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Health Literacy Among Elderly Hispanics and Medication Usage

Wilda Parker
Walden University

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Walden University

College of Health Sciences

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Wilda Parker

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Review Committee

Dr. Raymond Panas, Committee Chairperson, Public Health Faculty
Dr. Vasileios Margaritis, Committee Member, Public Health Faculty
Dr. Rodney Bowden, University Reviewer, Public Health Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2016

Abstract

Health Literacy Among Elderly Hispanics and Medication Usage

by

Wilda Y. Parker

MPH, Benedictine University, 2011

BS, Southern Polytechnic University, 2008

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Community Health Education

Walden University

May 2016

Abstract

Health literacy among the elderly Hispanics is a problem for 44% who read at the lowest level due to issues with recognition, cognition, or vision. The purpose of this study was to determine the extent that elderly Hispanics have problems with medication adherence due to health literacy. The social cognitive theory was the framework for this study. Inclusion criteria consisted of being 65-75 years of age, and speaking and/or reading English and/or Spanish. Questionnaires from 156 individuals were completed in Cobb County/Atlanta GA and analyzed using multiple regression to determine the relationship between health literacy and medication usage. Medication adherence was the dependent variable and independent variables were gender, age, Hispanic origin, education, income, income means, health insurance, health literacy, and medication usage. Statistical significance was noted in medication adherence, health literacy, and working full-time. Results were based on the correct answers from health literacy questions, which showed an association between medication adherence and health literacy and a reduction in medication adherence problems among elderly Hispanics who worked full-time. These findings showed a significant association between medication adherence and health literacy level among elderly Hispanics. No medication adherence problems were noted among participants who had good health literacy, unlike participants with poor health literacy. A larger ethnic group may show a variation of problems in future studies. Implications for social change could include recommendations for the use of Spanish language hotlines and reading materials to provide care, knowledge, and medication information assistance.

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Dedication

This is for my children, Lianette Parker and Keith Parker, for encouraging me to continue my education and hopefully it will motivate you both to continue your education. To my fiancé Johnny Collins for all the inspiration, praise and motivation to continue going even when I was tired and lacked energy due to my health issues. Finally I wanted to thank God for providing me this opportunity and giving me the strength to start and finish this process.

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Chapter 1: Introduction to the Study

Introduction

Health literacy, which is defined as the degree to which the individuals have the capacity to obtain, process, and understand basic health information and sources needed to make appropriate health decisions (Freedman et al., 2009), is associated with common problems facing the adult population. It is estimated that 48% of English-speaking patients have problems with health literacy, while 90 million adults in the United States may have trouble understanding health information (Andrus & Roth, 2002; Davis et al., 2006b). Forty-four percent of the elderly population over the age of 65 read at the lowest level, making it hard for the elderly with cognitive, vision, and recognition problems to take their medication correctly (Baker et al., 2000).

The purpose of this study was to evaluate whether elderly Hispanics have problems with medication usage due to health literacy as it pertained to medication adherence and identification. This study could create positive social change in raising the rate of patients for taking their medication correctly and reduce the \$100 billion per year cost of morbidity and death associated with medication adherence (Brown & Bussell, 2011). Information will be provided in the sections on background, problem statement, purpose of the study, description of the research questions and hypothesis, theoretical concept, nature of the study, study definitions, assumptions, scope of the study, limitations and significance of why health literacy and medication adherence are important to the elderly Hispanic population.

Background

Identifying the health problems the elderly face, and measures to assist them in overcoming the obstacles regarding medication usage, is important for proper health and wellness. A study performed by Cohen et al. (2012) showed patients do not follow the medication regimen when it is associated with diabetes, high blood pressure, and cardiovascular disease. Some issues with medication usage pertained to side effects, social support, and education (Zuñiga, 2012). Health literacy requires reading and performing numerical tasks and comprehending prescription labels (Baker, 2006). Medication adherence affects the patients with chronic illnesses who do not take their medications as prescribed, causing poor medication usage and greater health problems among the patients (Brown & Bussell, 2011). Patients who do not speak English well and have problems understanding physician information have English proficiency problems (Bailey et al., 2011). Elderly patients managing multiple prescriptions have a greater risk of misinterpreting prescription labels (Bailey, 2009).

Problem Statement

The elderly population has problems understanding information pertaining to medication usage. Non-adherence is a public health issue in chronic disease management which costs \$100 billion annually in the United States and makes up for 10% of hospital admissions (Kripalani et al., 2006). Among patients with chronic diseases such as cardiovascular disease, 50% of patients do not take their medications as prescribed by a pharmacist or a physician (Brown & Bussell, 2011).

There were literature gaps pertaining to health literacy among adults and educational methods for providing information that the general public can understand; especially the elderly Hispanics concerning medication regimens and usage (Baker, 2006). The elderly Hispanic culture may play a role in their medication problems due to lack of communication and understanding of the medication instructions and regimen given by their physicians for taking their medications (Gerber et al., 2010; Zuñiga, 2012). Recruiting an adequate representation of older Hispanics/Latinos with chronic conditions can assist in determining their difficulties with medication adherence (Kao & Lynn, 2009). Finally, the lack of evidence of a relationship between health literacy and medication adherence measurements for older adults is an issue for the Hispanic population that needs to be investigated (Zuñiga, 2012).

Purpose of the Study

Hispanics may not understand the importance of taking correct medications daily and taking medication as prescribed by the doctor in order to avoid future hospitalizations and morbidity or death (Brown & Bussell, 2011). Taking the wrong medication or lack of medication usage compromises health outcomes and increases patient mortality (Brown & Bussell, 2011). The World Health Organization (WHO) categorized poor medication adherence for patients as lack of understanding of their disease, failure to recognize medication usage, and limits the amount of discussion among physician and patients (Brown & Bussell, 2011). Empowering patients can motivate them to manage their

medications and encourage participation in their health care outcomes (Brown & Bussell, 2011).

The purpose of this study was to evaluate whether elderly Hispanics have problems with medication usage due to health literacy as it pertained to medication adherence and identification.

Research Questions

The goals of the study were to determine the relationship among the variables as it pertains to health literacy and medication usage. The research questions for the study were as follows:

RQ1: What is the relationship between health literacy and medication adherence among the elderly Hispanics?

H_{o1}: Health literacy is not associated with medication adherence among elderly Hispanics.

H_{a1}: Health literacy is associated with medication adherence among elderly Hispanics.

RQ2: Is there a correlation between health literacy and medication identification among the elderly Hispanic patients?

H_{o2}: There is no correlation between health literacy and medication identification among elderly Hispanic patients.

H_{a2}: There is a correlation between health literacy and medication identification among elderly Hispanic patients.

RQ3: Which elderly Hispanic's demographic (age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy) indicators play a role in medication adherence?

H₃: No elderly Hispanic's demographic (age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy) indicators play a role in medication adherence.

H₃: Elderly Hispanic's demographic (age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy) indicators play a role in medication adherence.

Theoretical Foundation of Health Literacy and Medication Usage

The theory used in the study was the social cognitive theory (SCT). The theory was developed in 1941 by Miller and Dollard (Glanz, Rimer, & Viswanath, 2008). In 1963, Bandura and Walters widened SCT with principals on observational learning and reinforcement. Bandura introduced self-efficacy in 1977 to better understand learning (Glanz, Rimer, & Viswanath, 2008, p. 170). Social cognitive theory's key concepts include reciprocal determinism, outcome expectations, self-efficacy, collective efficacy, observational learning, incentive motivation, facilitation, self-regulation, and moral disengagement (Glanz et al., 2008, p. 170).

Glanz et al. (2008) stated looking at the elderly Hispanic population's behavior as it pertained to medication identification and usage determined their performance issues in adhering to medication usage (pp. 172-176). According to Glanz et al. (2008)

observational learning takes into account attention, retention, production, and motivation (pp.172-173). This theory provides a basis for determining why the elderly Hispanics do not take their medication daily, do not take the appropriate dosage, and cannot identify their medication (Kripalani et al., 2006).

Medication adherence could be a problem among the elderly due to comprehension. Developmental tools can assist the target population to understand medication usage in an understandable form. The tool can assist in providing social change to a community having problems with medication adherence. The tool can provide medication pictures with moon or sun to direct the elderly when to take their medication (Dowse & Ehlers, 1998). This practical application can assist the elderly Hispanic with health literacy issues become adherent to medication usage. The elderly Hispanic population can follow proper guidance for their medication from findings which might reduce hospital visits, improve health and reduce the cost of health care expenditures in the United States (Backes & Kuo, 2012).

Nature of the Study

Creswell (2009) stated objective theories test for quantitative research of the phenomena by examining the relationship of the variables. Quantifying the variables regarding health literacy levels among the elderly Hispanics could determine the problems regarding medication usage (p. 4). Rudestam & Newton (2007) indicated the research strategy is an important aspect of the dissertation process. Applying a cross-sectional survey with a non-experimental quantitative design to assess medication

adherence problems can provide the results for health literacy and medication adherence among a sample of elderly Hispanics (pp. 26-32). Per the information from the Laerd Dissertation (2012) and the Latin American Association (2013) the convenience sample includes elderly men and women age 65-75 of Mexican and Puerto Rican descent. According to Gazmararian et al. (2005) the age of the sample represents 30% of the population that use prescription medication. The study sample is discussed further in Chapter 3.

The dependent variable was medication adherence. The independent variables were demographic data such as age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, and income level, and health literacy. Other independent variables were gathered using a single subject questionnaire pertaining to missed medication dosage, stopped taking medication due to feeling worse, stopped taking medication when health issues are under control, forgot to take medication, forgot to take medication away from home, and took medication yesterday (Cordasco et al., 2009;).

Definition of Terms

Adherence: Coincides with a person's behavior as related to medical and health advice recommended by a health care provider (Brown & Bussell, 2011).

Elderly population: Consist of men and women over the age of 65.

Ethnicity: "A subgroup of people who share a common ancestry, history, or culture"
(Austin et al., 2002, p. 123).

Health literacy: The ability to obtain, process, and understand basic health information and services to assist in making health decisions (Freedman et al., 2009).

Medication Adherence: “Percentage of prescribed medication dosage taken by a patient during a specific time period” (Cohen et al., 2012, p. 470).

Medication Identification: Classifying medication names, dosage, or purpose of the medication (Mohan et al., 2013).

Non Compliance: Patient’s unresponsiveness to take or understand medical and health advice provided by a health care professional (Brown & Bussell, 2011).

Physicians: Medical personnel who provide health care to patients.

Rapid Estimate of Adult Literacy in Medicine (REALM): Tool used to measure the ability to pronounce individual words associated with health materials (Literacy REALM, 2010).

Test of Functional Health Literacy in Adults (TOFHLA): Tool used to measure functional health literacy for both numeric and reading comprehension using health-related materials (Nurss, Parker, Williams, & Baker, 2004).

Scope of Study

The researcher examines medication identification and adherence as it concerns health literacy. The scope of the study included elderly Hispanic men and women between the ages of 65-75 in Cobb County and Atlanta, Georgia area. This age represents 30% of the population that use prescription medication (Gazmararian et al., 2005). The

elderly Hispanics are of Mexican and Puerto Rican descent. These adults met the criteria of age and currently take more than one medication.

Assumptions

There were two assumptions in the study. One was that patients provided truthful information to physicians when answering questions or filling out information. Another assumption was patient truthfulness when answering the study questionnaire. Medication self-reporting was a problem because there is not a standard for measuring whether patients take their medications correctly and on time (Colby et al., 2011).

Limitations

The limitations to this study concerned the amount of time provided to perform the study, the narrow group of study participants from a specific geographic location, no pre-existing information related to elderly Hispanics in association with health literacy, and medication usage from a quantitative perspective. Glanz et al. (2008) states SCT recognizes barriers in promoting health behaviors. The barrier can relate human behavior as it influences the elderly Hispanic population when it comes to talking to others outside their culture (pp.172-176). The cross-sectional design limited the ability to make inferences or to generalize the elderly Hispanic population (Rudestam & Newton, 2007). The questionnaire provided information from the elderly participants. However, ensuring all the questions were answered can limit the amount of information received from the participants. Participants can underreport their inability to read or comprehend

medication usage. The researcher attempted to minimize underreporting by putting the participants at ease in their environment.

Significance of the Study

The study determined the barriers elderly Hispanics have with medication adherence and health literacy. It may also motivate and empower elderly Hispanics in taking their medications properly in order to avoid further illnesses (Brown & Bussell, 2011). Identifying the problems elderly Hispanics may experience because of their health literacy may assist pharmacists and physicians develop alternative methods of educating this population in taking their medications properly (Gerber et al., 2010). The findings from this study could improve medication adherence among elderly Hispanics who have health literacy problems in making changes to their behavior patterns and cultural beliefs which could produce positive social values among the community (Walden University, 2013).

Summary

Identifying medication is important for the wellness and health outcomes of the elderly Hispanics. Limited English proficiency among the elderly Hispanics may cause them to misunderstand prescription labels.

The purpose of the study was to examine patient related factors, physician related factors, and health system/team building factors as they relate to medication usage and health literacy.

Evaluating whether elderly Hispanics had problems with medication usage due to health literacy as it related to medication adherence and identification was important to the study. Medication adherence was the dependent variable for the research questions. The independent variables consisted of age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy. Other independent variables were missed medication dosage, stopped taking medication due to feeling worse, stopped taking medication when health issues are under control, forgot to take medication, forgot to take medication away from home, and took medication yesterday.

Social cognitive theory (SCT) was used to examine the elderly Hispanic population's self-efficacy and outcome expectations. A non-experimental quantitative design was used to assess medication adherence problems in regards to health literacy among the sample of elderly Hispanics. This study may be significant because addressing the problems of the elderly as it pertains to medication identification and usage will provide them with a better understanding of why taking medication is essential to their well-being. The literature search completed to address the problems associated with health literacy and medication adherence is provided in Chapter 2.

Chapter 2: Literature Review

Introduction

The purpose of this study was to evaluate whether elderly Hispanics have problems with medication usage due to health literacy as it pertains to medication adherence and identification.

The literature review in this chapter outlines studies associated with medication adherence as it pertains to health literacy among elderly Hispanics. This chapter will provide information on health literacy and medication adherence and how health literacy relates to medication usage among elderly Hispanics. Next, a literature review and the methodological strengths and limitations follow. Finally, the results in this study will show how it contributes to social change.

Literature Search Criteria

The articles for this review came from a search of literature related to health literacy and medication adherence. The databases used to find peer-reviewed journals were MEDLINE, PUBMED, Cumulative Index to Nursing & Allied Health Literature (CINAHL), PsycINFO, PsycARTICLES, Psychology, PsycEXTRA, PsycTESTS and media. The search terms used consisted of *health literacy, elderly Hispanics, elderly, medication adherence, prescriptions, nonadherence, Latino, compliance, older, measurement, underserve population, patient medications*. These search terms were used individually and in various combinations to identify appropriate articles for review. The databases used for measuring the health literacy of the participants regarding health

literacy were the Rapid Estimate of Adult Literacy in Medicine-Revised (REALM-R) and the National Assessment of Adult Literacy (NAAL). The data dates ranged from 2006 to 2014.

Literature Review

The articles by Zuñiga (2012), Gerber et al. (2010), Cohen, Shaykevich, Cawthon, Kripalani, Paasche-Orlow, and Schnipper (2012), and Colby, Wang, Chhabra, and Perez-Escamilla (2011) included studies pertaining to diabetes, high blood pressure, cardiovascular disease, and tuberculosis and the issues regarding patients and their non-adherence to their medication regimen. The medication adherence barriers identified consist of financial status, health literacy, and communication and identification problems. Zuñiga (2012) indicated that the five main predictor variables affecting medication adherence are side effects, social support, demographics, education, and self-report of health as it relates to the elderly Hispanic population. On the other hand, Gerber et al. (2010) indicated that Hispanics have additional barriers such as low English proficiency, cultural factors, and limited access to health care clinics. Another issue found pertained to older patients adhering to their medication regimen for the first month after being discharged from the hospital. But after that month they stop taking their prescriptions according to instructions due to the cost and the amount of prescriptions they have to take daily (Cohen et al., 2012). Prescription drug coverage and out-of-pocket drug cost were associated with underuse and medication sharing pertaining to type 2 diabetes among adults over age 58 (Colby et al., 2012). Colby et al. (2012) found that

Latino patients have lower glycemic control compared to non-Latino population. The three key components found concerning medication adherence pertained to support of physician and healthcare team, socio-economic status, and number of simultaneous medications. Colby et al. (2012) stated the information in the report was gathered from the patients self-reporting, which may indicate the patient may not be providing the health care provider correct information. There are measures to assist the patient in combating the barriers associated with medication adherence. This included providing information for state and federal assistance programs for medications, improving patient-provider relationship, transportation, smaller tablets, health promoter to reinforce proper medication instructions, multimedia educational model, pictograms, teach back methods, team based approached between providers and pharmacist and interpreters to assist with language barriers (Colby et al., 2012).

Davis et al.'s (2006a) study provided information regarding literacy levels and how patients can read labels but have problems counting pills. The study indicated rates of misunderstanding prescription labels are higher among patients with low literacy and 37.7% of patients misunderstand at least one label instruction causing this to be a source for medication errors (Davis, 2006a). Mistakes are common when instructions have more than one component. Twenty-two percent of patients have problems interpreting dosage when it is measured in "teaspoons" and "tablespoons" (Davis et al. 2006a). According to the study findings, patients have problems with numeracy making the literacy task more difficult than decoding simple words (Davis et al., 2006a). According to Lenahan,

McCarthy, Davis, Curtis, Serper, and Wolf (2013), identification was a problem among elderly Hispanics with low literacy because patients who cannot correctly recognize their medications by label or appearance are likely to self-report poor adherence to their physician or pharmacist. The literature review revealed a limited amount of quantitative research regarding health literacy among elderly Hispanics and medication usage.

Health Literacy

There are various definitions of health literacy depending on the context.

Freedman, Bess, Tucker, Boyd, Tuchman, and Wallston (2009) defined health literacy “as the degree to which individuals have the capacity to obtain, process, and understand basic health information and sources needed to make appropriate health decisions” (p. 446). There are many forms of health literacy. Low literacy is associated with patient deficits in reading, numeracy skills, word recognition, and text comprehension (Freedman et al., 2009). Literacy was defined as the “basic ability to read and speak English,” whereas functional health literacy is the “ability to read, understand, and act on health information” (Andrus & Roth, 2002, p. 283).

Health literacy starts with the individual. The individual should have the ability to perform basic reading and numerical tasks that require reading and comprehending prescription bottles, appointment slips, and other essential health related health care materials (Baker, 2006). Andrus and Roth (2002) found in their study that 48% of English-speaking patients do not have adequate functional health literacy. Inadequate health literacy included poorer health status, lack of knowledge about medical care and

medical conditions, decreased comprehension of medical information, lack of understanding and use of preventive services, worse self-reported health, poorer compliance rates, increased hospitalizations, and increased health care costs (Andrus & Roth, 2002).

Various tests can be used to determine the health literacy levels among elderly adults. Information from the Short Test of Functional Health Literacy in Adults (S-TOFHLA), National Adults Literacy Survey (NALS), and the Rapid Estimate of Adult Literacy in Medicine (REALM) indicate the reading and comprehension levels of the participants. Baker, Gazmararian, Sudano, and Patterson (2000) performed a study to determine the reading levels of the elderly population. The results stated that 16% among Americans 45-54 read at level 1; 55-64 years old are 26% and age 65 and older read level 1 at 44% (p. S368). Level 1 indicates poor reading and comprehension among participants. Poor reading skills affect the patient's chronic disease and health related information (Baker, Gazmararian, Sudano, & Patterson 2000; Baker, Wolf, Feinglass, Thompson, Gazmararian, & Huang 2007b). Reading requires good vision, concentration, recognition of words, a good memory, and the ability to process information.

Health literacy as it relates to comprehension of written materials affects older adults with dementia or cognitive impairment producing a higher prevalence of chronic disease, making their health worse (Baker et al., 2000). A chronic condition such as hypertension contributes to a decline in cognitive function (Baker et al, 2000). Functional health literacy was worse among older age groups (Baker et al., 2000). U.S. Surgeon

General Carmona theorized that many steps have been taken to educate the population on risky behavior indicating the population may not understand the health information due to health literacy problems which may be why the population still smokes or does not get breast or colorectal exams (Gazmararian, Curran, Parker, Bernhardt, & DeBuono, 2005, p. 319).

Health care providers need to close the health literacy gap by ensuring that the public has the ability to access, understand, and use health related information and services that are critical to improving their health. To help raise awareness collaboration is needed among consumers, government, health care professionals, patient advocacy groups, health care organizations, media, industry, policymakers and community based organizations (Gazmararian et al., 2005).

Medication Adherence

Medication adherence is important for the improvement of patient health and wellness. Adherence is an individual patient behavior, and improving patient health coincides with taking medications as prescribed. Fifty percent of patients with chronic illnesses do not take their medications as prescribed by their physician. Poor medication adherence contributes to an increase in morbidity and death, which incurs a cost of approximately \$100 billion per year (Brown & Bussell, 2011). In the U.S. 50% of prescriptions do not provide the necessary results due to improper use and 14% - 21% of patients never fill their original prescriptions (Gazmararian, Kripalani, Miller, Echt, Ren, & Rask, 2006).

Medication adherence is a problem among the elderly population. The elderly use 30% of all prescription medications and they have risk factors associated with cardiovascular disease as well as other chronic illnesses (Gazmararian et al., 2006). Adherence is ideal for long term medical management of chronic conditions (Gazmararian et al., 2006). Adherence is defined as the “process by which a patient takes their medication as prescribed” while nonadherence is a problem caused by noninitiation, not taking dosing regimens as instructed, and discontinuation of treatment (Ostini & Kairuz, 2013, p. 2). Elderly patients with chronic illness take more than one medication, which probably makes it difficult to determine which medication to take throughout the day (Bubalo et al., 2010). The number of medications taken by an individual can cause nonadherence, especially at the onset of being diagnosed with a chronic illness (Bubalo et al., 2010). Treatments that call for more than one dosage are associated with non-adherence because patients can miss a dose or take it at the wrong time. Nonadherence rates decreased 69% for two dosages, 65% three dosages, and 51% for four dosages (Bubalo et al., 2010). Multiple concurrent dosages leads to a greater likelihood that one dose will not be filled or refilled (Bubalo et al., 2010).

The elderly experience cognitive issues that may contribute to difficulty in following prescription instructions (Gazmararian et al., 2006). Cohen et al. (2012) performed a study regarding patient adherence to medication regimen. After the first month of being discharged from the hospital they stopped taking their prescription medication due to cost and the amount of prescription being taken daily (Cohen et al.,

2012). Factors that influence medication taking behavior include how patients perceive their illness, their cognitive function, and the patient-provider relationship (Ostini & Kairu, 2013). Pharmacists can assist elderly patients with their literacy problem by using uncomplicated language and providing physical or pictorial cues for taking medication correctly. Labels can contain pictures to assist individuals with dosing instructions and bigger print on the labels can assist those with vision problems (Bubalo et al., 2010).

Limited English Proficiency

Bailey, Agarwal, Sleath, Gumusoglu, & Wolf (2011) stated in their study that Limited English Proficiency (LEP) is correlated with “one in ten individuals reporting they do not speak English well” (p. 1131). This is associated with patients having problems understanding, obtaining, and acting on health information provided by their physicians. The issues facing the patients with LEP included no interpreters in the pharmacy, prescription instructions unavailable in other languages, and prescription labels mainly printed in English. These issues can contribute to poor health outcomes for the elderly Hispanic population (Bailey et al., 2011). Medication management is important for patients as it pertains to adherence. Physicians and pharmacist need to associate medication management with their patients. Kripalani, Henderson, Chiu, Robertson, Kolm, & Jacobson (2006) indicated a national study found that 30% of patients who took prescription medications took them less often, 26% delayed filling their prescriptions, 21% stopped taking their prescriptions, and 18% never filled their prescriptions. Identifying the reasons for these problems in adherence is critical to the

health and well-being of the population. Limited English proficiency and inadequate literacy skills are risk factors associated with medication identification and medication mismanagement (Kripalani et al., 2006). These studies were performed to determine the problems with the elderly population and their medication adherence as it pertained to limited English proficiency and low literacy among adults.

Prescription Labeling

Prescription labeling is a factor when it pertains to health literacy. The Medical Expenditure Panel Survey (MEPS) stated adults 65 years of age and over fill approximately 20 prescriptions per year on average (Davis et al., 2006b). The Institute of Medicine indicated that 90 million adults in the U.S. have problem understanding and acting on health care information (Davis et al., 2006a; 2006b). Prescription labels have two forms of instructions on the label. The first provide instructions on taking medications and the other provides drug warning labels. Physician assume that patients understand instructions on prescription medications containers but 46.3% are unable to read one or more label instructions and 37.7% misunderstood information on label (Davis et al., 2006a). Davis et al. (2006b) showed in their study for drug warning labels keeping the words uncomplicated on the label can assist the patient understand when reading the prescription label. Moderately complicated messages such as “do not drink alcoholic beverages” were not understood by the patients with health literacy. Messages written at the high school level proved to be a problem for patients (Davis et al., 2006b). Elderly with low health literacy and those managing multiple drug regimens have greater risk for

errors in interpreting instructions (Bailey, 2009). Symbols can warn or encourage in instructing and educating the observer. It can be used as a substitute or enhancement. Twenty-one percent of American adults have literacy limitations and 27% have marginal literacy skills (Dowse & Ehlers, 1998). Elderly have doubled the illiteracy rate which correlates with age (Dowse & Ehlers, 1998). Doctors and pharmacists often miss the opportunity to educate patients so the drug label is their only source of instructions received. Translation services are lacking among pharmacist and minority communities especially Latino represent 15% of total population (Bailey, 2009). Most people age 50 and over identify their medications by pill color, shape and size. When receiving generic prescriptions sometimes the same medication is different in shape, color and size so this confuses the patient. The patients dependent on visual identification have problems adhering to their medications producing lower rates in their chronic condition and repeat hospitalization (Dowse & Ehlers, 1998). Patients who could not identify the name of the medication but could visually identify them were associated with health literacy. Patients that could not identify their medication by name or appearance had poor medication adherence. Davis et al. (2006) performed a study on patients to studied instruction labels for three common prescriptions (Metformin, glyburide, and atenolol). The participants were tested on 10 mock labels for the three medications. It was estimated that participants with low or marginal literacy misinterpret instructions and the results showed a significant misinterpretation in the number of times per day and hourly intervals per day, and the dose of pills per day. This indicates that those with low literacy have problems

understanding medication instructions indicating 79% of patients misinterpreted one or more of the 10 common prescription labels (Davis, 2009). These patients needed counseling on medication safety and usage. Patients relying solely on visual appearance can have adverse effects when the medication they think they are taking for one chronic disease has changed. Ensuring the patient knows the actual name of the medication can assist in avoiding potential dangers in their health care needs (Lenahan, McCarthy, Davis, Curtis, Serper, & Wolf, 2013).

Theoretical Foundation of Health Literacy and Medication Usage

Health literacy and cognitive abilities are important in gaining health information and interacting with health care system (Baker et al., 2007a). The theory identified for the study was the Social Cognitive Theory (SCT). The theory was developed in 1941 by Miller and Dollard then in 1963 Bandura and Walters widened SCT with principals on observational learning and reinforcement. Bandura introduced self-efficacy in 1977 to understand learning better (Glanz, Rimer, & Viswanath, 2008, p. 170). Social cognitive theory's key concepts include reciprocal determinism, outcome expectations, self-efficacy, collective efficacy, observational learning, incentive motivation, facilitation, self-regulation, and moral disengagement (Glanz, Rimer, & Viswanath, 2008, p. 170). Exploring the interaction between people and the environment as it pertains to individual or group behavior pertains to the social cognitive theory. Theorizing human behavior as it relates to personal, behavioral, and environmental influences is associated with the social cognitive theory. According to population behavior (Glanz, Rimer, & Viswanath, 2008)

looking at the elderly Hispanic population's behavior as it pertains to medication identification and usage can determine their performance issues in adhering to medication usage (pp.172-176). Observational learning takes into account attention, retention, production, and motivation since the problems in taking medications correctly are indicated by the literature (Glanz et al., 2008, pp.172-173). Determining why the elderly Hispanics do not take their medication daily, do not take the appropriate dosage and cannot identify their medication was the basis for the theory (Kripalani et al., 2006). The hypotheses was to determine the relationship between health literacy and medication usage and correlation between health literacy and medication identification among the elderly Hispanic. The SCT was used to evaluate cognitive function of the elderly Hispanics.

The study performed by Clark et al. (2008) determined that older adults have problems with self-efficacy as it pertained to their health outcomes and behaviors. There is a knowledge gap between concepts and live experiences among the elderly adults and it is due to self-management. The study identified a problem between limited knowledge regarding the purpose of medications. Baker, Wolf, Feinglass, & Thompson (2007a) found that individuals with low health literacy and cognitive abilities anticipated more mortality among the elderly population. Reading skills are connected to cognitive function and the population with poor cognitive ability is linked to understanding medication prescriptions.

The rationale for using the SCT was to understand how health literacy and cognitive and social skills interact among the elderly population and their medication usage. According to Tones (2002) there are three levels literacy; basic/functional literacy, communication/interactive literacy, and critical literacy. Basic/functional literacy is associated with adequate basic skills in reading and writing for everyday situations. Communication/interactive literacy is linked to advanced cognitive and literacy skills and critical literacy pertains to advanced cognitive skills that can be applied to critical information by the population (Tones, 2002). Unfortunately the elderly Hispanic population may not be in any of these categories so determining the level of health literacy among the elderly Hispanic to determine their level of medication usage was important for this study. The SCT relates to this study for determining the cognitive issues the elderly Hispanics have that can interfere with their medication usage as it correlates to health literacy.

The idea and occurrence of health literacy among elderly Hispanics and medication usage was to determine if the elderly Hispanic have problems identifying and taking their medications. The articles by Baker et al. (2007a), Clark et al. (2008) and Tones (2002) provided research to determine the health related knowledge, self-efficacy, behavior and literacy levels among the elderly participants. The concept was applied using the Test of Functional Health Literacy in adults (TOFHLA) to calculate the variables associated with medication adherence among the study participants in each study. Researchers have approached the problem through qualitative studies for

interviewing participants and determining their reading levels and cognitive functions. The strength for the SCT pertains to identifying and improving the behavior of the patients for a positive health outcome when they take their medications and the limitation pertain to the expectations of the elderly and what the elderly see as important in taking their medications (Clark et al., 2008). Identifying the variables for the SCT study consist of age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy and medication usage (Baker et al., 2007a; Clark et al., 2008; Tones, 2002). The rational for using those variables pertain to determining if any of the variables contributed to medication adherence problems among the participants. The independent variables consisted of age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy while the dependent variable consisted of medication adherence gathered from TOFHLA and Morisky Medication Adherence Scale (MMAS) scores of the participants (Baker et al., 2007a; Clark et al., 2008; Tones, 2002).

Summary

The information provided in this chapter showed how health literacy affects the population as it pertained to medication adherence and identification. Unfortunately the literature gathered for review provided little information on health literacy and medication identification and adherence concerning elderly Hispanics. The purpose of this study was to evaluate whether elderly Hispanics have problems with medication usage due to health literacy as it pertains to medication adherence and identification. It

was determined that medication adherence was associated with patients taking less prescriptions, missing dosage and not being able to identify the correct medication for their illness. The limitation to the health literacy and medication usage problem was lack of medications in other languages and the sample size and location of sample collected was not enough to determine the exact problems associated between health literacy and medication usage. The Social Cognitive Theory was used to determine the problems with the elderly participants to determine the cognitive issues associated with health literacy and medication adherence. Cognitive abilities such as reading can assist in health outcomes of the elderly when used to determine their health literacy levels and medication adherence can provide social change to the community because it will provide the target population with resources to educate the physicians and patient advocacy groups the essentials of a practical application using pictures to address the needs of the elderly Hispanic population.

Information on the research design and methodology are provided in Chapter 3 which was used to determine the level of literacy and medication identification and usage. Included in the chapter is a description of the population and the sample size for the study.

Chapter 3: Research Method

Introduction

The purpose of this study was to evaluate whether elderly Hispanics have problems with medication usage due to health literacy as it pertains to medication adherence and identification. Elderly Hispanic patients may have problems with health literacy, because they may not be able to read and comprehend prescription bottles, appointment slips, and other health related materials. Lack of health literacy limits the ability of the elderly to understand their health issues or lack of health outcomes if they do not take their medications (Tones, 2002).

The methodology used in this study is described in this chapter. The first section explains the research design that was used for this study and the justification for the design. The other sections include the population, sample size, sampling procedure, the recruitment process, method of data collection, the instrument used, variables for this study, threats of validity and ethical procedures used in this study.

Research Design

The methodology used was a non-experimental quantitative design. Rudestam and Newton (2007) provided information on a cross-sectional survey design. Therefore, this study used a cross-sectional survey design to assess medication adherence problems in regards to health literacy among a sample of elderly Hispanics (pp. 26-32). Past research studies exist regarding health literacy and medication usage by the elderly Hispanic population. The majority of the research studies performed pertained to limited English

proficiency (LEP), patient age, non-adherence, and Hispanics. These studies were all qualitative and (Baker, 2006; Brown & Bussell, 2011; Cohen et al., 2012; Zuniga, 2012). Creswell stated quantitative research gathers the results from a sample by examining the relationship of the variables. Quantifying the variables regarding health literacy levels among the elderly Hispanics could determine the problems regarding medication usage (p. 4). The model appropriate for the data collection was multiple regression and Chi Square, given there are several predictors that were observed for analysis (Field, 2009). The study variables include concepts and variables from the Morisky Medication Adherence Scale (MMAS), National Assessment of Adult Literacy (NAAL) and the Short Test of Functional Health Literacy in Adults (S-TOFHLA) (Emory University, 1995; Morisky, 2008; National Center for Educational Statistics, n.d.; Raehl et al., 2006). These tests provided recognition data about oral prescription medication use among the elderly. The questionnaire asked questions regarding taking their medications. The dependent variable included medication adherence as it relates to the elderly Hispanic health literacy levels (Baker, Wolf, Feinglass, Thompson, Gazmararian, & Huang, 2007b) and the independent variable consisted of various demographic variables such as age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level, and health literacy. Other independent variables were: missed medication dosage, stopped taking medication due to feeling worse, stopped taking medication when health issues are under control, forgot to take medication, forgot to take medication away from home, and took medication yesterday.

Understanding how the concepts and variables connect is important for reducing health literacy issues regarding medication usage.

According to Creswell (2009) a numeric description of trends, behaviors and attitudes of the study population provided a design choice which can assist pharmacies and physicians connect with their patients with health literacy problems. This tested the hypotheses to determine the correlation between health literacy and medication adherence (p. 145). Using a quantitative study assisted in any resource constraints currently affecting the discussion between physicians and pharmacists regarding the patient's medications. The research questions inquired about the relationship among the variables in the study as it pertained to health literacy and medication usage. The research questions used variables that determined the issues affecting the elderly Hispanic population with their medications (Creswell, 2013, p. 107). The research questions for this study determined the relationship between health literacy and medication usage among elderly Hispanics and the correlation between health literacy and medication identification among the elderly Hispanic patients.

Methodology

Population and Sample Size

The target population for this study was elderly Hispanics: men and women of Mexican and Puerto Rican descent, between the ages of 65-75, which represents a sample of the population that uses more prescription medication, that reside in the Cobb County and Atlanta, Georgia area and who have filled at least 1 prescription. The total population

in 2013 for Georgia was 9,992,167 (U.S. Census Bureau, 2014b) and in 2012 the Atlanta area population was 443,775 with 5.2% (2010) Hispanics and 9.8% (2010) for people 65 years of age and older (U.S. Census Bureau, 2014a). In 2012 the Cobb County area of Atlanta had a total population of 707,442 with 12.6% Hispanics and 9.7% for people 65 years of age and older (U.S. Census Bureau, 2014b). The sample target population size projected from the Raosoft sample size calculation software estimated 383 elderly Hispanic men and women who reside in Cobb County and the Atlanta, Georgia area (Raosoft, 2004). The calculations were determined by using the margin of error, which was 5%, the Confidence Interval of 95%, the response distribution of 50% and the population size of 68,622 which is the total population 707,442 multiplied by the 9.7% of the population of 65 years and older (Raosoft, 2004, Table 1). The actual amount of questionnaires collected was 161, with 156 questionnaires completed for this study.

The sampling procedure included participants filling out the S-TOHFLA, NAAL and the MMAS questionnaires to gather information on their health literacy level and medication usage problems (Emory University, 1995; Morisky, 2008; National Center for Educational Statistics, n.d.).

Sampling and Sampling Procedure

The sample strategy was a nonprobability sample design using a convenience sample. Due to this method, there was no way to estimate the number of representatives from the population (Frankfort-Nachmias & Nachmias, 2008, p. 168). The convenience sample was the easiest way to gather elderly men and women age 65 and older of

Mexican and Puerto Rican descent for the study. According to Laerd (2012) and the Latin American Association (2013) Hispanics do not socialize with people not in their immediate group, making it hard to gather information from them. Since this is a problem among elderly Hispanics, this sample strategy would work best to get as many questionnaires returned.

The procedure for collecting the samples included collecting online questionnaire information through Survey Monkey, for a subset of the elderly Hispanic population. The questionnaire includes three separate surveys. The questions were taken from the S-TOHFLA, MMAS, as well as the NAAL (Emory University, 1995; National Center for Educational Statistics, n.d.). The questionnaire included health literacy questions, used to determine literacy level and it had questions regarding medication usage. The sampling frame included only elderly Hispanics between the ages of 65 and 75. The inclusion for the sample included: (a) men and women over the age of 65 who take more than one medication, (b) participants who speak Spanish, (c) and can read in either English or Spanish. Exclusion criteria pertained to: (a) incapable of communicating verbally, (b) suffering from mental illness, (c) unwilling to complete study, (d) impaired vision, and (e) anyone younger than 65 (Wang et al., 2013).

The STOFHLA and MMAS were used and only portions of the NAAL was used for demographic information. The STOFHLA and MMAS questionnaires were purchased in both English and Spanish. The demographic information obtained from the NAAL had to be transcribed into Spanish (Emory University, 1995; National Center for Educational

Statistics, n.d.). I found no evidence that the NAAL was validated in Spanish; the translation website to translate the NAAL demographic questions were used (SDL, 2014). The MMAS was translated into foreign languages and validated by the MAPI Institute. This information was documented in the licensing agreement of the MMAS.

Raosoft Analysis Appropriate for Sample Size

The researcher manipulated various components to determine the sample size for the study. Using the four components pertaining to margin of error, confidence interval, response distribution, and population size estimated the sample size (Raosoft, 2004). The calculations were determined by using the margin of error which was 5%, the confidence interval of 95%, the response distribution of 50% and the population size of 68,622 which is the total population 707,442 multiplied by the 9.7% of the population of 65 years and older (Raosoft, 2004, Table 1). However, only 156 questionnaires were completed for the study. The researcher used the multiple regression model, frequency analysis, and Chi Square in determining the relationship between the dependent variable and independent variables. These methods allowed the test of the individual predictors within the model (Field, 2009).

Table 1: *Sample Size Calculations*

Calculation Questions	Calculation Amount
What margin of error can you accept?	5%
What confidence level do you need?	95%
What is the population size?	68,622
What is the response distribution?	50%
Total Population Size /	707,442
Age Percentage	7.9%
Total Population Size/Age Percentage	68,622
Recommended Sample Size	383
Actual Sample Size	156

Recruitment and Data Collection

Recruitment for this study sample was done through newspaper ads, flyers, and social media responses provided through Survey Monkey. Ads were placed in the Atlanta *Journal Constitution* and *Mundo Hispanico*. This reached a portion of the Hispanic population providing a website for them to take the questionnaire. The Survey Monkey website was posted on Facebook. The consent form was the first page participants saw when accessing the questionnaire online. It described the process for the study and they checked the Yes or No box for participation. The participants read the consent form and then checked the appropriate box in order to answer the questionnaire. The questionnaire did not advance to the next page until an option had been selected. The inform consent was in Spanish and English. Once the participant read the form they checked off that they consented to the study. The inform consent was online ensuring anonymity among the participants. The participants filled out the questionnaire in the privacy of their own home or in a secluded location. The risk to protect participant's welfare was minimized due to the questionnaires being on line eliminating the researcher to ask for personal information

of the participants. No results were shared with participants unless they indicated in the questionnaire that they would like a copy of the results by providing their email address in the last question of the questionnaire.

Exclusion criteria pertained to: (a) incapable of communicating verbally, (b) suffering from mental illness, (c) unwilling to complete study, (d) impaired vision, and (e) anyone younger than 65 (Wang et al., 2013). Participants should be able to communicate verbally and should be able to see the questionnaire. Anyone with mental illness may have problems comprehending the questionnaire and participants should complete the study without coercion. All participants were 65 or older to ensure an accurate sample count. A severe illness such as Alzheimer patients excludes the participants from the study. Alzheimer may have problems with comprehension and remembering their medication usage in even mild dementia patients (Baker et al., 2000). The questionnaire has question regarding age for ruling out this criterion. Also any questionnaires that had 50% missing data was excluded.

Medication adherence questions as well as cognitive questions from the S-TOHFLA and MMAS were answered by the participants through a questionnaire (Emory University, 1995). This study gathered variables from the questionnaire pertaining to demographic data such as age, gender Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy. Other variables gathered through the single subject questionnaire were: missed medication dosage, stopped taking medication due to feeling worse, stopped taking

medication when health issues are under control, forgot to take medication, forgot to take medication away from home, and took medication yesterday (Cordasco et al., 2009).

This study information determined the issues affecting the elderly Hispanic population regarding medication usage and medication identification. After the data was collected and analyzed, the information determined if a medication tool can assist the elderly Hispanic population who had problems with medication usage (Cordasco et al., 2009).

Research Questions

The research questions inquired about the relationship among the variables in the study as it pertains to health literacy and medication usage. The research questions gathered variables that determined the issues affecting the elderly Hispanic population with their medications (Creswell, 2013, p. 107). The research questions for this study are as follows:

RQ1: What is the relationship between health literacy and medication adherence among the elderly Hispanics?

H₀₁: Health literacy is not associated with medication adherence among elderly Hispanics.

H_{a1}: Health literacy is associated with medication adherence among elderly Hispanics.

RQ2: Is there a correlation between health literacy and medication identification among the elderly Hispanic patients?

H₀₂: There is no correlation between health literacy and medication identification among elderly Hispanic patients.

H₂: There is a correlation between health literacy and medication identification among elderly Hispanic patients.

RQ3: Which elderly Hispanic's demographic (age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy) indicators play a role in medication adherence?

H₃: No elderly Hispanic's demographic (age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy) indicators play a role in medication adherence.

H₃: Elderly Hispanic's demographic (age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy) indicators play a role in medication adherence.

Variables

The variables for this study pertained to health literacy and medication adherence. The dependent variable, medication adherence was measured using the information gathered from the questionnaire. The variable captured information on medication adherence as it relates to health literacy and medication usage. The independent variables are demographic data that include age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy. Other independent variables were: missed medication dosage, stopped taking medication due to feeling worse, stopped taking medication when health issues are under control, forgot to take medication, forgot to take medication away from home, and took

medication yesterday. The closed-ended questions were developed using questions from the Short-Test of Functional Health Literacy Assessment (S-TOFHLA) questionnaire, Morisky Medication Adherence Scale (MMAS) as well as the National Assessment of Adult Literacy (NAAL) (National Center for Educational Statistics, n.d.; Office of Information and Regulatory Affairs, 2006).

Dependent Variable

Medication Adherence. Medication adherence is the “Percentage of prescribed medication dosage taken by a patient during a specific time period” (Cohen et al., 2012, p. 470). The study asked six questions pertaining to medication. Each question was coded as “No” (coded 1) or “Yes” (coded 2). The questions “Do you ever forget to take your medicine” was categorized as “Take Medication”. The question “Are you careless at times about taking your medicine” was categorized as “Careless with Medication”. Question, “When you feel better do you sometimes stop taking your medicine” was categorized as “Feel better when stop taking medication”. Question “Sometimes if you feel worse when you take the medicine, do you stop taking it” was categorized as “Feel worse when stop taking medication”. The question “Do you know the long-term benefits of taking your medicine as told to you by your doctor or pharmacist” was categorized as “Long term benefits of medication”. Finally the question (Sometimes do you forget to refill your prescription medicine on time” was categorized as “Forget to refill medications.” This variable is dichotomous since the question will need a Yes or No answer for this category (Laerd Statistics, 2013).

Independent Variables

Age. The age of the subject will be provided by the age from each participant. Age will be coded individually for ages 65 through 75. This is an ordinal variable that is ordered in a sequence that can be ranked (Laerd Statistics, 2013).

Gender. The study asked for the sexual orientation of the participant whether they were male or female. In this study, gender was coded as either “Male” (coded 1) or “Female” (coded 2). This variable is considered dichotomous due to it only has two categories (Laerd Statistics, 2013).

Hispanic or Latino Origin. To determine the Hispanic or Latino origin of the participants, the question was coded as follows: “Puerto Rican” (coded 1), “Mexican” (coded 2) or “Other” (coded 3). This is an ordinal variable that is ordered in a sequence that can be ranked (Laerd Statistics, 2013).

Education level. The question “What is the highest level of education you completed” is how education level was determined. There were seven categories narrowed down to two categories: “Elementary” (coded 1) and “High School/College” (coded 2). This is an ordinal variable that is ordered in a sequence that can be ranked (Laerd Statistics, 2013).

Language. To determine the question “What language do you usually speak now”, the question was coded as follows: “English” (coded 1) or “Spanish” (coded 2). This variable is considered dichotomous for this study since the only language being identified pertains to Spanish or English categories (Laerd Statistics, 2013).

Language Materials. To determine the question “What language do you read the newspaper, book, letters, or magazine”, the question was coded as follows: “English” (coded 1) or “Spanish” (coded 2). This variable is considered dichotomous for this study since the only language being identified pertains to Spanish or English categories (Laerd Statistics, 2013).

Income means. The question “Do you receive any of the following during the past 12 months” concerns how the participants receive their monetary funds during the year. There were five categories: “Social Security” (coded 1); “SSI” (coded 2); “Other Retirement” (coded 3); “Work Full-Time” (coded 4); and “Work Part-Time” (coded 5). This is a nominal variable because it has two or more categories to determine the means of income level for the participants (Laerd Statistics, 2013).

Health insurance. To determine if the participants have health insurance, the question was coded as follows: “Yes” (coded 1) or “No” (coded 2). This variable is considered dichotomous since the question will need a Yes or No answer for this category (Laerd Statistics, 2013).

Income Level. The question “Approximate total personal income for the last 12 months” was how income level was determined. There will be six categories narrowed down to three categories: “Less than \$24,999” (coded 1); “\$25,000 to \$49,999” (coded 2); and “\$50,000 to \$99,999” (coded 3). This is a nominal variable because it has two or more categories to determine the income level (Laerd Statistics, 2013).

Health Literacy. Health literacy is the ability to obtain, process, and understand basic health information and services to assist in making health decisions (Freedman et al., 2009). The answers to the questions were coded as “Good” (coded 1) or “Poor” (coded 2). This is a continuous variable since there are four levels to choose from pertaining to each question (Laerd Statistics, 2013).

Instrumentation

The assessment tools that was used for this study pertained to Morisky Medication Adherence Scale (MMAS), Short-Test of Functional Health Literacy in Adults (S-TOFHLA), and National Assessment of Adult Literacy (NAAL). The three assessment tools were appropriate for this study because they provided the necessary skills and comprehension testing to determine the health literacy level of the elderly Hispanic participants. These tests were available in Spanish and English. Furthermore, the three tests were compiled to ensure the individual completes the three questionnaires.

MMAS. The Morisky Medication Adherence Scale (MMAS) is a generic assessment pertaining to medication behavior that is used in various health conditions. The MMAS was validated from a 4 item scale to capture barriers regarding adherence behavior. Additional items were included to generate an 8-item scale that has higher reliability of .87 in identifying patients at risk of medication adherence (Morisky et al., 2008).

TOFHLA. The Test of Functional Health Literacy in Adults (TOFHLA) was developed by Georgia State University with a grant from Emory University from the

Robert Wood Johnson Foundation in 1995 (Nurss et al., 2004). It was used to measure numeracy and reading comprehension for health literacy using health materials such as prescription labels and appointment slips. The test is used by physicians and researchers to determine patient reading and understanding of health care materials to assess health literacy (Nurss et al., 2004). In 1998 the S-TOFHLA was developed (Nurss et al., 2004). The S-TOFHLA has 36 reading comprehension questions divided into two passages. Each passage has every fifth or seventh word omitted and the participant can select the correct word from four options (Literacy S-TOFHLA, 2010). Reliability of the S-TOFHLA was calculated in a study to evaluate functional health literacy. Using the Cronbach's alpha measure of internal consistency adequate totals should be .84 for numeracy and .98 for reading comprehension. The study reported that changes regarding font and simplification of several words ensured reliability of .95 with numeracy estimate of .819 and comprehension estimate of (Rivero-Mendez, 2010). Content validity was measured using hospital medical texts for both comprehension and numeracy. The validity was tested using Spearman's correlation between TOFHLA, Wide Range Achievement Test-Revised (WRAT-R) and REALM. The test showed comprehension at $r=0.79$ and numeracy at $r=0.70$ for both the English and Spanish version are valid testing questionnaires. The validity was established by administering the test to 256 English patients and 249 Spanish patients from two public teaching hospitals. The S-TOFHLA was tested among the WRAT-R, and the REALM to show comparison of all three tests. The S-TOFHLA is a valid indicator showing patient's ability to read health related

materials. The test showed that 15% of patients could not read prescription labels and 37% did not understanding the medication instructions (Parker et al., 1995).

NAAL. The National Assessment of Adult Literacy (NAAL) was established in 1992 but provided tangible results in 2003 of the progress of adult health literacy. This was developed by the National Center for Education Statistics (NCES). This assessment is used nationally to determine English literacy among Americans over the age of 16 (National Center for Educational Statistics, n.d.). The assessment was used by researchers, physicians, policymakers and the general public. This assessment was validated by using a marginal maximum likelihood regression. The items were considered valid if the coefficient was consistent across all the models used in the questionnaire. Validation occurred in 2003 when 19,000 adults participated at the national and state level along with 1,200 inmates from federal and state prisons. The information gathered was used to establish the four literacy performance level that are being used today to provided estimates regarding the U.S. population and their health literacy skills (National Center for Educational Statistics, n.d.; White, 2006). Reliability was access using the Kuder-Richardson coefficient providing an acceptable level of 0.70 indicating this questionnaire is reliable to assess health literacy (Olson, Smyth, Wang & Pearson, 2011).

The NAAL assessment was available for research use online without prior permission (National Center for Educational Statistics, n.d.). Permission was acquired from Morisky's website pertaining to the MMAS. The application form was on the

website and permission had to be obtained for a license from Dr. Morisky prior to the use of the copyrighted MMAS-8 diagnostic adherence assessment instrument. The license application and agreement for use of MMAS™ Intellectual Property (v.10) was signed and emailed to Dr. Morisky. The S-TOFHLA is available for use in this study. The purchase of the S-TOFHLA confirms permission to use the data. The S-TOFHLA questionnaire both in English and in Spanish were acquired from Peppercorn Books and Press. They are the official carrier of the S-TOFHLA. The reliability for this study consists of participants filling out the questionnaire and guessing at the answers if they do not understand and the questions are not clear. The validity of this study will provide information on whether the participants do have problems when taking their medications. A copy of the invoice can be requested and a copy of the license agreement can be found in the appendix.

Data Analysis

The data analysis used the IBM Statistical Package for the Social Sciences (SPSS) statistical software version 17 that integrates the analytical process from data collection to analysis. This statistical package allowed for transforming data and recoding variables gathered from a sample of the population to estimate the characteristics, opinion and behaviors of the population (Frankfort-Nachmias & Nachmias, 2008, p. 457; IBM, n.d.). Using SPSS addressed the research questions and the possible different answers from the participants pertaining to medication adherence (dependent variable) and participant's evaluation of health literacy levels and demographic data (independent variables). The

questionnaire was reviewed for content with the participants. Each questionnaire after completed was checked for omission of information before entering it into the dataset. Any omissions were caused for excluding the participants from this study's dataset. Omissions consist of questions that were not answered and the questionnaire that had more than 50% missing information was not included in the dataset. The data from the questionnaires was entered into SPSS where it was calculated and analyzed using the multiple regression model, frequency analysis and Chi Square (Field, 2009, pp. 48-86).

The participants provided a numerical response for each question. Each numerical response was summed up in SPSS and coded to a variable. The dataset in SPSS tracked multiple similar occurrences or variables from the questionnaire. Similar variables values were counted and reported for that variable. Comparing the counts for each variable whether dependent or independent showed the correlation between the participants and their responses (Field, 2009, pp. 584-626). The responses provided statistical data to test the null hypothesis in all the groups and determine they were not significant (Field, 2009, p. 608). From the data provided various tables were generated. Table 2 showed the variables, the research question and item on survey as it pertained to each research question. Table 3 provided the statistical procedures per research question. Table 4 provided the power calculations for demographic statistics for key variables, Table 5 provided the demographic statistics for key variables; Table 6 provided the Chi Square Test for Medication Usage and Health Literacy Level and Table 7 provided the Medication Adherence Outcomes using Demographic Statistics.

Table 2.
Variables, Research Question, and Items on Survey

Variable Category and Name	Research Question	Item on Survey
Dependent Variables: Medication Adherence	Research Question 1: What is the relationship between health literacy and medication adherence among the elderly Hispanics?	Survey Questions: 13-34
Independent Variables: Health Literacy		
Dependent Variables: Medication Adherence	Research Question 2: Is there a correlation between health literacy and medication identification among elderly Hispanic patients?	Survey Questions: 13-34 MMAS survey questions: 36-41
Independent Variables: Health Literacy		
Dependent Variables: Medication Adherence	Research Question 3: Which elderly Hispanic's demographic indicators play a role in medication adherence?	Survey Questions: 2-12
Independent Variables: Age, gender, Hispanic origin, education level, Hispanic origin, language, language materials, income means, health insurance, income status and health literacy		

Table 3.
Statistical Procedures per Research Question.

Research Question	Hypothesis	Variables	Statistical Procedure
RQ1: What is the relationship between health literacy and medication adherence among the elderly Hispanics?	<i>Ho1</i> : Health literacy is not associated with medication adherence among elderly Hispanics. <i>Ha1</i> : Health literacy is associated with medication adherence among elderly Hispanics.	IV : Health Literacy DV : Medication Adherence	Pearson Chi Square
RQ2: Is there a correlation between health literacy and medication identification among elderly Hispanic patients?	<i>Ho2</i> : There is no correlation between health literacy and medication identification among elderly Hispanic patients. <i>Ha2</i> : There is a correlation between health literacy and medication identification among elderly Hispanic patients.	IV : Health Literacy DV : Medication Adherence	Pearson Chi Square
RQ3: Which elderly Hispanic's demographic indicators play a role in medication adherence?	<i>Ho3</i> : No elderly Hispanic's demographic (age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy) indicators play a role in medication adherence. <i>Ha3</i> : Elderly Hispanic's demographic (age, gender, Hispanic origin, education level, language, language materials, income means, health insurance, income level and health literacy) indicators play a role in medication adherence.	IV : Age, gender, Hispanic origin, education level, Hispanic origin, language, language materials, income means, health insurance, income status and health literacy Medication Adherence	Multiple regression

Table 4
Power Calculations for Demographics

Variables	Sample Size	Achieved Power
Gender	X	X
Hispanic	X	X
Income Means	X	X
Health Insurance	X	X
Amount of Medication	X	X
Income Level	X	X
Age	X	X
Education Level	X	X

Table 5
Demographic Statistics for Key Variables

Variables	No of Participants	Percentage
Age		
Gender		
Education Level		
Language		
Language Materials		
Income Means		
Health Insurance		
Income Status		
Health Literacy		

Table 6
Chi-Square Test for Medication Adherence and Health Literacy Level

	Value	Asymp. Sig. (2-sided)
Pearson Chi-Square	X	X

Table 7
Medication Adherence Outcomes using Demographic Statistics

Variables	Percentages
Gender	X
Age	X
Hispanic Origin	X
Education Level	X
Income Level	X
Income Means	X
Health Insurance	X
Health Literacy Level	X
Daily Medication Usage	X

Threats to Validity

The threats to validity relate to the relationship between the questionnaire and the measured outcomes pertaining to the answers from the participants. An empirical validity will measure the results of the questionnaire against the results from the previous Short-Test of Functional Health Literacy (S-TOFHL) questionnaire. Performing a correlation coefficient of the questionnaire shows the relationship between the variables. Through predictive validity assessing the results use external criterion which is the health literacy levels provided by various health literacy questionnaire such as S-TOFHL, Morisky Medication Adherence Scale (MMAS) and National Assessment of Adult Literacy (NAAL) to compare the results calculated from the elderly Hispanic questionnaires (Frankfort-Nachmias & Nachmias, 2008). The S-TOFHLA validity test showed reading

comprehension at $r=0.79$ and numeracy at $r=0.70$ for both the English and Spanish version indicating a valid testing questionnaires. Validity was established by administering the test to 256 English patients and 249 Spanish patients from two public teaching hospitals. The S-TOFHLA was tested among the Wide Range Achievement Test-Revised (WRAT-R), and the REALM to show comparison of all three tests. The S-TOFHLA is a valid indicator showing patient's ability to read health related materials. External validity is defined as the degree to which a program can be expected to reproduce the same effects of the study in other populations. When a program is tailored to a particular population, such as Hispanics, the threat for external validity is greater (McKenzie, 2009). Confirming external validity to ensure that this study is replicated with other participants in a similar study and in a different setting is important for any research. This was accomplished through the study being done through newspaper ads, flyers and social media (Facebook) where the Survey Monkey link will be specified. This study can be reproduced for usage in other studies comparing health literacy with other populations.

Ethical Procedures

Conducting research with human subjects is sensitive and can encounter ethical problems. Researching requires having good technical skills and weighing the potential benefits or contribution of the project against the cost to the participants (Frankfort-Nachmias & Nachmias, 2008, p. 72). Ensuring personal information for the elderly participants is kept confidential is a part of ethical accountability. It is a requirement to

protect participants with anonymity and confidentiality. It is the obligation of the researcher to protect the anonymity of the participants and keep the research data confidential from outside organizations (Frankfort-Nachmias & Nachmias, 2008, p. 78). The process to eliminate ethical issues pertained to the Walden IRB approval for the study #10-24-14-0283127 prior to providing the consent forms, receiving consent online from the subject with the informed consent form, and providing the questionnaire to the participants online. Each informed consent form was on the first page of the online questionnaire. Participation was voluntary and anonymous and participants were free to withdraw from the study at any time. The consent form and study materials were provided in English and Spanish for the participants to use the document appropriate for their specific language.

The consent form was written at a literacy level that the population can understand. Ethical concerns related to data collection are not an issue since no personal identification was provided and the data was stored on a secured laptop that was password protected. The collected data was coded replacing any personal identification making it impossible to trace. The participants were recruited through newspaper ads, flyers and social media (Facebook) and no names were exchanged when they participated. The S-TOFHLA questionnaires were available in both English and Spanish and was available through survey monkey (Nurss et al., 2004). The informed consent form was provided online before the questionnaire for participants and they checked Yes or No on the form if they agree to participate. Once the consent form was checked the

participants scrolled down to the questionnaire. The questionnaire did not advance to the next page until an option had been selected. The consent form and the questionnaire was located on the same Survey Monkey site. The questionnaire was kept secure online through survey monkey. No one other than the researcher had access to the questionnaire or the data once uploaded to SPSS in the secured laptop. The data gathered from survey monkey was downloaded from survey monkey and kept in a secured location on the secured laptop. The consent forms and questionnaire will be destroyed 5 years from completion. No results were shared with participants unless they indicated in the questionnaire that they would like a copy of the results by providing their email address in the last question of the questionnaire. There were no financial incentives or conflict of interest regarding this study. It is strictly to obtain information on health literacy and medication usage among the elderly Hispanic population.

Summary

The methodology provided in chapter 3 was used for this study. The research design for this study was a non-experimental using a cross-sectional quantitative survey design to gather information regarding health literacy among the elderly Hispanic and medication usage. Quantitative research using multiple regression, frequency analysis, and Chi Square tested the variables and provided numerical descriptions of the trends, behaviors, and attitudes of the study population. The target population were elderly Hispanic men and women of Mexican and Puerto Rican descent between the ages of 65 and 75 living in Cobb County and Atlanta, Georgia. Recruitment for this study sample

was gathered from newspaper ads, flyers and social media (Facebook) responses provided online through Survey Monkey. Ads were placed in the *Atlanta Journal Constitution* and *Mundo Hispanico*. This reached a portion of the Spanish population providing a website for them to take the questionnaire. Survey monkey website was posted in the newspaper ads, the flyer and social media (Facebook). The consent forms was the first page the participants saw when accessing the questionnaire online. It described the process for the study and signatures were needed for participation. The inform consent was in Spanish and English. Once the participant read the form they checked off that they consented to the study. This ensured anonymity among the participants. The Raosoft software determined that 383 participants were needed for this study and 156 questionnaires were completed. Data collection provided health literacy and medication adherence information to determine the challenges if any affecting the elderly population. The questionnaire used cognitive questions as well as medication adherence questions from S-TOHFLA, MMAS and NAAL. The dependent variable pertained to medication adherence and independent variables gathered from the questionnaire pertained to demographic data such as age, gender, Hispanic origin, education level, Hispanic origin, language, language materials, income means, health insurance, income status and health literacy. Obtaining this information determined the issues affecting the elderly Hispanic participants in regards to health literacy and medication usage. The questionnaire was developed by using the three instruments already established S-TOFHLA, MMAS and NAAL. These survey instruments provided

the essential information used in the questionnaire for determining the cognitive functions regarding health literacy and medication adherence. The validity of the previous survey was established through previous studies that had identified reading and comprehension issues among the population that contributes to health literacy. External validity could be a problem if it cannot be reproduced for other populations. The SPSS statistical package was used to upload data and record the variables from the questionnaires. This was important in detecting which hypothesis had been answered in the study. The ethical concerns related to data collection and personal identification are not an issue due to no personal identifiers being used on the informed consent form or questionnaire and the data collected was kept in the survey monkey database and then in a secured password protected laptop. The participants had the option to withdraw from the study at any point in the process. There were no financial incentives or personal interest regarding this study. Information on the results from the study, the time frame associated with data collection and the results from the statistical analysis performed in this study were provided in Chapter 4.

Chapter 4: Results

Introduction

The previous chapters provided information on the research problem, the study's significance, methods, recruitment procedures, statistical analysis, and sample size determination used to collect and analyze the data. The three research questions analyzed from the data gathered from the questionnaires were presented in Chapter 4. In this chapter, I will describe the target population, data collection process, the characteristics of the samples, and the results of the data analysis.

Target Population

The target population for the study is related to elderly Hispanic men and women of Mexican and Puerto Rican decent, between the ages of 65-75 who resided in Cobb County and the Atlanta, Georgia area and took prescription medications.

Data Collection

Data collection started on October 25, 2014. As of October 4, 2015 only 156 questionnaires were completed. Five respondents declined to participate in the study. The number of valid questionnaires collected was 161, for an overall rate of 96.9% (156/161). The questionnaire was developed in Survey Monkey and contained 42 questions. The questions were taken from the health literacy assessment test, the Short Test of Functional Health Literacy in Adult (S-TOFHLA), the Morisky Medication Adherence Scale (MMAS) and portions of the National Assessment for Adult Literacy (NAAL) (Emory University, 1995; National Center for Educational Statistics, n.d.). Both the S-

TOFHLA and MMAS were available with both English and Spanish questions. The questionnaires in Survey Monkey were developed in both English and Spanish. There were 153 questionnaires completed in Spanish and only eight in English. The informed consent form was the first page of the questionnaire and the respondents had to consent to take the survey by either checking off “Yes” or “No”. Recruitment for completion of the survey was done by posting the Survey Monkey link via an advertisement in the *Atlanta Journal Constitution* and *Mundo Hispanico* newspapers. A flier was also distributed at various locations such as the supermarkets, senior citizen centers around Cobb County and Atlanta, Georgia and social media such as Facebook. The data collection plan was to have respondents fill out the questionnaire online from the various advertisements. Each participant consented to filling out the questionnaire and once completed it was stored in the Survey Monkey website. In addition to the use of the newspaper, flyer and social media outlet the data were gathered by approaching persons outside at various locations in public spaces to have them complete the questionnaire on the Survey Monkey website. The locations were the right of way at clinics in Chamblee and Smyrna, Georgia. Another location was the flea markets in Kennesaw and Lithia Springs, Georgia which are located either in Atlanta or Cobb County, Georgia. No personal information other than basic demographic data was gathered from the participants when they were asked to complete the questionnaire.

The data were analyzed using the IBM Statistical Package for the Social Sciences (SPSS) statistical software version 17. The data collected were exported into Excel from

Survey Monkey and entered into SPSS. Any questions that had omissions were not entered into SPSS.

Characteristics of the Analysis

The researcher collected a total of 156 valid surveys. The G*Power software was used for confirming the statistical power of the obtained sample size (Faul, Erdfelder, Lang, & Buchner, 2007; Faul, Erdfelder, Buchner, & Lang, 2009; G*Power, 2013). A post hoc x2 contingency table was created using SPSS. The analysis from the post hoc table provided the expected value percentages to use in the power calculation. The percentages were entered into G*Power using the total sample size, the error of probability and the degree of freedom. The expected value percentages provided the effect size which provided the power for the sample size. The power sample size determined if the sample size was sufficient for the study. The analysis established that the power was good with the majority above the 80% range (Table 4).

Table 4
Power Calculations for Demographic Statistics for Key Variables

Variable	Sample Size	Achieved Power (1- β err prob)
Gender (IV) vs Medication Adherence (ID)	156	0.997425
Hispanic (IV) vs Medication Adherence (ID)	156	0.657731
Income Means (IV) vs Medication Adherence (ID)	154	0.999983
Health Insurance (IV) vs Medication Adherence (ID)	155	0.932803
Amount of Medication (IV) vs Medication Adherence (ID)	154	0.845360
Income Level (IV) vs Medication Adherence (ID)	156	0.936417
Age (IV) vs Medication Adherence (ID)	156	0.768428
Education Level (IV) vs Medication Adherence (ID)	156	0.584471

Table 4 shows the achieved power for each independent variable; gender (0.997425), Hispanic origin (0.657731), income means (0.999983), health insurance

(0.932803), amount of medication (0.845360), income level (0.936417), age (0.768428), and education level (0.584471) while the dependent variable was medication adherence. Most of the independent variables were over 0.80 with only three variables having powers lower (Hispanic origin, age, and education level) (Table 4). While greater than 50%, this indicates some limitations on extrapolating the finding regarding these three independent variables.

The demographic variables analysis was performed on the following demographic characteristics: gender, age, origin, education level, income level, income means, health insurance, language spoken at home, and amount of medications, reading language, health literacy level and medication adherence (Table 5). The majority of the questionnaire participants were female (75.0%) and most of the participants were among 67-68 years of age (32.1%). The primary origin of the participants were Mexican (62.2%) and most of the participants had a high school and/or college education (52.6%) (Table 5).

The majority of the participants (46.2%) earned an income between \$25,000 and \$49,999 and worked full-time (41.0%). Regarding health insurance (55.8%) did not have insurance. The majority of participants indicated the language spoken at home was Spanish (94.9%) and the reading language was Spanish (95.5%) (Table 5).

Overall, the health literacy level shows that 91.0% answered the questions correctly and 9.0% answered the questions incorrectly (Table 5). Overall, the medication

taken for the respondents showed that 95.5% took 2 or more medications daily. Two respondents did not answer this question in the questionnaire (Table 5).

Among the 156 participants that answered the questionnaire, the medication adherence showed that 80.8% of respondents answered the questions correctly (Table 5).

Table 5

Demographic Statistics for Key Variables

Variable	Elderly Hispanic N -134	Percentage (%)
Gender		
Male	39	25.0
Female	117	75.0
Age		
65-66	42	26.9
67-68	50	32.1
69-70	27	17.3
71-72	15	9.6
73-76	221	14.1
Hispanic Origin		
Puerto Rican	51	32.7
Mexican	97	62.2
Other	8	5.1
Education Level		
Elementary School	74	47.4
High School / College	82	52.6
Income Level		
Less than 24,999	50	32.1
25,000-49,999	72	46.2
50,000-99,999	34	21.8
Income Means		
Social Security	11	7.1
SSI	7	4.5
Other Retirement	43	27.6
Work Full-Time	64	41.0
Work Part-Time	29	18.6
Missing	2	1.3
Health Insurance		
Yes	68	43.6
No	87	55.8
Missing	1	0.6
Language Spoken in Home		
English	7	4.5
Spanish	148	94.9
Missing	1	0.6
Reading Language		
English	6	3.8
Spanish	149	95.5
Missing	1	0.6
Health Literacy Level		
Correct	142	91.0
Incorrect	14	9.0
Daily Medication Usage		

1 Type	5	3.2
2 or more Types	149	95.5
Missing	2	1.3
Medication Adherence		
Yes	30	19.2
No	126	80.8

Results

I answered the research questions by means of frequency analysis, regression analysis and Chi Square. Laureate Education, Inc. (2009c) provided information on using various statistical programs to use for analyzing data. Using the Chi Square test showed if values were related to and/or dependent on one another (Laureate Education, Inc., 2009c). The missing values range from 1 to 8 which is 1% of the total missing value but they vary per different questions in the questionnaire. The health literacy questions numbered 12-33 were combined into two categories, (a) health literacy questions right and (b) health literacy questions wrong. The results established that 14 (9.0%) participants had problems answering the health literacy questions (Table 5)

Regarding the medication adherence questions, the results established that 80.8% of the participants answered the medication adherence questions correctly and 19.2% of the participants answered the medications adherence questions incorrectly (Table 5). While analyzing the data from each variables, 11 demographic variables had missing data and of those 5 variables had either one or two missing answers (language spoken in participants home had one missing; income means had two missing; health insurance had one missing; amount of medication had two missing; and reading language had one missing. The participants did not answer those questions.

The researcher used Chi Square to show the association between health literacy level and medication adherence. The results for RQ1: What is the relationship between health literacy and medication adherence among the elderly Hispanics? The Chi Square test showed a p Value = 0.019, therefore the null hypothesis was rejected in lieu of the alternative hypothesis (Table 6). This indicates there is a significant association between medication adherence and health literacy (Tables 6 & 7). Participants who had good health literacy (83.1%) had no problems with medication adherence versus the participants who had good health literacy but had problems with medication adherence (16.9%). The review of other results showed that health literacy participants with poor health literacy (57.1%) also had problem with medication adherence (42.9%). According to Peterson-Iyer (2008) Hispanics primarily speak Spanish at home but have problems when visiting a physician or receiving information for medication usage due to the complicated medical terminology and the rapid communication regarding medication instruction.

Table 6

Chi-Square Test for Medication Adherence and Health Literacy Level

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.527	1	0.019		
Continuity Correction	3.983	1	0.046		
Likelihood Ratio	4.592	1	0.032		
Fisher's Exact Test				0.030	0.030
Linear-by-Linear Association	5.492	1	0.019		
N of Valid Cases	156				

Table 7

Medication Adherence Total and Health Literacy Total Crosstabulation

	Health Literacy Total		Total*
	Good	Poor	
Medication Adherence†– No	83.1%	57.1%	80.8%
Medication Adherence†– Yes	16.9%	42.9%	19.2%
Total	100%	100%	100%

* $p < 0.05$

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Identifying medication was not directly captured in the questionnaire but from the data gathered regarding taking medications, the results showed that 80.8% of the respondents did not have any problems taking their medication. 19.2% stated they had problems with medications. The Chi Square was used to show the correlation between health literacy level and medication identification. The results taken from the medication adherence were used as a proxy for the RQ2: Is there a correlation between health literacy and medication identification among the elderly Hispanic patients? Therefore the

same results were used for RQ1 and RQ2. The Chi Square test showed a p Value = 0.019, therefore the null hypothesis was rejected in lieu of the alternative hypothesis (Table 7).

Regarding testing the hypothesis for the RQ3: Which elderly Hispanic's demographic (age, gender, Hispanic origin, education level, language spoken at home, reading language, income means, health insurance, income level, health literacy) indicators play a role in medication adherence? A Logistic Regression analysis was performed to determine the association between the demographic data and medication adherence. The statistical analysis used Medication Adherence total data as the dependent variable and the demographic data as the independent variable to predict the effects of each variable. The assumptions for multiple logistic regression consist of dependent variable, more than one continuous independent variable, multicollinearity, linear relationship between any continuous independent variables, and no outliers (Field, 2009). The statistical assumptions for multiple logistic regression are met. The dependent variable was Medication adherence and the independent variables were health literacy, age, gender, and Hispanic origin, and health insurance, amount of medication, income level, and education level. The multicollinearity result showed the analyzing the predictors for the demographic data. The first assumption pertained to the dependent variable which is a dichotomous variable for Medication Adherence since it has two categories. The second assumption pertained to one or more independent variables which were continuous because the variable for example age measured years and income measured U.S. dollars. The Goodness-of-fit test provided a $p = .166$ indicating the model

fits the data well. The coefficient model test showed the model statistically predicts the dependent variable. Multicollinearity showed one for all the variables in the study (Field, 2009).

Table 8 shows the amount of participants that answered “yes” in the questionnaire that had problems with medication adherence and it provides the adjusted odds ratio (aOR) to identify if data was significant to answer research question to determine if the indicators play a role in medication adherence.

The data showed the following demographics have a higher risk of non-medication adherence; men (30,8%), age 65-66 (23.88%), Mexican (21.6%), elementary school (23.0%), income level 25,000 to 49,999 (25.0%), income means working part-time (34.5%), no health insurance (24.1%), speaking Spanish at home (57.1%), reading language in English (50.0%), incorrect health literacy level (42.9%) and daily medication usage of one type (40.0%) (Table 8).

Table 8

*Medication Adherence Outcomes using Demographic Statistics**

Variable	Non-Medication Adherence	Unadjusted OR(95% CI)	Adjusted OR (95% CI)
Gender			
Male	12 (30.8%)		
Female	18 (15.4%)	2.44 (1.05-5.69)	1.93 (0.69-5.38)
Age			
65-66	10 (23.8%)		
67-68	9 (18.0%)	1.06 (0.31-3.61)	0.56 (0.11-2.92)
69-70	3 (11.1%)	0.75 (0.22-2.56)	0.25 (0.04-1.57)
71-72	3 (20.0%)	0.43 (0.09-2.02)	0.16 (0.02-1.17)
>72	5 (22.7%)	0.85 (0.17-4.26)	0.31 (0.04-2.32)
Hispanic Origin			
Puerto Rican	7 (13.7%)		
Mexican	21 (21.6%)	0.48 (0.08-2.85)	0.68 (0.07-6.65)
Other	2 (25.0%)	0.83 (0.16-4.41)	1.14 (0.09-13.76)
Education Level			
Elementary School	17 (23.0%)		
High School / College	13 (15.9%)	1.58 (0.71-3.53)	1.47 (0.43-4.95)
Income Level			
Less than 24,999	7 (14.0%)		
25,000-49,999	18 (25.0%)	0.94 (0.27-3.26)	0.41 (0.07-2.54)
50,000-99,999	5 (14.7%)	1.93 (0.65-5.74)	0.83 (0.19-3.65)
Income Means			
Social Security	2 (18.2%)		
SSI	1 (14.3%)	0.42 (0.08-2.34)	0.39 (0.04-4.18)
Other Retirement	4 (9.3%)	0.32 (0.03-3.01)	0.25 (0.01-5.41)
Work Full-Time	13 (20.3%)	0.20 (0.05-0.70)	0.15 (0.03-0.84)
Work Part-Time	10 (34.5%)	0.48 (0.18-1.29)	0.34 (0.10-1.19)
Health Insurance			
Yes	9 (13.2%)		
No	21 (24.1%)	0.48 (0.20-1.13)	0.51 (0.10-2.57)
Health Literacy Level			
Correct	24 (16.9%)		
Incorrect	6 (42.9%)	0.27 (0.09-.85)	0.27 (0.07-1.07)
Daily Medication Usage			
1 Type	2 (40.0%)		
2 or more Types	28 (18.8%)	2.88 (0.46-18.06)	3.02 (0.31-29.71)

*Permission to use of the MMAS scales is required. Reproduction and distribution of the MMAS is protected by US copyright laws. A license agreement to use the scale is available from: Donald E. Morisky, ScD, ScM, MSPH, Professor, 294 Lindura Court, Las Vegas, NV 89135-1415.

Table 8 presents the ratios for the indicators that gathered from the statistical data. Regarding the adjusted analysis for odds ratio (aOR) the data showed there were no significant statistical results besides the variable Working Full-Time. The results for Working Full-Time showed reduced odds for medication adherence (aOR=0.15, 95% CI: 0.03-0.84) compared to other Income Means. Peterson-Iyer (2008) stated Hispanics lack health insurance, have irregular access to health care and live in poverty. For those reasons working full-time does not necessarily mean elderly Hispanics have health insurance. The remainder of the variables in the model were not significant to other groups in Income Means such as social security, supplemental security income (SSI), other retirement and working part-time. The null hypothesis was rejected for RQ#3 in lieu of the alternative hypothesis. This indicates there is a significant association between the demographic variable work full-time and medication adherence which was the only variable that showed an odds ratio of (aOR=0.15, 95% CI: 0.03-0.84) (Table 8).

Evidence of Quality

The study followed the procedure to assure accuracy of the data. The data was answered directly by the participants by using the questionnaire. A minimal amount of questionnaires were done on paper and those were entered into the questionnaire. Once entered into the questionnaire the data was checked for accuracy by checking the entries and comparing them to the paper entries. All the participants' entries were double checked when computing the data for logistic regression, Chi Square and frequency analysis.

Regarding the minimal amount received for the sample size, the study was the driver of the sample size. As long as the hypothesis can be proven, a smaller sample size was appropriate for the study. The nature of the topic and the participants needed in the study have affected the sample size for the study. The requirements of the proposal determine the sample size but the actual sample size was not determine until the study was started. The stigma of the topic and the restriction on gathering data on only Hispanic elderly participants has become counterproductive meaning finding more participants would not necessarily change the outcome of the data. Working with a quota of the sample size does not necessarily indicate richer data (Mason, 2010). Here, 156 participants have provided data and the data showed that there is an association between health literacy and medication usage and the power calculation (Table 5) was sufficient to suggest further data collection would not likely change this finding but rather strengthen the results found..

Summary

The results indicated an association between health literacy and medication adherence. The questionnaire was answered by 161 but five questionnaires were not used due to two not providing consent and three did not answer any questions on the questionnaire resulting in a total of 156 questionnaires that could be used for the study. Chi Square was used to analyze the data for Research Question 1: What is the relationship between health literacy and medication adherence among the elderly Hispanics? Chi Square test showed a p Value less than .05 ($p=0.019$) therefore the null

hypothesis was rejected in lieu of the alternative hypothesis (Table 6 & 7). Participants who had good health literacy had no problems with medication adherence versus the participants who had good health literacy but had problems with medication adherence. The review of other results showed that health literacy participants with poor health literacy also had problem with medication adherence. Elderly Hispanics primarily speak Spanish at home but have problems when visiting a physician or receiving information for medication usage due to the complicated medical terminology and the rapid communication regarding medication instruction

The results taken from the medication adherence was used as a proxy for Research Question 2. Therefore the same results were used for RQ1 and RQ2 (Table 7). Research Question 2: Is there a correlation between health literacy and medication identification among the elderly Hispanic patients? The Chi Square was used to show the correlation between health literacy level and medication identification. The Chi Square test showed a *p* Value less than .05 ($p= 0.019$, therefore the null hypothesis was rejected in lieu of the alternative hypothesis.

Regarding Research Question 3, Table 8 presents the ratios for the indicators that played a role in medication adherence. Regarding the adjusted analysis for odds ratio (aOR) the data showed the only variable Working Full-Time had low risk to medication adherence. The results for Working Full-Time showed reduced odds for medication adherence (aOR=0.15, 95% CI: 0.03-0.84) compared to other Income Means. This may be due to poverty, lack of health insurance, and irregular access to health care (Peterson-

Iyer, 2008). The remainder of the variables in the model were not significant to other groups in Income Means such as social security, supplemental security income (SSI), other retirement and work part-time. The null hypothesis was rejected for RQ#3 in lieu of the alternative hypothesis. This indicates there is a significant association between the demographic variable working full-time and medication adherence which was the only variable that showed an odds ratio of (aOR=0.15, 95% CI: 0.03-0.84) (Table 8). Information on the summary, conclusion, and recommendations for this study will be provided in Chapter 5.

Chapter 5: Summary, Conclusion, and Recommendations

Introduction

The researcher used a cross-sectional design to determine if any medication adherence problems existed among elderly Hispanic participants due to health literacy issues. The target population for the study was elderly Hispanic men and women of Mexican and Puerto Rican decent, between the ages of 65-75 who resided in the Cobb County and Atlanta, Georgia area.

The results for this study showed there was a significant association between medication adherence and health literacy level among elderly Hispanics between the ages of 65-75. The interpretation of the findings, limitations of the study, recommendations for action and for further study and the implications for social change will be provided in this chapter.

Interpretation of Findings

The majority of the participants in this study were between the ages of 65-68 (59.0%), were female (75.0%) and were of Mexican decent (62.2%). The education level showed more of the population attended high school and/or college (52.6%), the income level earned was \$25,000-\$49,999 per year (46.2%), and worked full-time (41.0%). Regarding health insurance the findings showed that more than half (55.8%) of the participants lacked health insurance. The findings showed the majority of the participants spoke Spanish at home (94.9%), the reading language was mainly Spanish (95.5%), and participants who answered the health literacy questions correctly (91.0%), took two or

more medications (95.5%), and did not have a problem understanding the medication adherence questions (80.8%).

This study showed a significant association between medication adherence and health literacy level among the elderly Hispanics between the ages of 65-75. Participants who had good health literacy (83.1%) had no problems with medication adherence versus the participants who had good health literacy but had problems with medication adherence (16.9%). The review of other results showed that health literacy participants with poor health literacy (57.1%) also had problem with medication adherence (42.9%). The major finding pertaining to medication adherence and the demographic variables showed full-time work is less likely to be associated with medication adherence (aOR=0.15, 95% CI: 0.03-0.84).

Peterson-Iyer (2008) stated Latinos may use nonclinical areas of healthcare such as folk medicine rather than traditional medicine for their healthcare needs. Elderly Hispanics lack health insurance whereas folk medicine is available to everyone. The Hispanic culture can cause a strain on clinical healthcare because they believe in showing respect to authority usually the healthcare provider and that is a reason for not asking questions even though the elderly Hispanic may have issues with understanding their medication usage (Peterson-Iyer, 2008). Overall poor health literacy level contributes to concerns with medication adherence.

The results showed there was a significant association between medication adherence and health literacy level for RQ1 and RQ2 due to the participants having

problems with both variables. Based on the iterations, work full-time was a significant predictor for medication adherence for RQ3 indicating the participants who worked full-time had problems with medication adherence. According to the results, RQ1 and RQ2 hypothesis was rejected indicating there is a significant association between health literacy and medication adherence. Working full-time was the only significant predictor for medication adherence. The article from Zuñiga (2012) indicated Mexican migrant workers have financial hardship decreasing the likelihood of them meeting their medication requirement resulting in increased nonadherence to medication. Since the questionnaire did not ask their type of employment it is hard to determine how they earn their income when working full-time and if their employment offered health insurance.

Discussion of Findings

The study showed that elderly Hispanics who worked full-time were less likely to experience medication adherence compared to others. The full-time working population is likely to experience medication adherence problems due to poverty, lack of health insurance, or lack of access to physicians (Peterson-Iyer, 2008). Per Peterson-Iyer, the poverty rate for Latinos for 2006 was 20.8% compared to 12.3% for U.S. population and 32.7% of U.S. Latinos lacked health insurance in 2006. Also, Latinos feel less listened to and understood by their doctor because Latinos are underrepresented in the healthcare industry (Peterson-Iyer, 2008). Participants with poverty issues do not have the extra funds for medication, those who lack health insurance, cannot afford a physician visit and

those with irregular access to health care indicated they do not have a regular physician or the means to see a regular physician. Physicians, social workers, or community center volunteers may assist the Latino population locate information on financial assistance programs to assist the individuals with economic constraints (Brown & Bussell, 2011). Some elderly patients provided the excuse that the medication was too expensive especially if they are taking more than one medication daily (Gottlieb, 2000). The other group of participants who indicated they had Social Security and Social Security Income (SSI) have medical insurance in their plans.

Limitation of the Study

The limitations of the study were sample size, data collection methods, and location. The expected number of questionnaires needed was 383, but only 161 questionnaires were provided with only 156 actually completed. The number of valid questionnaires collected were 161 for an overall rate of 96.9% (156/161). Of the 161 questionnaires, 153 were completed in Spanish and eight in English. Data collection methods consisted of newspapers, social media, and fliers. This method did not provide a significant amount of completed questionnaires. This may be due to the amount of participants who either do not subscribe to the newspapers, participate in social media, or did not receive a flier. A way to address this issue would be to gather participants from physicians' offices. Also, based on data collection no sufficient information was gathered on medication identification where a proxy was used for RQ2. Inadvertently the questions used for the survey did not ask any information on medication identification.

Incorporating medication identification questions in the study would eliminate this problem in future studies.

Hispanic origin was the biggest obstacle to getting participants. Many people in the Hispanic culture do not trust people who are not in their immediate social circle, making it difficult to get participants to complete the questionnaires. Involving physicians in order for the participant to feel comfortable providing information may address this problem.

Various locations were visited to obtain participants and the locations were exhausted after numerous visits making it difficult to obtain completed questionnaires. Working with a physician can alleviate this problem of recruiting participants. By narrowing down the study most of the participants were Mexican which could produce a case bias. Further studies can be done with other racial groups to avoid population bias for other future studies. Finally, a limitation to the study involves self-reporting which may indicate the patients may not provide correct information during the study or whether they were truthful with their answers.

Recommendations for Action

Medication adherence improvement for health care issues for the elderly Hispanics consist of providing literate level medication directions in order for participants to understand how to take their medications. Davis (2006a) stated since patients may misunderstand label instructions, physicians and pharmacists should make an effort to provide the medication labeling instructions in a language the participant can

understand. Regarding medication adherence participants could have problems interpreting dosage instructions as well and providing accurate dosage information which is key to ensuring medication adherence (Davis, 2006a).

The participants in this survey did not have a problem with health literacy due to using the native/spoken Spanish language. This study indicated there was an association between health literacy and medication adherence. Health literacy level is less likely to affect medication adherence. Based on the study, Spanish reading materials can be used at health departments, physicians' offices, and pharmacists' locations to assist elderly Hispanic patients in their health care. Recommendations can be implemented by public health agencies and health centers to enhance the medication adherence among the elderly by providing avenues where the elderly can call to ask questions and/or by developing visual aids to assist with medication adherence. These results should be disseminated to health care professionals to provide them with alternatives for reaching their patients. Disseminating the results through publications is the best effective way to reach the health care professionals.

Recommendations for Further Study

The recommendations for further study include surveying different generational ages to capture more information from the participants. A larger age group would provide more participants for the study. Including other Hispanic ethnicities in the study would provide a broader range for more information. The questionnaire can be expanded to ask participants more questions regarding medication identification and any problems with

medication dosage. Further research can determine if there is a difference in Hispanic literacy and medication adherence from the different age groups and other ethnic cultures.

Implications for Social Change

The implications for this study consisted of identifying any problems among the participants with medication usage and health literacy. The findings showed a correlation between health literacy and medication adherence among the participant's responses. Communities and public health agencies should provide Spanish speaking hotlines for questions, medication pamphlets in Spanish, community meetings in Spanish to educate the elderly generation living in the community. Social change in the community will assist public health agencies in implementing changes through pharmacist and community outreach efforts and to handle the social stigma for increasing medication adherence and health literacy awareness. The community can change how they associate with elderly Hispanics by providing care, knowledge, and assistance with medication adherence and health literacy through communication efforts such as hotlines and materials providing information on medication adherence. Educating the study population on medication usage through alternative methods can assist the population and the community in avoiding further illness, reduce hospital visits, improve health and reduce the cost of health care expenditures.

Summary

Health literacy is an important aspect in health care. Ensuring the problems facing elderly Hispanics today such as cognitive, vision and recognition problems are taken care of as it pertains to health literacy and medication usage are vital to health care. This study showed the target population being Mexican and Puerto Rican elderly Hispanics, ages 65-75 who lived in the Cobb County, Atlanta, Georgia area. The findings showed the majority of the participants were 65-68 years old, female, and of Mexican descent. The participants attended high school and/or college, earned an income level of \$25,000-\$49,000, worked full-time and had no health insurance. The participants answered the health literacy question in Spanish correctly, took two or more medications, and in most cases did not have a problem with taking medications. The finding for this study showed a significant association between medication adherence and health literacy level among the elderly Hispanics between the ages of 65-75. Participants who had good health literacy had no problems with medication adherence versus the participants who had good health literacy but had problems with medication adherence. The review of other results showed that health literacy participants with poor health literacy also had problem with medication adherence. Elderly Hispanics primarily speak Spanish at home but have problems when visiting a physician or receiving information for medication usage due to the complicated medical terminology and the rapid communication regarding medication instruction (Peterson-Iyer, 2008). Overall poor health literacy level contributes to concerns with medication adherence.

In addition, the study showed the elderly Hispanics who worked full-time are less likely to experience medication adherence compared to other income means. This population (work full-time) are likely to experience medication adherence problems due to poverty, lack of health insurance or lack of access to physicians. Participants with poverty issues do not have the extra funds for medication, those who lack of health insurance, cannot afford a physician visit and those with irregular access to health care indicates they do not have a regular physician or the means to see a regular physician.

The results showed there was a significant association between medication adherence and health literacy level for RQ1 and RQ2 due to the participants having problems with both variables. Based on the iterations work full-time was a significant predictor for medication adherence for RQ3 indicating the participants that worked full-time had problems with medication adherence. They hypothesis for RQ1 and RQ2 was rejected indicating there was a significant association between health literacy and medication adherence. Work full-time was the only significant predictor for medication adherence.

The limitations of the study pertained to the completed number of questionnaires, lack of data collection methods, lack of data on medication identification, and Hispanic culture. The expected number of questionnaires needed were 383, but only 161 questionnaires were provided with only 156 actually completed with an overall rate of 96.9% (156/161). Of the 161 questionnaires, 153 were completed in Spanish and eight in English. Data collection methods consisted of newspapers, social media, and fliers. This

method did not provide a significant amount of completed questionnaires. This may be due to the amount of participants who either do not subscribe to the newspapers, participate in social media or did not receive a flier. Addressing this issue would be to gather participants from physicians' offices. There was no data collection on medication identification where a proxy was used for RQ2. Inadvertently the questions used for the survey did not ask any information on medication identification therefore incorporating medication identification questions in the study would eliminate this problem in future studies. Hispanic culture indicates the population does not trust people that are not in their circle making it difficult to get participants therefore involving physicians can address this issue. Working with a physician can alleviate the problem of gather participants. Involving other ethnic groups can address the issue of the majority of participants being Mexican. Finally, a limitation to the study involves self-reporting which may indicate the patients may not provide correct information during the study or whether they were truthful with their answers.

The recommendation for action included using Spanish reading materials and/or hotlines at health departments, health care centers, pharmacists to enhance medication adherence among the elderly Hispanics through avenues for the elderly not to be afraid to ask questions. Recommendations for further study showed a larger age group would be conducive to providing more data. Also not restricting the Hispanic origin to Mexican and Puerto Ricans can detect more elderly Hispanics with health literacy or medication adherence problems.

Implication for social change can be provided through community incentives to educate the study population on medication usage in the community. The community can assist public health agencies in implementing changes through pharmacist and community outreach efforts for controlling social stigma as it relates to medication adherence and health literacy awareness.

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