) and the susceptibility construct and cues to action were significant as well (p = .000).

The parallel lines for severity question in this section were tested using the predictor variables severity, cues to action and self-efficacy. The null hypothesis of parallelism for seriousness and cues to action, (p = 1.000, -2 log likelihood 158.896) do not have sufficient evidence to reject showing that ordinal regression using the log-log

function is appropriate for these data. The null hypothesis of parallelism for severity and self-efficacy, (p = .450, -2 log likelihood 128.782) do not have sufficient evidence.

My intention for research question three was to determine if there was a significant relationship between older adult participants' perception of benefits and the positive consequences of annual seasonal influenza vaccine uptake.

3. Is there a significant relationship between older adults' perceived benefits and the positive consequences of the annual seasonal influenza vaccine uptake?

*H*3$_0$: There is no significant relationship between older adults' perceived benefits and the positive consequences of the annual seasonal influenza vaccine uptake. This hypothesis was not supported and was rejected.

*H*3$_A$: There is a significant relationship between older adults' perceived benefits and the positive consequences of obtaining the annual seasonal influenza vaccine. This hypothesis was supported based on the following results.

Examination of the data suggests that there is a significant relationship between the perceived benefits construct and the dependent variable recency of influenza vaccine uptake. The items combined in the perceived benefits construct and ordinal regression statistics were run between perceived cue to act and self-efficacy construct and the dependent variable recency of influenza vaccine. The model fit null hypothesis can be rejected as the observed significance for the barriers construct and self-efficacy construct resulted in a $p = .000$ and the barriers construct and cue to act resulted in a $p = .000$.

The parallel lines for benefit question in this section were tested using the predictor variables, barriers, cues to action and self-efficacy. The null hypothesis of

parallelism for barriers and cues to action, (p = 1.000, -2 log likelihood 250.360) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data. The null hypothesis of parallelism for barriers and self-efficacy, (p = 1.000, -2 log likelihood 272.515) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data.

My intention for research question four was to determine if there was a significant relationship between older adult participants' perceived barriers and discouragement concerning the uptake of the seasonal influenza vaccine.

4. Is there a significant relationship between older adults' perceived barriers and discouragement concerning the uptake of the seasonal influenza vaccine?

   $H4_0$: There no significant relationship between older adults perceived barriers and discouragement concerning the uptake of the seasonal influenza vaccine. This hypothesis was not supported and was rejected.

   $H4_A$: There is a significant relationship between older adults' perceived barriers and discouragement concerning the uptake seasonal influenza vaccine. This hypothesis is supported as the dependent variables and the benefit construct relate to each other.

Findings indicate that there is a significant relationship between the perceived barriers and the dependent variable recency of influenza vaccine questions. Ordinal regression statistics were run between this construct and the dependent variable recency of influenza vaccine uptake. The model fit null hypothesis can be rejected as the observed

significance for the perceived benefits construct and self-efficacy construct resulted in a p = .002 and the benefit construct and cues to action resulted in a p =.000.

The parallel lines for barrier question in this section were tested using the predictor variables severity, cues to action and self-efficacy. The null hypothesis of parallelism for benefit and cues to action, (p = .000, -2 log likelihood 382.944) does have sufficient evidence to reject showing that ordinal regression using the log-log function may not be appropriate for these data. However, the null hypothesis of parallelism for benefit and self-efficacy, (p = .972, -2 log likelihood 130.160) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data.

My intention for research question five was to determine if there was a significant relationship between older adult participants' perception perceived cues to action and health care providers providing persuasive communications about seasonal influenza vaccine.

5. Is there a significant relationship between older adults' perceived cues to action and health care providers' persuasive communications about seasonal influenza vaccine?

   $H5_0$: There is no significant relationship between older adults' perceived cues to action and health care providers' persuasive communications about seasonal influenza vaccine. This hypothesis was not supported and was rejected

   $H5_A$: There is a significant relationship between older adults' perceived cues to action and health care providers' persuasive communications about seasonal

influenza vaccine. This hypothesis was supported based on the following results.

Examination of the data suggests that there is a significant relation between the cues to action construct questions and the dependent variable questions. Ordinal regression statistics were run between this construct, cues to action and self-efficacy and the dependent variable recency to influenza vaccine constructs. The model fit null hypothesis can be rejected as the observed significance for the barriers construct and self-efficacy construct resulted in a $p = .000$ and the barriers construct and cue to act resulted in a $p = .000$.

The parallel lines for cues to action question in this section were tested using the predictor variables barriers, and self-efficacy. The null hypothesis of parallelism for barriers and cues to action, ($p = 1.000$, -2 log likelihood 250.243) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data. The null hypothesis of parallelism for barriers and self-efficacy, ($p = 1.000$, -2 log likelihood 267.924) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data.

My intention for research question six was to determine if there was a significant relationship between older adult participants' perception of perceived self-efficacy and the ability to successfully obtain the seasonal influenza vaccine.

6. Is there a significant relationship between older adults' perceived self-efficacy and the ability to successfully obtaining the seasonal influenza vaccine?

$H6_0$: There is no significant relationship between older adults' perceived self-efficacy and the ability to successfully obtaining the seasonal influenza vaccine. This hypothesis is not supported and was rejected.

$H6_A$: There is a significant relationship between older adults' perceived self-efficacy and the ability to successfully obtaining the seasonal influenza vaccine. This hypothesis was supported based on the following results.

Examination of the data suggests that there are significant associations between the self-efficacy construct questions, and the dependent variable questions. Ordinal regression statistics were run between the six constructs of the HBM and the dependent variable recency of influenza vaccine uptake. The model fit null hypothesis can be rejected as the observed significance for the barriers construct and self-efficacy construct resulted in a $p = .000$ and the barriers construct and cues to action resulted in a $p = .000$.

The parallel lines for self-efficacy question in this section were tested using the predictor variables barriers and cues to action. The null hypothesis of parallelism for barriers and cues to action, ($p = 1.000$, -2 log likelihood 244.225) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data. The null hypothesis of parallelism for barriers and self-efficacy, ($p = 1.000$, -2 log likelihood 269.920) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data.

My intention for research question seven was to determine whether there was a significant relationship between older adult participants' perception between the full

HBM constructs plus mediating demographic factors such as age, gender, ethnicity, occupation and older adults' perceptions of the seasonal influenza vaccine.

7. Is there a significant relationship between full HBM constructs plus mediating demographic factors such as age, gender, ethnicity, occupation, and older adults' perceptions of the seasonal influenza vaccine?

    $H7_0$: There is no significant relationship between full HBM constructs plus mediating demographic factors such as age, gender, ethnicity, occupation, and older adults' perceptions of the seasonal influenza vaccine. This hypothesis was not supported and was rejected.

    $H7_A$: There is a significant relationship between full HBM constructs plus mediating demographic factors such as such as age, gender, ethnicity, occupation, and the elderly perceptions of acceptance of the seasonal influenza vaccine. This hypothesis was supported based on the following results.

Examination of the data suggests that there are significant associations between the mediating factor age and dependent variable frequency of influenza disease questions. Ordinal regression statistics were run between this construct and the dependent variable and age. The model fit for the null hypothesis can be rejected as the observed significance for age construct resulted in a $p = .000$.

The parallel lines for mediating factor age question in this section were tested using the predictor variables barriers, cues to action and self-efficacy. The null hypothesis of parallelism for barriers and cues to action, ($p = 1.000$, -2 log likelihood 248.125) do not have sufficient evidence to reject showing that ordinal regression using the log-log

function is appropriate for these data. The null hypothesis of parallelism for barriers and self-efficacy, (p = 1.000, -2 log likelihood 272.936) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data.

My intention for research question eight was to determine whether there was a significant relationship between older adult participants' perception influenza disease and recency and influenza vaccine uptake.

8. Is there significant relationship between influenza vaccine recency and influenza disease among older adults?

$H8_{0:}$ There is no significant relationship between influenza vaccine recency and influenza disease among older adults. This hypothesis was not supported based on the following results.

$H8_{A:}$ There is a significant relationship between influenza vaccine recency and influenza disease among older adults. This hypothesis was supported based on the following results.

Examination of the data suggests that there are significant associations between the six HBM constructs and dependent variable recency of influenza vaccine uptake. Ordinal regression statistics were run between the HBM constructs and the dependent recency of influenza vaccine uptake. The model fit null hypothesis can be rejected as the observed significance for health belief constructs resulted in a p = .000.

The parallel lines for recency of influenza vaccine question in this section were tested using the predictor variables barriers, cues to action and self-efficacy. The null

hypothesis of parallelism for barriers and cues to action, (p = 1.000, -2 log likelihood 242.340) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data. The null hypothesis of parallelism for self-efficacy (p = 1.000, -2 log likelihood 272.926) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data.

My intention for research question nine was to determine whether there was a significant relationship between influenza disease frequency and influenza vaccine uptake and older adults.

9. Is there a significant relationship between influenza disease frequency and influenza vaccine uptake among older adults?

$H9_{0:}$ There is no significant relationship between influenza disease frequency and influenza vaccine uptake among older adults. This hypothesis is not supported and was rejected.

$H9_{A:}$ There is a significant relationship between influenza disease frequency and influenza vaccine uptake among older adults. This hypothesis is supported based on the following results.

Examination of the data suggests that there are significant associations between the mediating factor age and dependent variable frequency of influenza disease. Ordinal regression statistics were run between this construct and the dependent variable and age. The model fit for the null hypothesis can be rejected as the observed significance for age construct resulted in a p = .000.

The parallel lines for frequency of influenza disease question in this section were tested using the predictor variables barriers, cues to action and self-efficacy. The null hypothesis of parallelism for barriers and cues to action, (p = 1.000, -2 log likelihood 248.326) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data. The null hypothesis of parallelism for barriers and self-efficacy, (p = 1.000, -2 log likelihood 272.926) do not have sufficient evidence to reject showing that ordinal regression using the log-log function is appropriate for these data.

Summary and Transition

In this section I have summarized the answers to research questions, provided transitional material from the findings and introduced the materials used in Chapter 5. The results of this study indicate that older adults' subjective agreement of their influenza vaccine uptake statements are related to their perceptions of benefits from the influenza vaccine. The test-retest results showed reliability of the instrument was consistent and stable across time and testing. The nine research questions were investigated using factor analysis, computed means, reliability and ordinal regression. Factor analysis was appropriate for these data, which indicated that the factors were related to the dependent variables. Cronbach's alphas were significant in the reliability testing for all constructs. Construct items were grouped into subscales by computing means, based on factor analysis, prior to ordinal regression analysis. Hypothesis testing was done based on the review of the literature, which indicated that to minimize barriers to influenza vaccine uptake, the clinicians' role is to remind patients about the influenza vaccine safety and

effectiveness in preventing influenza disease and its complications. Despite variations in the test of parallel lines the null hypotheses were rejected. The nine alternative hypotheses were retained. Chapter 5 further explains the summary of the interpretation of these findings, generalizations, limitations, social implications of the study, and recommendations for future studies.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to identify perceived factors that may be associated with poor influenza vaccination uptake among older adults. I also explored recency of influenza vaccine uptake and frequency of influenza disease within the past year. In this chapter, I discuss the interpretation of key findings, generalizations, limitations, recommendations for future studies, and implications for practice and social change.

The study was carried out in three senior centers in Brooklyn, New York. The overall number of elderly participants who responded to the survey invitation was 147. The results indicated that 92% of older adults received the seasonal influenza during the 2014/2015 flu season. This high vaccination uptake could be the success of influenza vaccination campaigns and the extensive media education regarding the influenza related deaths in the United States and around the world. I found that perceptions of cues to action, such as healthcare provider reminders, were more likely to influence those older adult participants who had prior vaccination. Partners from the CDC's 2011-12 Influenza Vaccination Communication Campaign reported that 80 % of participants were likely to take the influenza vaccine due to media education while 19% were less likely to take the influenza vaccine (as cited in Sheedy, 2011). There is evidence on the effectiveness of interventions that apply new social media such as text messaging, smartphones application, YouTube videos, and Facebook (Odone, 2015). Targeted websites and portals for physicians and healthcare providers promoted vaccination uptake and increased vaccination coverage (Odone, 2015). According to Odone (2015), the

effectiveness of vaccine uptake using these new media sources are as follows: text messaging (37%), smartphone applications (5%), YouTube videos (5%), and Facebook (5%), targeted websites and portals (21%), software for physicians and health professionals (21%), and email communication (5%). In addition, the current reminder from health care providers (90%) has a significant effect on older adult participants perceived behaviors concerning vaccine uptake (Odone. 2015).

Interpretation of the Findings

In this section, I present whether the study findings confirm, disconfirm, or extend knowledge in the discipline in comparison to current literature. A main goal of the study was the development of a new instrument. Evidence from factor analysis is discussed in terms of reliability and constructs validity of the questionnaire. In addition, the analysis and interpretation of the findings are presented based on the conceptual framework.

Factor analysis and correlations were performed to analyze the reliability (test/retest) of the newly developed scale and findings indicated that the new scale had a reliability coefficient ($r^2 = 0.9$) calculated from the data for the first group that indicated high test-retest reliability. Factor analysis verified the constructs of the new scale by calculating Cronbach's alphas.

Previous literature indicated racial and ethnic differences in beliefs where whites were more likely to believe the influenza vaccine was very effective in preventing influenza compared to African Americans (Blacks) and Hispanics (Wooten, Wortley, Singleton, & Euler, 2012). In the present study, the odds of influenza vaccine uptake indicated that there were no significant differences between European Americans

(Whites), African Americans, or Hispanics concerning influenza vaccine uptake (*OR* = 1.20, 95% CI [0.64, 2.30], *p* =.58). Zimmerman, Raymund, Janosky, Norwalk, and Fine (2003) compared self-report with medical record abstraction of older adults in several locations. Their findings indicated that Veterans Association patients had the highest sensitivity and lowest specificity for both influenza and pneumococcal vaccines. While over 90% of the responders stated they had vaccine uptake, verification from medical records indicated that only 51% had received the vaccine. The opposite was true for inner-city health centers. The findings from the homogeneous senior center participants are likely to reflect these two types of health centers; however, the associations between self-reported perceptions and vaccination uptake in the present study remain stable.

Older adult participants believed that the influenza vaccine is very effective; self-reported vaccination was substantially higher across all racial/ethnic groups. To identify older adults perceived behaviors that contributed to poor uptake of the seasonal influenza vaccine among older adults, I developed nine research questions, a 33-item tool using the HBM to explore the perception of the older adults concerning the seasonal influenza vaccine uptake, demographic mediating factors, frequency of the influenza disease, and recency of influenza vaccine uptake. In this study, the ordinal regression revealed that there were significant correlations between older adults' perceptions of the influenza disease and influenza vaccine uptake ($p = 0.05$).

Research Question 1: Perceived Susceptibility

Ordinal regression analysis was performed to answer this research question. Perception of influenza infection risk was significant as a predictor for older adult

participants. Older adults who believed that they were at greater risk for contracting influenza were more likely to obtain influenza vaccination. This finding addresses the construct of perceived susceptibility, where it refers to an individual's beliefs about the chances of getting a condition (Glanz et al., 1997; NCI, 2005). The computed sample mean for the specific perceived susceptibility was 5.24. Most participants *agreed* or *strongly agreed* with the items related to the risk of contracting seasonal influenza. The results of the ordinal regression showed that there were significant correlations between the perceived susceptibility and predictor variables cues to action and self-efficacy and dependent variables recency of influenza vaccine and frequency of influenza disease. Yamamoto et al. (2002) reported that perceived threat and net benefit were associated with intention, and net benefit had a stronger correlation with intention than did perceived benefit and barriers. In this study, I found that older adults *agreed* or *strongly agreed* with the susceptibility of influenza infection items.

Research Question 2: Perceived Severity

Perceived severity is an individual's belief about the seriousness of influenza and its prevention (Glanz, K., Rimer, B.K. & Lewis, 2002). Ordinal regression analysis was run on each independent variable: susceptibility, severity, benefits, barriers, cues to action, self-efficacy, and the demographic modifying factors as well as the dependent variables: perceived recency of influenza vaccine uptake and frequency of influenza disease. Perception of the seriousness of influenza disease was found to be significant as a predictor of older adults' uptake of the influenza vaccine. This finding indicated that

perceptions of the seriousness of influenza disease and its complications correlated with most of the other predictor variables as well as the two dependent variables.

My findings confirm that the extent of knowledge and awareness of influenza disease and vaccine availability contributed to the importance of influenza vaccine uptake among the elderly when comparing them with reports found in the peer-reviewed literature. The computed sample mean for the specific seriousness construct was 5.5. Most participants *agreed* or *strongly agreed* with the items related to the seriousness of influenza disease. Items that addressed the perceived seriousness of contracting seasonal influenza disease showed that a higher percentage of vaccinated older adults believed that influenza was a serious concern. Ordinal regression was performed, and it was identified that there were significant correlations. This finding is not consistent with the current literature. Maurer et al. (2010) reported that perceived seriousness of seasonal influenza and swine flu risks in adults revealed that swine flu was believed to be more serious and therefore the uptake of vaccination was lower due to perception by the public who believes it was less safe. However, the current study suggests that older adults were more likely to consider seasonal influenza as a serious illness that would negatively affect their everyday functioning and quality of life.

Research Question 3: Perceived Barriers

Perceived barriers to influenza immunization is the belief about the influenza vaccine and psychological costs of taking the vaccine (Glanz, Rimer, & Lewis, 2002). Ordinal regression analysis was used to answer the perceived barrier construct. The perception of the barriers of the influenza vaccine was found to be a significant predictor

in addressing influenza vaccine uptake among older adults. This finding indicated that the perceptions of the barriers of influenza vaccine was with most related to predictor variables benefits, cues to action, self-efficacy, as well as the two dependent variables recency of influenza vaccine and frequency of influenza disease. When comparing results with what has been found in the peer-reviewed literature, it was identified that my findings confirm some of the existing literature. The computed sample mean for the specific barriers construct was 4.60, where most participants *disagreed* or *strongly disagreed* with the items related to the barriers of influenza vaccine. However, the ordinal regression was found to have significant correlations. This is consistent with the current literature in relation to the barriers. Johnson et al. (2008) reported that among the most common barriers to immunizations were lack of physician recommendations and mistaken assumptions while other reasons cited by healthcare providers were side effects, fear of needles, and lack of insurance coverage as reasons and practice issues, such as a lack of an effective reminder system.

Research Question 4: Perceived Benefit

Perceived benefit is the belief about the effectiveness of taking the influenza vaccine to reduce risk of getting influenza and the related complication (Glanz, Rimer, & Lewis, 2002). Ordinal regression analysis was done to answer research question, perceived benefit. Perception of the benefit of addressing the influenza vaccine was found to be significant as a predictor of elderly participants' uptake of the influenza vaccine. This finding is not surprising given that perceptions of the benefit of influenza vaccine correlated with predictor variables, barriers, cues to action, and self-efficacy, as

well as the two dependent variables of recency of influenza vaccine uptake and frequency of influenza disease.

My findings extend knowledge in the discipline when comparing them with what has been found in the peer-reviewed literature. The computed sample mean for the specific benefit construct was 5.42, where most participants *agreed* or *strongly agreed* with the items related to the benefit of influenza. Ordinal regression showed that there were significant correlations. This is consistent with the literature that reported on perceived benefits of the influenza vaccination due to the prevention of the seasonal influenza disease, decreased severity of symptoms, less time off, a lower chance of passing influenza to family and friends, and prevention of complication and hospital admission. Chen et al. (2007) supported the contention that groups with major long-term conditions, women, older people, and those who have needed or are likely to require hospital admission are more likely to decide to receive an annual influenza vaccination.

Research Question 5: Perceived Cues to Action

Cues to action are strategies to activate readiness (Janz & Becker, 1984) that can be described as events, either bodily symptoms such as physical symptoms of a health condition or environmental such as media publicity that motivate people to take an action. Ordinal regression analysis was done to answer perceived cues to action construct. Perception of the cues to action of the influenza vaccine was found to be significant as a predictor in addressing influenza vaccine uptake among the elderly. This finding indicated that perceptions of the cues to action of influenza vaccine was most related to

predictor variables barriers, benefits, and self-efficacy as well as the two dependent variables recency of influenza vaccine and frequency of influenza disease.

When comparing results with what has been found in the peer-reviewed literature, it was identified that my findings confirm some of the existing literature. Physician and other clinicians' recommendations and reminder systems for the influenza vaccine are known to increase vaccination rates significantly (Anderson et al., 2008). The computed sample mean for the specific cues to action construct was 5.60, where most participants *agreed* or *strongly agreed* with the items related to the cues to action of influenza vaccine uptake. The ordinal regression was found to have significant correlations.

Research Question 6: Perceived Self-Efficacy

Perceived self-efficacy is the confidence and the ability to successfully make informed decisions (Glanz et al., 2002). Ordinal regression analysis was carried out to answer perceived self-efficacy construct. Perception of the perceived self-efficacy of the influenza vaccine was found to be significant as a predictor in addressing influenza vaccine uptake among older adults. This finding indicated that perceptions of the perceived self-efficacy concerning the influenza vaccine uptake was most related to predictor variables barriers, benefits, and cues to action as well as the two dependent variables recency of influenza vaccine and frequency of influenza disease.

Findings confirm those of Zimmerman et al. (2003) who concluded that patient education and recommendation for the influenza vaccination by healthcare providers increases likelihood of patient vaccination uptake by eliminating misconceptions, vaccine-related concerns, and myths. The computed sample mean for the specific self-

efficacy construct was 5.64, where most participants *agreed* or *strongly agreed* with the items related to the self-efficacy of influenza vaccine uptake. The ordinal regression was found to have significant correlations.

Research Question 7: Demographic Mediating Factors

Demographics mediating factors in this study found that the vaccinated were not statistically different with regards to most of the demographic variables: gender, age, ethnicity, education, annual income, and type of residence. Evidence for the clinical efficacy of the influenza vaccine among the older adults, especially those with chronic disease, can reduce mortality and hospital admissions (CDC, 2013). Mediating factor age was tested using the six HBM predictor variables: susceptibility, severity, barriers, benefit, cues to action, and self-efficacy. Ordinal regression statistics were run between the six HBM subscales, which indicated that there were no statistical significant differences across age groups of older adults, resulting at a 5% significance level. However, there are significant associations between the mediating factor age and dependent variable of frequency of influenza disease. When comparing results with what has been found in the peer-reviewed literature, it was identified that my findings confirm some of the existing literature concerning the importance of influenza vaccine among the elderly. Johnson et al. (2008) reported that by counseling older adult patients and by acknowledging their fear and susceptibility to influenza, it can help them to make changes in their behavior that will motivate them to make informed decisions.

Research Question 8: Frequency of Influenza Disease

Frequency of influenza disease refers to measurement of the most recent episode of influenza disease 1 = ≤1 year (CDC, 2013). Logistic regression analysis was used to answer research question about frequency of influenza infection. Research questions predicting frequency of influenza infection were tested using the six HBM constructs: severity, susceptibility, barriers, benefits, cues to action, and self-efficacy. Ordinal regression was run using predictor variables barriers, benefits, cues to action, and self-efficacy. There was not sufficient evidence to reject the null hypothesis. Ordinal regression statistics were run between frequency of influenza disease and age, and the null hypothesis was rejected because it indicated that age makes no difference. When comparing results with what has been found in the peer-reviewed literature, it was identified that my findings confirm some of the existing literature. Studies have shown that older adults who had received the influenza vaccine in a year or less had a decreased incidence in influenza and its complication (CDC, 2010).

Research Question 9: Recency of Influenza Vaccine Uptake

Recency of influenza vaccine uptake refers to measurement of the most recent influenza vaccine uptake. Ideal = (1 = ≤ 1 year) (CDC, 2013). Logistic regression analysis was used to answer research question recency of influenza vaccine uptake. The recency of influenza vaccine question were tested using the six construct of the HBM, severity, susceptibility, barriers, cues to action and self-efficacy. Ordinal regression was run using predictor variables barriers, cues to action and self-efficacy. There was not sufficient evidence to reject the null hypothesis. When comparing results with what has

been found in the peer-reviewed literature it was identified that my findings confirms some of the existing literature. Studies have shown that recency of influenza vaccine uptake within one year or less has proven to be safe and effective in preventing influenza infection and its complication among the elderly (CDC, 2010). Studies have reported that there is an age-related decline in immune responses in older adults causing a greater susceptibility to infection and reduced responses to vaccination (Skowronski, Tweed, Serres, 2008). Other studies have indicated that a low protective effect of the influenza vaccine suggest a decline in vaccine effectiveness in older adults over time post vaccination therefore annual influenza immunization of high-risk populations against influenza remains the most important preventive method (Castilla, Martinez-Baz, Martinez-Artola, et al., 2013).

Limitations

In every study, there is a possibility of limitations. Since this study uses a cross-sectional design, there can be limitations with the strength of the internal validity. The study was also limited to self-report of seasonal influenza vaccination status, truthfulness of participant's responses, either because they cannot remember or because they wish to present themselves in a socially desirable manner. In addition, external validity is a limitation as data on disease diagnosis and vaccination uptake was limited to self-administration without verification of medical records. Due to the nonrandom selection of participants, the study was limited by self-selection of volunteer male and female adults age 65 and older who attended the selected senior centers Brooklyn, New York.

The possible biases that could influence study outcomes are those due to non-response. To minimize this type of bias the sample size was large enough to estimate the prevalence of the influenza vaccine uptake among the elderly in the selected demographic areas of Brooklyn. A potential limitation is that the study did not use random sampling and the results may not be generalizable to all older adult population hesitant to receive the seasonal influenza vaccination. However, the development of a new instrument required quick and high participation from a homogeneous population.

Recommendations

The recommendations for further research that are grounded in the strengths and limitations of the current study, as well as the current literature are discussed in this section. The following are the recommendations for further studies:

- Additional studies should be done on more specific correlations related to older adults' perceptions in both controlled and uncontrolled community settings.
- Research using a random selection of elderly in the community involving recency of influenza immunization uptake and frequency of influenza disease within one year or less.
- Future studies should further examine the effectiveness of structured influenza vaccine interventions such as physicians and other clinician reminders, television advertising, targeting social media networks, and community organizations.
- Get family members more involved by asking them to get vaccinated or to accompany older adult family members to vaccine sites.

These recommendations can help provide future researchers, public health professionals and healthcare clinicians to work together to increase influenza vaccination rates in the general population.

Implications for Social Change

Positive social change that can be derived from this study is identifying the gap in knowledge related to direct care clinicians concerning the importance of influenza vaccine and the contributory aspects in reducing the influenza complication among older adults. Although the constructs perceived susceptibility, seriousness and barriers may contribute to difficulties accepting influenza vaccination; clinicians can make a difference by teaching their patients about safety and effectiveness of the seasonal influenza vaccine. In this study the constructs benefit, cues to action and self-efficacy were determinants that made a positive difference in the perceived older adults' beliefs about seasonal influenza vaccination uptake. This research captured the perceptions of the older adults concerning their perceived belief about influenza disease and gave a better understanding that the influenza vaccine uptake among older adults can be improved through education and information received from the clinicians. This information can also help clinicians and public health officials to be more involved in educational seminars and follow CDC (CDC, 2014) and evidence based guidelines to improve the seasonal influenza vaccine uptake among older adults. The HBM can also be a useful tool in understanding beliefs and perceptions of older adults concerning influenza vaccination and guide the choice of the clinical interventions for elderly patients who either directly or indirectly oppose the influenza vaccination (Glanz, Marcus Lewis, & Rimer, 1997).

Practice Recommendations

Recommendations for practice include increasing knowledge and awareness of clinicians by addressing methods of informing their patients during health visits; clinicians must also overcome their own barriers that prohibit influenza vaccine uptake; and also, making clinicians more aware of their roles in influenza prevention. Most importantly, review of health policies based on the risk factors of influenza disease, severity, evidence of the influenza vaccine safety, efficacy, and the effectiveness in preventing influenza complication among the older adults can improve vaccine uptake. The results of this study lead us to believe that clinicians understanding of current health policies and patients' perceptions of influenza vaccine can lead to improvement in clinical practice and standards of care.

Conclusion

This research captured the perceptions of the older adults concerning their perceived belief about influenza disease and gave a better understanding that the influenza vaccine uptake among older adults can be improved through education and information received from the clinicians. The significance of the findings suggest older adults' perception of seasonal influenza disease and vaccine uptake as a method of prevention and its association with clinical practice in raising awareness about the safety and effectiveness of the influenza vaccine. In this study, I examined the perceptions of older adults concerning the influenza vaccine uptake which was below the national average. To increase vaccination uptake among older adults, this research suggests there is a need to address health beliefs, influenza vaccine side effects, safety and effectiveness.

The results of this study support the need for continued patient and clinician education, and awareness of effective guidelines that support influenza vaccine uptake among older adults. The data indicate that older adults' perception of the seriousness, susceptibility and barriers, are triggered by predictors including perceived benefits, cues to action and self-efficacy. These findings support clinical strategies that promote the influenza vaccination uptake. Implementing more clinicians' reminders and media campaigns especially during the influenza season can be an asset in improving influenza vaccine uptake.

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Appendix A: Expert Panel Recruitment Letter

I am working on my dissertation related to *Correlates of Influenza Vaccine Uptake Among the Elderly* and need an expert panel to review my newly created survey. I am looking for professionals that have either academic background in content or methodology expertise, have research experience in healthcare, or practice as a medical doctor or nurse practitioner. I am reaching out to you as I feel you meet one of these criteria and I feel you would be a vital asset to my expert panel.

As a member of an expert panel you receive all the information the typical study participant will receive and provide comments on the items in the survey. I will ask you to look strictly at the content of the survey and wording of the questions/statements and not the format of the survey. The official survey format will be done on a Word document which you will review. You would add comments where you feel changes are needed on the form available titled "Form for Review and Evaluation of Validity and Reliability by a Panel of Experts for Quantitative Instrumentation of "Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake". I may ask you to review revisions made based on the comments received, however I will try to get these back to you within 7 to 10 days. The survey and form are attached above for you to review.

Thank you for your time and consideration.

I have also attached my Curriculum Vitae for information on my background.

Sincerely,

Cheryl Hilliman, RN, MSN, FNP, WCCN

Appendix B: Panel of Experts Review Form

Form for Review and Evaluation of Validity and Reliability by a Panel of Experts for Quantitative Instrumentation of *Elderly Perceptions of Influenza Disease and Influenza Vaccine Uptake*

Instructions: Please review the attached Quantitative Instrumentation of *Elderly Perceptions of Influenza Disease and Influenza Vaccine Uptake* and respond to the following questions regarding the construction, validity and potential reliability for the Quantitative *Elderly Perceptions of Influenza Disease and Influenza Vaccine Uptake* concerning the phenomenon being researched, examined, assessed, evaluated or measured.

Section I. VALIDITY EVALUATION

A test, survey, questionnaire, evaluation or assessment instrument is valid to the extent that the instrument measures the construct(s) that the instrument purports to measure.

1. Instrument Construction:

1. (a). Are the instructions for completing the instrument clear?

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

1.(b). Is the application and results of the Quantitative Instrumentation of *Elderly Perceptions of Influenza Disease and Influenza Vaccine Uptake* adequately reflected in this instrument?

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

1. (c). What items would you add?

1. (d). What items would you delete?

2. Content Validity:

Will the scores yielded by Quantitative Instrumentation of *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake* adequately represent the content or conceptual domain of the construct being measured? In other words, does the instrument have adequate and appropriate items that constitute a representative sample of the complete domain of items used to generalize the construct being measured? Please see the attached table of specifications [instrument blueprint] that reflect which items and how many items within the instrument are designed to measure each type of content domain.

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

3. Construct Validity:

Quantitative Instrumentation *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake* is designed to measure *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake, Recency of influenza vaccine uptake= (1=≤1 year) and Frequency of Influenza disease = (1=≤1 year)*. Please see constructs definition:

Insert of constructs definition based on Glanz, K., Marcus Lewis, F. & Rimer, B.K. 1997; Rosenstock, Strecher, Becker, 1988. *The health belief model has six constructs and the mediating demographic factors which support the six constructs, and its underlying concept is that health behavior is determined by a person's beliefs or perceptions about influenza disease and vaccine uptake and techniques to decrease influenza disease among older adults. The main constructs are perceived susceptibility, severity, benefits, barriers, cues to action, self-efficacy and the mediating demographic factors which supports the six core perceived concepts. Perceived susceptibility evaluates the perception of the risk of developing the influenza disease and lends to the motivation to take the influenza vaccine to decrease that risk of getting influenza disease. The construct of perceived severity evaluates individual's beliefs about the seriousness of influenza disease and how to avoid it. Perceived benefit evaluates the participants' beliefs about the chances of getting influenza disease and the potential positive impact of the uptake of the influenza vaccine to decrease the risk of influenza disease. Perceived barriers evaluates participants' opinion of what is stopping them from making the decision to adopt a new behavior that can protect and prevent influenza disease. Self-efficacy evaluates* the participants' *perception of their competence to successfully act in seeking the influenza vaccine. Demographic mediating factors are the modifying variables such as age, sex, race, ethnicity, and education that may interfere influenza vaccine uptake indirectly by affecting perceived susceptibility, benefits, barriers, cues to action and self-efficacy. Recency of influenza is evaluated by measuring the most recent influenza vaccine uptake. Ideal = (1=≤1 year).*

3. (a) Does the Quantitative Instrumentation of *Elderly Perceptions of Influenza Disease and Influenza Vaccine Uptake* represent concepts or constructs it should represent and does not represent concepts it should not represent? In other words, does the Quantitative Instrumentation of *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake* adequately represent the constructs it purports to represent?

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

3. (b) Is the Quantitative Instrumentation of *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake* inclusive of the important dimensions or facets of the constructs it purports to measure.

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

3. (c) Does the Quantitative Instrumentation of *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake* avoid excess reliable variance, ensuring no items are easier or harder for some respondents in a manner relevant to the interpreted construct?

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

D. Face Validity

Does the Quantitative Instrumentation of *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake* look valid? Does it appear to represent a measure of the construct it purports to measure?

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

E. Item Bias

Does the wording or placement of an item avoid affecting someone's response? (This includes the avoidance of double-barreled items, words or phrases, which raise emotional red flags, ambiguous wording, gender bias, racial/ethnic bias, and the manipulative placement of an item or wording of an item)

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

F. Consequential Validity

Does the Quantitative Instrumentation of *Elderly Perceptions of Influenza Disease and Influenza Vaccine Uptake* instrument embody desirable values and have potentially positive consequences for the discipline or field it reflects?

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

Section II. RELIABILITY EVALUATION

A test, survey, questionnaire, evaluation or assessment instrument is reliable to the extent that whatever construct(s) the instrument measures, it measures the construct(s) consistently.

A. Internal Consistency

Are the items that make up the Quantitative Instrumentation of *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake* internally consistent with each component and/or the constructs being examined, assessed, evaluated or measured?

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

B. Potential for Reliability (Potential for Consistent Responses)

Understanding that research participants completing this instrument will vary in their understanding and experience with the *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake* and thus vary in their responses, is there anything about this instrument that would lead you to believe that this instrument would not consistently measure *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake*.

[ ] Yes
[ ] No (if no, please explain)
[ ] Yes provided the following actions are taken:

Please provide any additional comments, suggestions for improvement, and/or any other thoughts regarding the construction, how the survey to be easier to complete, validity and/or reliability of the Quantitative Instrumentation of *Older Adults Perceptions of Influenza Disease and Influenza Vaccine Uptake*

Panel Member

Printed or typed Name:

Title:

Department:

Organization:

Location:

Signature: _____ Date: _____

Appendix C: Community Research Partner Review Form

Community Research Partner Name:
Contact Information
Date
Dear Cheryl Hilliman,
Based on my review of your research proposal, I give permission for you to conduct the study entitled "Correlates of Influenza Vaccination Uptake among the Older Adults" within the Christopher C. Blenman Senior Center. As part of this study, I authorize you to recruit all (a) men and women, (b) age 65 years and older, (c) English speaking, (d) oriented to person, time and place, (e) members of the selected senior citizen centers and (f) able to read and understand the English language to be in the study. Individuals' participation will be voluntary and at their own discretion. The purpose of the survey is to identify perceived factors that may be associated with poor influenza vaccination uptake among the older adults. The information that is collected will be analyzed and added to the future knowledge of how to Identify:

- Strategies for maintaining and sustaining change related to increasing influenza vaccine uptake; and
- Future implications of using the Health Belief Model to assess the perception and beliefs of the older adults' population especially in Brooklyn, New York.

We understand that our organization's responsibilities include: a secure area which will be allocated to you to complete the survey. We reserve the right to withdraw from the study at any time if our circumstances change.
I will be complying with your site's research policies and requirements, including participants' safety and confidentiality.
I confirm that I am authorized to approve research in this setting and that this plan complies with the organization's policies.
I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the student's supervising faculty/staff without permission from the Walden University IRB.
Sincerely,
Authorization Official
Contact Information

Appendix D: Survey Rating Form

Survey Rating Form

This survey explores the perception related to influenza vaccine uptake among the elderly. Participation in this survey is completely voluntary. Your answers to each question is important, so please complete each item on the form to the best of your ability. Your responses must be honest. Each item to the concept of health belief model on the survey must be read carefully and answered by selecting one of the numbers on the 5-point scale that represents how relevant you believe it is measuring the concept of the perceived action. All the information you provided will help clinicians to develop better influenza vaccine programs for the elderly in the future.

ITEMS	*1. Strongly Disagree*	*2. Disagree*	*3. Neither Agree or Disagree*	*4. Agree*	*5. Strongly Agree*
1. If I get the seasonal influenza virus I will get sick.	1	2	3	4	5
2. If I get the seasonal influenza virus I will lose income.	1	2	3	4	5
3. If I get the seasonal influenza virus other members in my home will get sick.	1	2	3	4	5
4. If I get the seasonal influenza virus I will die	1	2	3	4	5
5. I am at risk for getting the seasonal influenza virus	1	2	3	4	5
6. My family members are at risk for getting the seasonal influenza virus.	1	2	3	4	5
7. I feel knowledgeable about my risk of getting the seasonal influenza virus.	1	2	3	4	5
8. I will have side effects from the seasonal influenza vaccine.	1	2	3	4	5
9. I will get sick from the seasonal influenza vaccine.	1	2	3	4	5
10. I will die from the seasonal influenza vaccine.	1	2	3	4	5
11. The seasonal influenza vaccine will be painful.	1	2	3	4	5
12. The seasonal influenza vaccine will be expensive.	1	2	3	4	5
13. It is inconvenient to get the seasonal influenza Vaccine	1	2	3	4	5
14. There is a shortage of the seasonal influenza vaccine	1	2	3	4	5
15. If I receive the seasonal influenza vaccine, I will not get sick from the seasonal influenza virus	1	2	3	4	5
16. If I receive the seasonal influenza vaccine it will prevent complications from the seasonal influenza disease	1	2	3	4	5
17. Seasonal influenza vaccines are safe.	1	2	3	4	5
18. I will take the seasonal influenza vaccine if my doctor or my nurse said it is important	1	2	3	4	5
19. I will take the seasonal influenza vaccine if a family member or significant other said it is important	1	2	3	4	5
20. I will take the seasonal influenza vaccine if I see a TV ad that said it is important	1	2	3	4	5
21. I will take the seasonal influenza vaccine if the interdisciplinary team at my clinic reminds me.	1	2	3	4	5
22. I am confident that I can obtain the seasonal influenza vaccine	1	2	3	4	5
23. I am confident that my day to day performance will not be adversely impacted by taking the seasonal influenza vaccine	1	2	3	4	5
24. I am confident that the seasonal influenza vaccine I will take will not exposed me to any side effects or death	1	2	3	4	5
25. I am confident that seasonal influenza vaccine will help to prevent me from getting the seasonal influenza throughout the influenza season.	1	2	3	4	5

Demographic Factors

Please circle the response that most closely corresponds to you. As with the survey, all responses will be kept confidential

What is your gender?	Male Female
What is your current age?	65 -70 70- 75 75 or greater
What Race/Ethnicity group do you consider yourself?	European Americans African Americans Hispanic Asians Other, specify: _____.
What is your highest educational attainment?	Grade School Some High School High School Diploma/GED Some College Bachelor Degree Graduate/Professional Degree
What is your family's annual income?	Under $10,000 $10,000 - $19,999 $20,000 - $29,999 $30,000 - $39,999 $40,000 - $49,999 $50,000 - $59,999 $60,000 or above.
Where do you reside?	Family house Own house alone Residence for senior citizens, Other, specify: ……..
How many times did you have influenza attack in the past one year?	0 time 1 time 2 times 3 times 4 or more times
How recently did you receive influenza vaccination?	Never More than three years, 2-3 years ago, Last year This year.

END. Thank you for completing the Influenza Vaccine Survey!

Appendix F: Letter of Invitation for Volunteers for Test-Retest Survey

Dear Volunteers,

I am inviting 50 older adults who will volunteer to participate in a study survey which will include test/retest sample to help the validity of this study. If you volunteered to participate in the test-retest survey the same test will be administered two times.
The purpose of this study is to identify perceived belief about uptake about influenza vaccine uptake. I feel this research is important to identify the belief that is responsible to poor influenza vaccine uptake. If you know any other older adults that might be willing to participate in the survey test-retest, please invite them so they might complete my survey.
I hope to finish my data collection by July 30, 2015. Once I have my final dissertation approved I hope to disseminate my findings anyone who is interested. Please contact for any questions or concerns at XXX@waldenu.edu.
Thank you, again, for your help!
Cheryl Hilliman RN MSN FNP WCCN

Appendix G: Test/Retest Participant Reminder Emailing

Dear Fellow Participants,

This is a reminder to participate in the Retest for the research study as previously discussed. I selected 50 older adults who volunteered to participate to complete the study survey a second time and be included in the test/retest sample to help the validity of this study. These participants practice autonomously and are members of the senior centers in Brooklyn, New York. I would like to, again, assess older adults' perceptions of influenza disease and influenza vaccine uptake. The purpose of this study is to identify perceived beliefs that may contribute to poor uptake of the influenza vaccine among older adults. The survey should take less than 15 to 20 minutes to complete.

Again, any information you provide will be kept confidential because no signatures is required. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the study reports. Data will be kept secure by a password protected computer that only the researcher will have access. Data will be kept for a period of at least 5 years, as required by the university.

If you are still interested, I will be at the senior center at 9 am Wednesday morning which is within 5 days from todays' date.

Please contact me at the information for any questions or concerns. If you have any questions about participants' rights, it can be directed to a Walden University representative at IRB@waldenu.edu.

Thank you

Cheryl Hilliman, RN, MSN, FNP, WCCN

Appendix H: Letter of Invitation Prospective Participants

Study Title: Correlates of Influenza Vaccination Uptake among Older Adults

Dear Prospective Participants
You are cordially invited to participate in a research among older adults. Your senior citizen center is invited to participate in this study because you are between the ages of 65 or older which makes you eligible for the study. The information that is collected will be analyzed and added to the future knowledge of how to Identify:

- Strategies for maintaining and sustaining change related to increasing influenza vaccine uptake; and
- Future implications of using the Health Belief Model to assess the perception and beliefs of the older adults' population especially in Brooklyn, New York.

It is very important that you read the entire consent form before agreeing to participate in the study. This study is being conducted by Cheryl Hilliman, RN, a current doctoral candidate at Walden University.
Background Information: Seasonal influenza outbreak usually occurs in the United States in late fall through early spring, causing severe illnesses and death, especially among the elderly and children (CDC, 2012). Although influenza affects all ages, the elderly is particularly vulnerable because they often have chronic illnesses which put them at a greater risk for influenza complications, including pneumonia (Molinari, et al, 2007). U. S. Census Bureau 2011 reported influenza and pneumonia is the 7th leading cause of death among the older adults and the annual rate of influenza-associated death among ages 65 and older is 45,321 deaths per 100,000 persons. The results obtained from this survey can be used to develop interventions that are specific to methods of decreasing the prevalence of influenza and its complication among older adults. If you agree to participate in this study please sign and return this letter of invitation to Cheryl Hilliman, email [redacted]

I agree to participate in this study
Signature (first name and last name initials only): _____ Date: _____
Senior Citizen Center Location_____

Appendix I: Flyer Advertising Influenza Vaccine Research Study

Research Study to Identify why the Influenza Vaccine Uptake Rates are decreasing among the Older Adults in Brooklyn, New York

Seasonal influenza is a contagious airborne respiratory disease that spreads from person to person during episodes of coughing or sneezing or through contact with frequently handled infected surfaces (CDC, 2012-2013). The influenza disease is caused by a group of influenza viruses, Type A, B, and C (CDC, 2012-2013). Although influenza affects all ages, the older adults are particularly vulnerable because they often have chronic illnesses which put them at a greater risk for influenza complications, including pneumonia (Molinari, et al, 2007). Immunization against influenza viruses is considered one of the most important health interventions to control seasonal influenza and to prevent unnecessary hospitalizations and premature deaths among the older adults yet many older adults do not obtain the influenza vaccine (CDC, 2012).

WHY THIS STUDY IS NEEDED

This study is carried out in Brooklyn New York because a survey done among Brooklyn residents reported that influenza and pneumonia combined is the third leading cause of death in Brooklyn (SUNY Downstate Medical Center, 2010).

How you can contribute to Decreasing Influenza Hospitalization and Death Rates among Older Adults?

Take the chance today and participate in the survey to help me determining the relationship between perception and belief among the elderly Brooklyn residents and their low influenza vaccination uptake rate. The study is being conducted as part of a Walden University dissertation fulfillment requirement by Cheryl Hilliman. With great honor I am encouraging you to participate in this survey to help clinicians in developing appropriate interventions specific to your older adult population who is vulnerable influenza and its complication.

Please call Cheryl Hilliman at [redacted]  or Email me at [redacted]

Appendix J: GPCOG Screening Test Authorization

Instructions: For these questions, simply check the box that best represents your answer. These questions are to determine if you meet the criteria to participate in the survey study.

1. Are you a member of this senior citizen center?
   - Yes
   - No
2. Are you read and write English?
   - Yes
   - No
3. Can you can you independently make appropriate decisions.
   - Yes
   - No
4. Do you live in Brooklyn?
   - Yes
   - No
5. Are you willing to participate in a 4 to 5 minutes screening to evaluate your current cognitive status?
   - Yes
   - No

   If you have answered yes to all the questions and you are willing to take the screening to test your cognitive ability, please put your initials of first and last names on the area provided below.
   First and Last Name Initials _____

Appendix K: GPCOG Screening Test

Participant Initials: _____ Date: _____

Items	Correct	Incorrect
1: Name and Address for Subsequent Recall Test Read the following to the patient: I am going to give you a name and address. After I have said it, I want you to repeat it. You must remember this name and address because I am going to ask you to tell it to me it again in a few minutes: Mary Jones, 342 East 83rd Street, Brooklyn. (Allow a maximum of 4 attempts).		
2. Time/Orientation What is the date? (exact only)		
3. **Clock Drawing – use blank page** Please mark in all the numbers to indicate the hours of a clock 4. Please mark in hands to show 10 minutes past twelve o'clock (12:00)		
5. Information Can you tell me something that happened in the news recently? (Recently = in the last week. If a general answer is given, e.g. "war", "lot of rain", ask for details. Only specific answer scores)		
<u>Recall</u> ***What was the name and address I asked you to remember?*** Top of Form Mary Jones 342 East 83rd Street Brooklyn		

To get a total score, add the number of items answered correctly

Total correct (score out of 9)

1. If patient scores 9, no significant cognitive impairment and further testing not necessary.

2. If patient scores 5-8, more information required. Proceed with Step 2, informant section.
3. If patient scores 0-4, cognitive impairment is indicated. Conduct standard investigations.

Informant Interview

Date: _____ Informant's name: _____

Informant's relationship to patient, i.e. informant is the patient's: _____
These six questions ask how the patient is compared to when s/he was well, say 5 – 10 years ago.

Compared to a few years ago: you will choose any of the following answers

Don't know _____ Yes _____ No _____ N/A _____

1. Does the patient have more trouble remembering things that have happened recently than s/he used to?
Don't know _____ Yes _____ No _____ N/A _____

2. Does he or she have more trouble recalling conversations a few days later?
Don't know _____ Yes _____ No _____ N/A _____

3. When speaking, does the patient have more difficulty in finding the right word or tend to use the wrong words more often?
Don't know _____ Yes _____ No _____ N/A _____

4. Is the patient less able to manage money and financial affairs (e.g. paying bills, budgeting)?
Don't know _____ Yes _____ No _____ N/A _____

5. Is the patient less able to manage his or her medication independently?
Don't know _____ Yes _____ No _____ N/A _____

6. Does the patient need more assistance with transport (either private or public)?
Don't know _____ Yes _____ No _____ N/A _____

(If the patient has difficulties due only to physical problems, e.g. bad leg, tick 'no')
To get a total score, add the number of items answered 'no', 'don't know' or 'N/A')
Total score (out of 6)
If patient scores 0-3, cognitive impairment is indicated. Conduct standard investigations.