2015

The Effectiveness of Educational Methods on Medication Adherence

Prema David
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral dissertation by

Prema David

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Chester Jones, Committee Chairperson, Health Services Faculty
Dr. Ji Shen, Committee Member, Health Services Faculty
Dr. Roland Thorpe, University Reviewer, Health Services Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2015

Abstract

The Effectiveness of Educational Methods on Medication Adherence in African Americans

by

Prema David

APN, North Park University, Chicago, 1998

MSN, St. Xavier University, Chicago, 1985

BSN, College of Nursing, Vellore, India, 1974

Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy
Health Sciences

Walden University
January 2015

Abstract

Nonadherence to medications for chronic illnesses is a public health problem that requires education related to its illnesses and medications in order to reduce morbidity, mortality, and health care costs, and to improve quality of life. Scholars have identified that morbidity and mortality are much higher among African Americans due to poor medication adherence when compared to Euro-Americans. This study focused on African Americans to increase their medication adherence with chronic illnesses. The purpose of this study was to analyze the effectiveness of using different educational methods to enhance medication adherence. The social cognitive theory and the theory of planned behavior were used as a foundation to develop this quantitative study. Three validated tools were used to assess the effectiveness of educational methods to see if there would be any increase in knowledge, self-efficacy, and change in health beliefs. A sample size of 144 African Americans in Chicago with chronic illnesses was randomized to an experimental group that received education on medication adherence for a period of 8 weeks through lecture, video presentation, roleplaying, and group discussion. A control group received regular education for the same 8 weeks. ANOVA, ANCOVA, and MANOVA statistical methods were used to analyze the findings that reported no statistical significance in the knowledge difference scores $F(1,261) = 0.17$, $p = 0.678$, self-efficacy difference scores $F(1,259) = 0.96$, $p = 0.328$, and health beliefs difference scores $F(4,258) = 0.46$, $p = 0.765$. This study contributes to social change by identifying a public health problem which can be improved by adding and testing other variables such as fatigue and cognitive and sensory deficits associated with chronic illnesses, which could yield a more valuable in-depth understanding.

The Effectiveness of Educational Methods on Medication Adherence in African Americans

by

Prema David

APN, North Park University, Chicago, 1998

MSN, St. Xavier University, Chicago, 1985

BSN, College of Nursing, Vellore, India, 1974

Dissertation Submitted in Partial Fulfillment
of the Requirements for the Degree of
Doctor of Philosophy
Health Sciences

Walden University
January 2015

Dedication

This entire dissertation is dedicated to my beloved family: our sons John and Jonathan David, and my husband James David, who walked with me every step of this great effort. I will love them forever.

Acknowledgements

Truly, to begin with, I thank my heavenly Father for His goodness, mercy, and love that carried me through this entire of mine, without which, I could not have completed it.

I express my heartfelt gratitude and thanks to my family.

I want to express my gratitude and thanks to Dr. Chester Jones for his words of wisdom and guidance. I will always remember him.

I sincerely thank Dr. Ji Shen for his able guidance with research methods.

I appreciate Dr. Roland Thorpe, who provided valuable suggestions in the URR committee.

I thank the Cook County Hospital and Healthcare System IRB for their help.

My sincere thanks goes to Pastor Dieltroe Ford and the members of Step of Faith Ministries.

I would like to extend my thanks to all the volunteers who helped with this study.

I would like to thank the African American study participants of Chicago.

I want to thank Dr. Krishnamurthy Gudehithlu, senior researcher at Cook County Hospital and Healthcare System, who helped me follow study protocol.

Table of Contents

Chapter 1: Introduction of the Study

In the 21st century, people are living longer, which has led to an increase in the prevalence of chronic illnesses such as hypertension, high cholesterol, chronic kidney diseases, diabetes, congestive heart failure, asthma, arthritis, and other chronic conditions (Williams, Manias, & Walker 2008; Wolff, Starfield, & Anderson 2002). Many of the hospitalizations for these chronic illnesses could have been halted or averted if people had received appropriate health care including effective health promotional work to prevent further decline of these chronic illnesses to improve their quality of life (Williams et al., 2008; Wolff et al., 2002). Wolff et al. (2002) explained that almost every person above the age of 60-65 is diagnosed with two or more chronic conditions, and some even live with four or more chronic illnesses resulting in an increase of 95% of Medicare expenditures. Multiple chronic illnesses affect the burden of total health status, which could have an increased negative impact on an individual's total health beyond the sum of the effects of each health condition. Verbrugge, Lepkowski, and Imanka, (1989); de Groot, Beckerman, Lankhorst, and Bouter (2003), Williams (2004), and Tong and Stevenson (2007) explained the seriousness of negative conditions on the influence of chronic illnesses. Wolff et al. placed more importance on medication adherence with chronic illnesses to explain how Medicare expenses continue to increase with chronic illnesses. Wolff et al. tried to explain that people with chronic illnesses, who receive Medicare help for their healthcare and do not take their medications as prescribed to control their chronic illnesses, are more likely to develop serious adverse consequences in their health resulting in frequently visiting urgent care as well as hospitalization, which leads to further increases in Medicare expenditures.

Chronic illnesses cluster with other chronic illnesses (Wolff et al., 2002) and a person with one chronic Illness is most likely to have other chronic illnesses (Wolff et al., 2002). For this reason, health promotion on medication adherence plays a key role in controlling and preventing chronic illnesses (Cutler & Everett, 2010). Several scholars have explained that poor medication adherence is an epidemic in the United States (Vlasnik, Aliotta, & DeLor, 2005) and half of all patients with chronic illnesses do not take their medications as prescribed for various reasons (Cutler & Everett, 2010; Haynes, McDonald, & Garg, 2002; Osterberg & Blaschke, 2005; Vlasnik et al., 2005).

There are a number of factors that affect medication adherence, including lifestyle (Cutler & Everett, 2010), psychological issues such as low self-efficacy (Bandura, 2004, 1977), health literacy (Vlasnik et al., 2005), support systems (Cutler & Everett, 2010), and side effects of medications (Haynes et al., 2002). In addition, racial and ethnic disparities have a role in medication adherence and in preventing and controlling chronic illnesses (Downie et al., 2011). African Americans have high death rates because of many chronic illnesses (Downie et al., 2011) such as hypertension, high cholesterol, diabetes, stroke, cardiovascular diseases (Downie et al., 2011), asthma, and chronic obstructive pulmonary disease (Mosen et al., 2010). Priest, Cantrell, Fincham, Cook, & Burch (2011) have explained that numerous researchers have suggested that disparities of care for chronic illnesses, including medication treatment and adherence, exist between European Americans and African Americans within the Medicaid population.

Medicaid is financed by the U. S. government to provide health insurance coverage to the poor, underserved, and vulnerable population in order to get access to healthcare including acute, chronic, and preventive healthcare. In spite of the efforts that the US government has taken, disparities of care continue to exist among the Medicaid population with treatment, medication adherence, and follow-up care, of which both African Americans and European Americans are equally affected (Priest et al., 2011).

A patient's beliefs about medications influences medication adherence (Gatti, Jacobson, Gazmararian, Schmotzer, & Kripalani, 2009). Gatti et al. (2009) explained that inner city African Americans have negative beliefs about medications and this negative belief often results in the conscious decision by individuals to be non-adherent. Patients in this population may forget to take medications because they perceive that those medications are unimportant (Gatti et al., 2009). In addition, some unintentional non-adherence is possible among African Americans who, when lacking health information, do not understand medication instructions and complex regimen, resulting in poor medication adherence (Gatti et al., 2009).

A health promotion program on medication adherence for African Americans with chronic illnesses may have long-term benefits in preventing and controlling chronic illnesses and improving their quality of life. When different educational methods are used with health promotion, African Americans may gain knowledge, increase their self-efficacy, and change their beliefs. This study was appropriate and significant for African Americans because in this randomized control trial, I provided further guidance in improving educational methods that will be culturally appropriate. This study was particularly relevant and appropriate for African Americans because of the nature of chronic illnesses and its burden on their lives.

Background of the Study

Some people do not take their medications as prescribed, which may affect how they are perceived by their healthcare providers (Krieger, Collier, Song, & Martin, 1999; Kripalani, Yao, & Haynes, 2007; Osterberg & Blaschke, 2005). An estimated 20 to 50% of patients do not take their medications as prescribed (Kripalani et al., 2007; Krieger et al., 1999; Osterberg & Blaschke, 2005), and they are labeled as nonadherent or noncompliant to medication therapy (Kripalani et al., 2007; Krieger et al., 1999; Osterberg & Blaschke, 2005). Osterberg and Blaschke (1999, 2005) claimed that when healthcare providers label patients as non-compliant, they could be stigmatized as noncompliant and this could jeopardize their future relationship with their healthcare providers. When people are stigmatized as noncompliant, the therapeutic communication between the patient and the provider becomes strained, resulting in increased non-adherent behavior, which ultimately jeopardizes the patient's health (Osterberg & Blaschke, 2005). The relationship between the patient and the healthcare provider is vital in enhancing medication adherence (Osterberg & Blaschke, 2005).

Multiple chronic illnesses leads to hypertension (Kripalani et al., 2007; Ogedegbe, et al., 2007), hyperlipidemia (Kripalani et al., 2007; McDonald, Garg, & Haynes, 2002), diabetes (Adams et al., 2008), and asthma (Wells et al., 2008), and medication non-adherence leads to worse medical treatment outcomes (Kripalani et al. 2007; McDonald et al. 2002), frequent hospitalization (Kripalani et al. 2007), increased emergency department visits and hospitalization (Kripalani et al. 2007; Wells, et al. 2008), and increased healthcare costs (Kripalani et al. 2007; Ogedegbe et al. 2007). These scholars have provided evidence on why Medicare expenses continue to increase.

Medication adherence, combined with lifestyle modifications, reduces mortality in congestive heart failure (Granger et al. 2005), but adherence to these interventions is below optimal levels (Granger et al. 2005). Poor adherence limits the effectiveness of proven therapies, resulting in lost opportunities to reduce mortality and recurrent hospitalization rates (Granger et al. 2005). Indeed, poor adherence accounts for up to two thirds of preventable admissions in heart failure and coronary artery disease and is associated with mortality in patients with other chronic illnesses (Granger et al. 2005). Many scholars have placed an emphasis on medication adherence with chronic illnesses and its significance in preventing and reducing morbidity and mortality due to chronic illnesses (Granger et al., 2005).

Scholars have argued that defining the concept of medication adherence is confusing because of the complexity that is involved with prescribed medications (McDonald et al., 2002). The regimen of prescribed medications satisfies empirical, theoretical, and physiological underpinnings of the healthcare providers, but does not meet certain requirements that would increase medication adherence such as the patient's real needs: patient centeredness and failure to recognize a patient's concerns such as nature, nurture, culture, economic background, and other impediments that the patient experiences (McDonald et al., 2002). Some prescribed regimens are difficult for patients to adhere to because of the difficulties involved with daily life situations and it becomes cumbersome, resulting in nonadherence (McDonald et al., 2002). The current methods of improving medication adherence for chronic illnesses are more complex, labor intensive, and lack predictability of the outcome (McDonald et al., 2002). There are many difficulties involved with prescribed medications for chronic illnesses and promoting medication adherence becomes a challenge.

Barriers to Medication Adherence

The problem of nonadherence to medications in relationship to chronic medical conditions has been well recognized by many scholars (van Dulmen et al., 2007), and is multifactorial and complex (Krousel-Wood, Muntner, Islam, Morisky, & Webber, 2009). The efforts taken to explain and improve adherence appear to be ineffective (van Dulmen et al., 2007); most of the interventions are not satisfactory because the theories on the concept of adherence are not clear enough to explain as to why this behavior is persistent and difficult to deal with (van Dulmen et al., 2007). The non-adherence behavior rates have remained unchanged in the past decades.

Adherence to long-term medication therapy remains a problem with chronic illnesses and it is below optimal level (Simpson, 2006; van Dulmen et al., 2007). There is a difference in medication adherence between acute and chronic conditions. Medication adherence is much higher during the acute stage of an illness when compared to patients with chronic conditions, especially with hypertension, hypercholesteremia, and asthma and the rates of adherence decreased after 6 months (Simpson, 2006; van Dulmen et al., 2007). This persistent non-adherence is because healthcare providers fail to recognize the problem and prescribe the needed treatment in a timely manner. Furthermore, the instructions on medications lack clarity with dosage and frequency and as how to take them. Finally, providers fail to involve patients in decision making, especially with long-term therapy (Simpson, 2006; van Dulmen et al., 2007).

Patient characteristics play a role in non-adherence (Krousel-Wood et al., 2009; Simpson, 2006; van Dulmen et al., 2007). These characteristics include advanced age (Simpson, 2006), patient's beliefs about medications (Gatti et al., 2009), inadequate health literacy (Gatti et al., 2009), cognitive impairment and depression (Gatti et al., 2009; Simpson, 2006), and the fear of potential adverse reactions from medications (Gatti et al., 2009; Simpson, 2006). Other barriers include polypharmacy, taking too many medications at one time for four or more chronic conditions, (Simpson, 2006), frequent dosing (Gatti et al., 2009; Simpson, 2006), and high cost, patients cannot afford to pay for medications that they need, (Gatti et al., 2009; Simpson, 2006; van Dulmen et al., 2007).

Problems related to the healthcare system also act as a barrier for medication adherence. These include patients' lack of access to healthcare (Simpson, 2006; van Dulmen et al., 2007; Zolnierek & DiMatteo, 2009), a lack of trust between healthcare provider and patient (Simpson, 2006; Zolnierek & DiMatteo, 2009), a providers' negative attitudes towards patients (Simpson, 2006), a patient's inadequate knowledge on diseases (Simpson, 2006; Zolnierek & DiMatteo, 2009), and a provider's lack of value for prescribed evidence-based guidelines (Simpson, 2006). The World Health Organization (WHO) identified the barriers that cause poor medication adherence as the following: current healthcare system, provider-patient relationship, type of illnesses, prescribed treatment, patient characteristics, and socioeconomic factors (as cited in Zolnierek & DiMatteo, 2009). There are many challenges to controlling chronic illnesses and enhancing medication adherence.

To improve medication adherence, successful interventions are needed (Simpson, 2006) and these include patient education (Simpson, 2006), structural support such as patient reminders (Simpson, 2006), and more frequent clinic visits or telephone calls from healthcare providers (Simpson, 2006). Some other scholars have suggested that, in order to improve medication adherence and assist patients to follow prescribed regimen, more studies with innovative approaches would be beneficial to patients (Kripalani et al., 2007; McDonald et al., 2002). Therefore, the purpose of this study was to assess the effectiveness of different educational methods applied to improve medication adherence.

Problem Statement

Poor adherence to prescribed medications has been identified as a barrier in controlling chronic illnesses including hypertension, hyperlipidemia, diabetes, asthma, and Chronic Obstructive Pulmonary Disease (COPD; Bandura, 2004). These chronic illnesses are contributing factors for increased morbidity and mortality, and poor quality of life when these illnesses remain uncontrolled because of poor adherence to prescribed medications (Schoenthaler et al., 2008). Furthermore, African Americans have the highest prevalence of these chronic illnesses, especially high blood pressure. When patients do not take medications as prescribed they suffer with severe consequences that lead to a poor quality of life (Bandura, 2004; Schoenthaler et al., 2008). Factors that could contribute to non-adherent behavior are race, marital status, substance abuse, low health literacy, poor understanding, a lack of confidence, complexity of prescribed medications, and poor socioeconomic status (Bandura, 2004; Schoenthaler et al., 2008; Vlasnik, Aliotta, & DeLor, 2005).

The author Bandura, in 2004, had expressed greater concern as to how healthcare expenditure was utilized because of current economic pressure. Bandura (2004) stated that current health practices focus more on the medical supply side because of growing economic pressure on the healthcare system to control cost, resulting in reducing, rationing, and delaying appropriate healthcare to people including health education promotion on the prevention of chronic illnesses. Scholars have identified major problems with written prescriptions that lead to one third of the prescriptions being never filled, whereby medication nonadherence becomes a pervasive problem in the United States (O'Reilly, 2011; Vlasnik et al., 2005). The high cost of medications imposes an epidemic of poor adherence, especially for socioeconomically disadvantaged people who could not afford to pay for those medications, resulting in failure of treatment (Bandura, 2004; Vlasnik et al., 2005). Many scholars have expressed concern that poor medication adherence leads to poorer health (Bandura, 2004; Schoenthaler et al., 2008) and frequent hospitalization, and increases the risk of death (Vlasnik et al., 2005).

Ogedegbe et al. in 2007 addresses that researchers also have to shoulder certain amount of responsibility in controlling nonadherent behavior through their scholarly work. Ogedegbe et al. (2007) claimed that a successful intervention designed to improve medication adherence in African Americans with chronic illnesses requires an effort from the researcher to incorporate their beliefs and concerns about their health and seek to include a variety of strategies to promote adherence. Poor adherence to prescribed medications has been identified as a barrier in controlling chronic conditions, reducing morbidity and mortality, and improving quality of life for African Americans (Bandura, 2004).

Poor adherence to medications with chronic illnesses imposes a physical and economic burden not only on the individuals, but also on the USA as a whole (Bandura, 2004). Poor medication adherence leads to increased morbidity and mortality, poor quality of life (Schoenthaler et al., 2008), poorer health, and increased hospitalization (Bandura, 2004; Schoenthaler et al., 2008; Vlasnik et al., 2005). The present healthcare system focuses more on cost cutting based on reducing, rationing, and delaying care, which has led to patients' poor adherence to prescribed medications (Bandura, 2004). Several scholars, who have emphasized patient education on medication adherence, have not explained effective use of different educational methods, and scholars, who have done studies on medication adherence, have provided their study findings based on a single chronic illness such as hypertension (Ogedegbe et al., 2007), hyperlipidemia (Kripalani et al., 2007; McDonald et al., 2002), diabetes (Adams et al., 2008), asthma (Wells et al., 2008), and congestive heart failure (Granger et al., 2005). Bandura (2004) explained that many chronic illnesses come in clusters and there is a gap left for further inquiry as to how to confront this significant problem (Bandura, 2004). The purpose of this study was to investigate the effects of using different educational methods to increase knowledge, self-efficacy, and change in health beliefs, leading to a social change in medication adherence behavior.

Nature of the Study

This study was a single, randomized controlled trial with a pretest/posttest design. Both experimental and control groups received education on medication adherence on chronic illnesses such as hypertension, hyperlipidemia, diabetes, asthma, and COPD. The experimental group received education through lectures, video presentations, role plays, and group discussions, whereas the control group only received regimen education. Both inferential and descriptive statistical analysis methods were used to examine the differences between the two groups and to compare and assess the relationship between the independent variable, which was educational methods, and the dependent variables, which were knowledge gain, increase in self-efficacy, and change in health beliefs. I also determined which educational method becomes more effective in promoting medication adherence with African Americans.

Research Questions and Hypotheses

Central Question

Is there any significant effect of using different educational methods in enhancing medication adherence in African Americans with chronic illnesses?

Subquestions

1. Do different educational methods have significant effects on knowledge gain in medication adherence in African Americans with chronic illnesses?

   $H_0$1: There will be no significant difference in knowledge gained on medication adherence between the intervention group and the control group

   $H_1$1: There will be a significant difference in knowledge gained on medication adherence between the intervention group and the control group

2. Do different educational methods have a significant effect in increasing self-efficacy on medication adherence in African Americans with chronic illnesses?

   $H_0$2: There will be no significant difference in self-efficacy on medication adherence between the intervention group and the control group

$H_1 2$: There will be a significant difference in self-efficacy on medication adherence between the intervention group and the control group

3. Do different educational methods have a significant effect in changing health beliefs in African Americans with chronic illnesses?

$H_0 3$: There will be no significant difference in health beliefs on medication adherence between the intervention group and the control group

$H_1 3$: There will be a significant difference in health beliefs on medication adherence between the intervention group and the control group

A more detailed discussion is included in Chapter 3.

Purpose of the Study

The main purpose of this quantitative study was to analyze the effectiveness of using different educational methods to enhance medication adherence. I examined how these educational methods enhanced knowledge, self-efficacy, and change in health beliefs on medication adherence. I assessed the responses of the experimental group and the control group. I analyzed the relationship between the independent variable, different educational methods, and the dependent variables, knowledge gain, increase in self-efficacy, and change in health beliefs.

Theoretical Framework

Social Cognitive Theory

The theoretical framework for this study was drawn from the social cognitive theory (SCT; Bandura, 1977) and the theory of planned behavior (TPB; McKenzie, Neiger, & Thackeray, 2009). The SCT is comprised of a core set of determinants (Bandura, 2004). These determinants include (a) knowledge of health risks and benefits of different health practices (Bandura, 2004), (b) perceived self-efficacy that an individual can exercise control over his or her own health habits (Bandura, 2004), (c) outcome expectations about the expected costs and benefits for different health habits (Bandura, 2004), (d) the health goals people set for themselves and the concrete plans and strategies for realizing them (Bandura, 2004), and (e) the perceived facilitators and social structural impediments to the changes they seek (Bandura, 2004).

According to Bandura (2004), knowledge on health risks and benefits set the stage for behavioral change. If people lack knowledge of chronic health conditions and its consequences on their life, they have little reason to change (Bandura, 2004). It is the knowledge that acts as a mechanism to influence people (Bandura, 2004) and causes behavioral change by overcoming impediments through perceived self-efficacy (Bandura, 2004). In this way, perceived self-efficacy enables individuals to seek and to practice healthy behaviors (Bandura, 1977, 2004).

Self-efficacy is drawn from the SCT (Bandura, 1977). Bandura (1977) defined self-efficacy as the conviction that a person can successfully execute the behavior required to produce outcome. Perceived self-efficacy is defined as peoples' beliefs about their abilities to produce designated levels of performance in events that affect their lives

(Bandura, 1994). Perceived self-efficacy challenges individuals to approach difficult tasks with confidence (Bandura, 1994), and allows them to make a commitment to challenging goals and to maintain such goals (Bandura, 1994, 2004). In addition, self-efficacy affects motivation and self-determination (Bandura, 1977, 2004).

Self-efficacy is influenced from four models (Bandura, 1977, 1994): (a) mastery experiences or good performance influences in which a person finds success of his/her performance that further leads to increased self-efficacy (Bandura, 1977, 1994); (b) vicarious experiences in which someone else models how to perform a task or to handle a situation that is difficult to perform without adverse consequences (Bandura, 1977, 1994); (c) verbal persuasion (Bandura, 1977, 1994) in which individuals are convinced, encouraged, and persuaded through positive reinforcement or feedback to accomplish the task with great confidence (Bandura, 1977, 1994); and (d) the physiological status of a person such that anxiety, nervousness, or emotional arousal could influence efficacy expectations (Bandura, 1977, 1994). A high level of anxiety and fear can have a negative impact on self-efficacy expectations (Bandura, 1977, 1994).

Self-efficacy affects an individual in all aspects of life, including educational aspects (Bandura, 2004). Beliefs about a person's competence to successfully perform a task can affect motivation, interest, and achievement (Bandura, 2004). The higher the perceived efficacy, the higher the goal aspirations people adopt, and the firmer their commitment will be to achieving those goals (Bandura, 2004). Health promotional activities should foster self-efficacy through different educational strategies (Bandura, 2004). By doing so, the learning environment is structured to deemphasize competition

(Bandura, 2004), and to highlight self-evaluation of progress to build a sense of self-efficacy, and to promote behavioral change (Bandura, 2004).

Theory of Planned Behavior

The Theory of Planned Behavior is an extension of the theory of reasoned action (TRA; Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975; McKenzie et al., 2009). A central factor in the TPB is the individual's intention to perform a given behavior, such as taking medications for chronic health conditions (Ajzen, 1991). The stronger the intention to engage in a behavior, the more likely that someone will engage in it (Ajzen, 1991). According to Ajzen (1991), some behaviors' performance depends on non-motivational factors such as money, skills, time, and resources, and these factors represent people's actual control over behavior (Ajzen, 1991; McKenzie et al., 2009).

According to Ajzen (1991), a person's behavioral achievement depends jointly on motivation or intention (Ajzen, 1991) and ability to perform a behavior or behavioral control (Ajzen, 1991). Motivation or intentions can influence performance to the extent that the person has behavioral control, and performance should increase with behavioral control to the extent that a person is motivated to try (Ajzen, 1991; McKenzie et al., 2009).

Ajzen (1991) explained that perceived behavioral control plays a part in the TPB. In fact, it differs from the Theory of Reasoned Action in its addition of perceived behavioral control (Ajzen, 1991; McKenzie et al., 2009).

Ajzen (1991) explained that perceived behavioral control is consistent with an emphasis on factors that are directly linked to a particular behavior. Perceived behavioral control refers to people's perception of their ability to perform a given behavior (Ajzen, 1991; McKenzie et al., 2009). Ajzen explained that perceived behavioral control refers to the perceived ease or difficulty of performing the behavior, and is assumed to reflect past experiences as well as anticipated impediments, and obstacles (Ajzen, 1991; McKenzie et al., 2009).

The more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavioral control, the stronger should be the individual's intentions to perform the behavior under consideration (Ajzen, 1991; McKenzie et al., 2009). This view of perceived behavioral control is considered similar to Bandura's (1997) concept of perceived self-efficacy (McKenzie et al., 2009). Successful performance of the behavior depends not only on a favorable intention, but also on a sufficient level of behavior control (McKenzie et al., 2009).

Operational Definitions

African Americans: This term usually refers only to American-born Blacks, excluding foreign-born Blacks (Kline & Huff, 2007).

Blacks: The US bureau of census uses this term to denote the race of individuals (as cited in Kline & Huff, 2007).

Chronic illness: The term *chronic* comes from the Greek chronos (time), and means lasting a long time (Shiel & Stoppler, 2008). Thus, an illness that persists for a long period of time is considered a chronic illness (Shiel & Stoppler, 2008).

Medication adherence: Osterberg and Blaschke (2005) defined medication adherence as the extent to which patients take their medications as prescribed by their healthcare providers.

Research Design

I conducted a single-blind randomized controlled trial using a pretest/posttest design with 142 African Americans between the ages of 18 to 65 years in a southwest community of Chicago. The participants were diagnosed with and prescribed medications for hypertension, high cholesterol, diabetes, asthma, and COPD. I assessed the effectiveness of different educational methods such as lectures, video presentations, role plays, and group discussions as to how these educational methods could enhance medication adherence with chronic illnesses by increasing knowledge, self-efficacy, and change in health beliefs. Three validated tools on medication adherence were used as the pretest/posttest method. The study findings were analyzed using SPSS software to see the relationship between the independent variable (educational method) and the dependent variables (knowledge, self-efficacy, and health beliefs). The interpretation of the study findings will help readers to understand which educational method is more effective in improving medication adherence with chronic illnesses in African Americans.

Study Assumptions

The study assumptions were determined for this particular study from scholarly works that various scholars presented. Health promotion on medication adherence for inner city African Americans will bring a greater benefit to their health, and improve their quality of life. Applying different educational methods such as role play, watching videos, classroom lectures, and telephone reinforcements may enhance their medication adherence due to gaining knowledge, increasing their self-efficacy, and changing of their beliefs. In addition, African Americans may develop a greater interest in their own personal health through this educational program, and learn to control chronic illnesses through the application of those skills that they develop in this program. Also, through this educational program, they will change their health beliefs, take their medications as prescribed, and see the benefits of it by experiencing improvements in their quality of life.

Study Limitations

This study was limited to inner city African Americans between the ages of 18 to 65 years. The study was limited to five chronic illnesses: hypertension, diabetes, high cholesterol, asthma, and COPD. The study could have been influenced by potential bias because I was a nurse practitioner providing primary care and was aware of what was happening in the communities.

Delimitation of the Study

This study was a single-blind randomized control trial and the population included African Americans with chronic illnesses living in Chicago. The study was delimited to African Americans who participated in the study on a voluntary basis and were willing to provide consent. In addition, the study was delimited to participants who took medications for hypertension, diabetes, high cholesterol, asthma, and COPD.

Significance of the Study

Cardiovascular disease (CVD) is one of the leading causes of death in the United States (Nichol et al., 2009). Both hypertension and high cholesterol are associated with CVD (Nichol et al., 2009) and patients with a comorbid diagnosis of the two diseases are at an increased risk for coronary heart disease events (Nichol et al., 2009). Even though significant improvement could be demonstrated in controlling blood pressure and lipid profile in the clinical settings (Nichol et al., 2009), long-term adherence and persistence with prescribed medication regimen remains a common problem in both conditions (Nichol et al., 2009).

Gerin et al. (2007) explained that untreated high blood pressure is a risk factor for heart disease and stroke (Gerin et al., 2007), and it places a tremendous financial burden on US healthcare costs (Gerin et al., 2007). The American Heart Association (AHA, 2004) estimated the direct and indirect costs of untreated high blood pressure to be 55.5 billion dollars (as cited in Gerin et al., 2007). Despite every effort taken to control high blood pressure, the rate of blood pressure control continues to be poor (Gerin et al., 2007) and only 30% of hypertensive patients are adequately controlled (Gerin et al., 2007). According to the Seventh Joint National Committee (JNC-7) guidelines on the management of hypertension, poor adherence to prescribed antihypertensive medications is a barrier in achieving adequate blood pressure control (as cited in Gerin et al., 2007) and the national goal that was set for 2010 still remains far out of reach (Gerin et al., 2007).

Janson, Earnest, Wong, & Blanc (2008), in their study on asthma medication non-adherence, found that the causes of non-adherence to asthma medication are thought to be due to a lack of clear understanding of medication directions (Janson et al., 2008) and a lack of understanding of the roles of control and rescue medications (Janson et al., 2008). Many people with chronic asthma do not adhere to prescribed treatment (Janson et al., 2008); either they overuse or underuse inhaled corticosteroids (ICS; Janson et al., 2008; Krishnan et al., 2004). Other factors that have been identified associated with non-adherence in asthma include beliefs about asthma (Janson et al., 2008), doubts about the usefulness of ICS medications (Janson et al., 2008), fear of side effects (Janson et al., 2008), and among African Americans, distrust of the healthcare system (Janson et al., 2008). Adherence to asthma medications depends on the type of healthcare providers such as physicians and non-physician providers (Janson et al., 2008).

Krishnan et al., (2004) described the problems related to frequent urgent care visits by people with asthma who live in major cities in the US. Krishnan et al., (2004) explained that medication adherence with asthma is a significant problem among inner-city African American populations resulting in worse asthma control. It affects 15 to 20 million people in the United States and is characterized by chronic airway inflammation and episodic respiratory symptoms (Krishnan et al., 2004) resulting in 465,000 hospitalizations (Krishnan et al., 2004) and nearly 5,000 deaths per year (Krishnan et al., 2004); the expenditure for hospitalizations represents the single largest portion of the estimated annual 12.7 billion dollars in asthma-related expenditures (Krishnan et al., 2004). Also, severe asthma serves as a marker for a poor quality of life (Janson et al., 2008; Krishnan et al., 2004) and predicts repeated exacerbation (Krishnan et al., 2004), readmission, and near fatal asthma episodes (Krishnan et al., 2004). These poor outcomes are particularly common among African Americans and inner city patients and hospitalization and deaths are two to three times higher among inner city African Americans than any other population (Krishnan et al., 2004). In this way, the scholars have expressed their concern that inner-city African Americans suffer with asthma at a much higher rate that results in early death.

Bolman, Arwert, & Völlink (2010) have asserted that patient adherence to prophylactic asthma medications (PAM) is critical to successful asthma management

(Bolman et al., 2010) because non-adherence to medications increases the risks of severe asthma (Bolman et al., 2010; Krishnan et al., 2004). Non-adherence to PAM are most likely because of the complexity of treatment due to the type of PAM inhalers with aero chambers that people are not able to handle effectively and the duration of asthma symptoms (Bolman et al., 2010). In addition, other patient-related factors that play a significant role in non-adherence include potential side effects of inhalers, perceived unpleasantness of inhaling steroids, and insufficient knowledge to recognize early symptoms (Bolman et al., 2010). Apter, Reisine, Affleck, Barrows, & zu Wallack (1998) suggested that poor adherence to asthma medication is mainly because of poor communication between the patient and the healthcare provider (Apter et al., 1998) and lack of a significant impact of health locus of control on adherence (Apter et al., 1998). In this way, poor adherence to asthma medications regimens may be contributing to the recent increase in asthma morbidity and mortality (Apter et al., 1998; Bolman et al., 2010).

Type 2 diabetes is another chronic illness that affects African Americans disproportionately (Adams et al., 2008; Hill-Briggs et al., 2005). African Americans with Type 2 diabetes have an increased rate of blindness as a result of retinopathy (Adams et al., 2008; Hill-Briggs et al., 2005), a threefold-to-sixfold higher rate of kidney failure (Hill-Briggs et al., 2005), end-stage renal disease that requires dialysis (Adams et al., 2008; Hill-Briggs et al., 2005), and non-traumatic lower-limb amputation at a threefold rate (Adams et al., 2008; Hill-Briggs et al., 2005). Hill-Briggs et al., (2005) cited the American Diabetic Association (2001) in that the prevalence of Type 2 diabetes in African Americans is much higher than in European Americans at each level and an increased poor glycemic control among African Americans may be a key factor for this racial disparity (Adams et al., 2008).

The reason for this increased diabetic burden in the African American population is not well understood (Adams et al., 2008; Hill-Briggs et al., 2005). Many scholars have suggested that African Americans do not use medical services adequately (Adams et al., 2008; Hill-Briggs et al., 2005). Geuder-Fredrick, Cox, & Ritterbaud (2002), in a study on medication-taking behavior in African Americans with type 2 diabetes, showed an increased association between medication-taking behavior and good metabolic control.

There are many reasons as to why African Americans show lesser adherence to medications when compared to European American counterparts (Adams et al., 2008; Hill-Briggs et al., 2005). These reasons include lack of access to a pharmacy in their communities (Hill-Briggs et al., 2005), patients easily manipulating pill counts through combining several medications in one pill bottle (Hill-Briggs et al., 2005), racial differences in medication adherence and other self-management practices (Adams et al., 2008), and the inability to make decisions (self-efficacy) when circumstances under which mediations might be missed (Adams et al., 2008; Hill-Briggs et al., 2005). In this way, diabetes as a chronic condition is greatly dependent on medication adherence (Schectman, Nadkarni, & Voss, 2002), and this adherence behavior is suboptimal in African Americans (Schectman et al., 2002).

Gaps in the Research

Choosing appropriate educational methods to enhance medication adherence with chronic illnesses is a priority in health promotion (Coulter & Ellins, 2007). Scholars have explained that medication adherence is pertinent and paramount to control chronic illnesses (Bandura, 2004; Osterberg & Blaschke, 2005) but have not adequately explained as how to educate people to enhance medication adherence by increasing knowledge, self-efficacy, and change in health beliefs (Bandura, 2004, 1977; Osterberg & Blaschke, 2005). Furthermore, there is a lack of evidence in explaining as to how educational methods such as lecture, video presentations, role play, and group discussions could make an impact to improve health outcomes with chronic illnesses (Coulter & Ellins, 2007; Ogedegbe et al., 2007).

Ogedegbe et al. (2007) explained in their study that there is a lack of evidence for a successful intervention to be designed to improve medication adherence in African Americans with chronic illnesses because this requires diligent effort from the researchers and healthcare providers to incorporate their beliefs and concerns about their health, and to seek to include a variety of strategies to promote adherence (Ogedegbe et al., 2007). In addition, many scholars have explained that patient-focused education on medication adherence is vital, but have not explained as to how the education could impact an individual to improve health outcomes in bringing social change in reducing chronic illnesses and their consequences, especially in African Americans (Coulter & Ellins, 2007; Ogedegbe et al., 2007).

Scholars have suggested that African Americans suffer with poor health status (Coulter & Ellins, 2007), have increased rates of hospitalization (Ogedegbe et al., 2007), are less likely to adhere to prescribed treatments and self-care plans (Bandura, 2004; Schectman et al., 2002), and make less use of preventive services (Coulter & Ellins, 2007). A well-designed educational program, targeting the concerned population, could bring out relevant positive health outcomes (Bandura, 2004; Coulter & Ellins, 2007).

Relevant outcomes of education for African Americans include an increase in knowledge, understanding chronic illnesses, and increase in self-efficacy by managing their conditions confidently and changing their health beliefs, which results in improved quality of life (Bandura, 2004; Coulter & Ellins, 2007).

The National Institute of Health (NIH), the Institute of Medicine (IOM), and the Agency for Healthcare Research and Quality (AHRQ) have recommended and supported health promotion in various ways, but large gaps still remain about how it could be improved to bring out relevant health outcomes through different educational methods (Coulter & Ellins, 2007). Furthermore, despite the large number of studies carried out by many scholars on medication adherence (Brunton, 2011; Chodosh, et al., 2005; Ogedegbe et al., 2007), the evidence base still has large gaps (Coulter & Ellins, 2007). Most scholars have reported some improvement in their studies; however, that improvement did not last long (Ogedegbe et al., 2007).

The purpose of this study was to assess the effectiveness of using different educational methods to enhance medication adherence with chronic illnesses in African Americans. This educational program would be an advantage to African Americans because the program focuses in helping African Americans to gain knowledge, increase self-efficacy, and change their health beliefs. Furthermore, this educational program will enable healthcare providers to increase their competency in health promotion. The study would further provide compelling evidence to other scholars in health science and health promotion to carry out further research work. Also, the study will inform policymakers about the need for promoting educational methods in different ways in order to bring better health outcomes, improve quality of life through positive social change, and the need for adequate funding for health promotion.

Summary of Chapter 1

In Chapter 1, I reviewed the effectiveness of applying educational methods and their association in enhancing medication adherence with chronic illnesses among African Americans who live in Chicago. The study participants were inner city African Americans, both men and women, who are diagnosed with hypertension, diabetes, hyperlipidemia, asthma, and COPD. In addition, these individuals were prescribed several medications for each of the illnesses. However, for various reasons, taking these prescribed medications has become a real challenge to African Americans in that medication adherence is a significant problem among this group. Scholars have suggested that chronic illnesses are major contributory factors for increased morbidity and mortality, and African Americans have the highest prevalence of chronic illnesses. Furthermore, poor adherence to prescribed medications has been identified as a major barrier in controlling chronic illnesses, reducing morbidity and mortality, and improving quality of life for African Americans.

It is necessary to educate people about their illnesses and the importance of taking medications. Many scholars have suggested that education on medication adherence requires more innovative approaches in which people's ideas and beliefs could be incorporated, thereby increasing knowledge and self-efficacy and changing their health beliefs. Despite many efforts in educating African Americans on medication adherence, African Americans consistently demonstrate inadequate knowledge on chronic illnesses and medications when compared with other racial groups. Current medical evidence suggests that it is time now to educate people on chronic illnesses and in self-management of their illnesses through health promotion by applying different educational methods. Several scholars have proposed various health promotional theories that can be used in preparing health promotional programs to improve health outcomes. For this particular study, the application of the social cognitive theory (SCT) and the theory of planned behavior (TPB) would fit well with the entire study.

Nonadherence behavior rates have remained unchallenged in the last decade because the theories on chronic illnesses and adherence concepts have not been effective in leading to behavioral change. The theories of SCT and TPB should be applied in this educational program to cause behavioral change in inner city African Americans with chronic illnesses.

An in-depth literature review on chronic illnesses and medication adherence will be explained in Chapter 2. In Chapter 3, the overall study methodology will be discussed in detail. This section includes an explanation on study population, randomization procedures, MMAS, SEAMS, BMQ-18 instruments, pretest/posttest design, and the analytical process. In Chapter 4, actual study will be presented with necessary tables, graphs, and other statistical techniques. In Chapter 5, a summary of the entire research will be undertaken, and there will be discussions and recommendations for future study.

Chapter 2: Literature Review

Literature Search Strategy

Many scholars wish to study the impact of chronic illnesses on people's life. The presence of multiple chronic illnesses increases the burden of the illnesses themselves (Bandura, 2004; Chodosh et al., 2005; Morisky, Kominski, Afifi, & Kotlerman, 2005). Chronic illnesses have a negative influence on health status beyond the sum of the effects of each single illness (de Groot et al., 2003; Tong & Stevenson, 2007; Verbrugge et al., 1989; Williams, 2004). It is important to manage coexisting chronic illnesses in all people of all ages, especially in vulnerable populations (Williams et al., 2008). It is critical to slow down the progression of chronic illnesses, prevent further risks involved, and to avoid unnecessary costly duplication with conflicting treatments that will have more adverse effects on health outcome rather than desired outcomes (Williams et al., 2008).

Ogedegbe et al. (2007) and Schoenthaler et al. (2009) focused on African Americans' medication adherent behavior. These scholars examined why medication adherence is no panacea for African Americans (Ogedegbe et al., 2007; Schoenthaler et al., 2009). The problem of nonadherence is chronic, pervasive, and continuous in the African American population (Ogedegbe et al., 2007), leading to medical and health consequences resulting in unemployment, higher morbidity, and mortality, and poor quality of life (Ogedegbe et al., 2007; Schoenthaler et al., 2009).

The review of this literature was drawn from empirical findings on the conceptual framework and research question that guided the study's hypothesis and research methodologies. In addition, I examined the literature to determine how different scholars have employed different educational methods to enhance medication adherence with chronic illnesses in African Americans and the relationships between (a) education and gaining knowledge, (b) education and increasing self-efficacy, and (c) education and changing health beliefs. I also examine the randomized controlled trials on medication adherence with chronic illnesses among African Americans and its negative consequences on their quality of life. The search included empirical findings that have scholarly descriptions on behavioral components related to medication adherence where many scholars have documented that medication adherence is a complex behavior (Morisky, Kominski, Afifi, & Kotlerman, 2009), and the outcome of chronic illnesses depends on the extent to which people adhere to prescribed medications (Bandura, 2004; Morisky et al., 2009).

The review of the literature includes the writings of several scholars who have provided descriptions on chronic illnesses and its impact on African Americans and their quality of life. Scholars have documented that African Americans experience chronic illnesses at a much higher rate when compared with other racial and ethnic groups, and these chronic illnesses include asthma, diabetes, hypertension, and coronary heart disease (Morisky et al., 2009). Chodosh et al. (2005) identified seven most common chronic illnesses that are highly prevalent among African Americans: hypertension, heart disease, diabetes mellitus, respiratory diseases, stroke, arthritis, and cancer.

The literature review consists of an exhaustive search of the literature using Walden University's Library asa primary resource. The affiliated academic institution database indexes were used to identify germane literature for this study. Included are scholarly writings of Bandura, and many other authors, whose work delved in the management of chronic illnesses. The work of these scholars have provided insights into health disparities among African Americans diagnosed with many chronic illnesses and the difficulties that they experience with medication adherence (Ogedegbe et al., 1999). In addition, these authors raised the national consciousness on chronic illnesses (Bandura, 2004) in that medication adherence behavior is the basic requirement in controlling and reducing the ill effects and the burden of chronic illnesses (Bandura, 2004; Morisky et al., 2009). Tong and Stevenson (2007) claimed that the management of chronic illness and its prognosis depends on adherence behavior.

I used the MEDLINE, Academic Premier (EBSCO), Psych Articles (Psyc INFO), Education Resource Center (ERIC) databases, PubMed, Google plus, OVID, CINAHL, and Science direct databases to find articles for the literature review. Articles were also selected from the *Journal of the American Medical Association*. International studies on chronic illness management, Lancet, archives of internal medicine, medical care, health education and behavior, health psychology, vocational behavior and advanced nursing, and clinical epidemiology were also examined. In order to add credibility and clarity to this study, I focused on randomized controlled trials on medication adherence with asthma, COPD, diabetes, hypertension, and hyperlipidemia. In addition, only peer-reviewed journal articles that had African Americans as the study participants, and published after 2000, were chosen. I did not find any study on different educational methods to enhance medication adherence in any setting with any group of people.

The search terms for this literature review included *African Americans*, *inner city*, *chronic illnesses*, *medication adherence*, *diabetes*, *asthma*, *COPD*, *hypertension*, *hyperlipidemia*, *self-efficacy*, *knowledge*, *health beliefs*, *barriers to adherence*, *health* *promotion*, *health education*, and *randomized controlled trials*. Many of the epidemiological studies included variation in levels and nature of chronic illnesses and its health outcomes among different ethnic groups. In this study, I focued on assessing the effectiveness of using different educational methods to enhance medication adherence among inner city African Americans who have chronic illnesses.

Different Educational Methods to Improve Medication Adherence

There is no single particular educational method that will bring behavioral change to improve medication adherence among patients with chronic illnesses (DeYoung, 2009). The problem of medication nonadherence is present among all groups of people (DeYoung, 2009), and educating culturally diverse learners presents a challenge to health promotion (DeYoung, 2009). Many scholars have recognized that chronic illnesses such as diabetes, hypertension, hyperlipidemia, asthma, and COPD are public health problems (Farmer, 2008; Fitzgerald, 2011) that require multiple medications to bring the conditions under control (Farmer, 2008; Fitzgerald, 2011; Morisky et al., 2002), and educating people on medication adherence is critical (Farmer, 2008; Fitzgerald, 2011; Morisky et al., 2002).

The extant research on educational methods to improve medication adherence requires multifaceted approaches (Brunton, 2011; Morisky et al., 2002). Chodosh, and colleagues (2005) have explained that, because there is no accepted single educational method that has shown improvement in medication adherence, there is a need for a combination of educational approaches to convince people to change their behavior (Chodosh et al., 2005). Education on medication adherence with chronic illnesses should be tailored to meet the individuals' specific needs and circumstances, such that they derive benefits from this educational program (Chodosh et al., 2005).

Educating people through group settings, which are affected due to the same conditions or illnesses, would be culturally appropriate to promote medication adherence (Chodosh et al., 2005; Ogedegbe et al., 2007). While promoting medication adherence, it is critical for the educator to realize that individual patients have their own perspective of their illnesses, and they make decisions based on their beliefs, and illness experiences (Ogedegbe et al., 2007; Brunton, 2011). In this way, successful educational methods involve patients' active participation (Ogedegbe et al., 2007).

Educating through feedback mechanism is an added benefit to patients by reviewing educational interventions such as reporting on pill counts, blood pressure readings, and monitoring blood sugar levels (Chodosh et al., 2005; Brunton, 2011) followed by some form of individual review (Chodosh et al., 2005). These individual reviews motivate people to change their behavior by helping them to recognize their own failures and to resolve such failures by setting their personal goals and values for their own health (Ogedegbe et al., 2007; Chodosh et al., 2005). Motivating through feedback increases self-efficacy of individuals because this method emphasizes patient centeredness (Bandura, 2004; Ogedegbe et al., 2007).

A counseling approach is another educational method in which patients must feel convinced that taking medications will improve their wellbeing (Ogedegbe et al., 2007). A patient may feel self-efficacious about his/her ability to make changes (Ogedegbe et al., 2007). Rask et al. (2009) found in their randomized controlled trial with African Americans (*N* = 5,000) that counseling, combined with a patient activation method, allows patients with chronic illnesses to make sound decisions and to promote their own health if they are engaged, well informed, and feel confident in their ability to care for themselves. Ponnusankar, Surulivelrajan, Anandamoorthy, and Suresh (2004), in a randomized controlled trial (*N* = 90) in South India, found that patients with a chronic illness who received counseling showed a significant increase in medication knowledge and adherence. The counseled group scored 88.10 % in the posttest when compared with the control group that scored 62.33 % ($p < 0.05$). The counseling method increases knowledge and adherence to medications (Ponnusankar et al., 2004).

Education that uses technology and interactive methods is considered to be highly innovative and revolutionary; this advanced technology can increase the scope, and impact of health promotion, especially on medication adherence with chronic illnesses (Bandura, 2004). According to Bandura (2004), using advanced technology and interactive computer-assisted education provides a convenient means for informing, enabling, motivating, and guiding people in their efforts to make lifestyle changes (Bandura, 2004). Meigs and colleagues (2003), based on their randomized controlled trial on web-based diabetic disease management educational program (N = 307 in the intervention group, and N = 291 in the control group), found that a web-based diabetic educational program was effective, and that the intervention group showed a significant improvement in several clinical areas such as increased rate of testing for AIC levels, LDL cholesterol levels, and screening foot disease. The levels of AIC decreased by 0.2 in the intervention group, and increased by 0.1 in the control group (p = 0.09) (Meigs, Cagliero, Dubey, Murphy-Sheehy, Gildesgame, Chueh … Nathan, 2003).

Vervloet and colleagues (2011), in a randomized controlled trial on improving medication adherence with type 2 diabetic patients, used the electronic method to monitor real time medication monitoring (RTMM) by sending short message service reminders (SMS). The group was randomized to two intervention arms, and one control arm. The intervention group Arm 1 received both RTMM and SMS, Arm 2 only received RTMM, and the control group received usual care, and no RTMM, and only SMS. The group that received both RTMM, and SMS showed increased adherence with oral diabetic medications, when compared with the other two groups, and the difference between the intervention group (arm 1), and the control group was ten percent. Power analysis showed, using a one-sided't' test (alpha = 0.05) for a ten percent difference (SD = 20), with a power of 0.90. Each group had sixty-nine patients (Vervloet, van Dijk, Santen-Reestman, van Vlijmen, Bouvy, & de Bakker, 2011).

Ramadas and colleagues (2011) explained in their systematic review of recent evidence on web-based intervention in the management of type 2 diabetes that emails, and short message services (SMS) could be used to remind patients to monitor their blood sugar levels, and to send that information to the provider; this was found to be an effective method because it has a positive way of giving reinforcement to patients on self-management of their blood sugar levels (Ramadas, Quek, Chan, & Oldenburg, 2011).

Factors Related to Poor Medication Adherence

Poor medication adherence with chronic illnesses is a serious public health issue (Kocurek, 2009). Non-adherence to prescribed medication is significant because it results in more harm to one's health, and wellbeing (Elliott, Ross-Degnan, Adams, Safran, & Samurai, 2007). According to the Cochrane review of randomized controlled trials (RCT) on medication adherence with commonly occurring chronic illnesses such as diabetes, hypertension, hyperlipidemia, asthma, mental health problems, and arthritis, scholars Williams, Manias, and Walker (2008) have cited authors (Haynes, Degani, Kripalani, Garg, & McDonald, 2005; Haynes, McDonald, Garg, & Montague, 2002), who have done systematic review of medication adherence, and have suggested some key reasons for non-adherence that include adverse effects of medications, poor instructions by healthcare providers, poor memory, inability to pay for medications, disagreement about the need for treatment, and poor relationships between consumers, and healthcare professionals (Williams et al., 2008).

The national council on patient information and education (NCPIE) is a coalition of more than 125 organizations whose main task is to improve communication and information between patient and healthcare providers to improve medication adherence (Kocurek, 2009), and they have explained that poor adherence is due to poor health literacy in that many do not understand or comprehend directions to take medications (Kocurek, 2009).

Kocurek (2009) summarized that medication non-adherence is due to 1) perception about the nature and severity of the illness, 2) fear of side effects or concern about becoming drug dependent, 3) worries about social stigma associated with taking medications, 4) beliefs about the effectiveness of medications, 5) lack of acceptance of taking medications for preventive purposes and for symptomless conditions, 6) denial of illness, and 7) the assumption that they can discontinue the medication because they feel better or symptom-free (Kocurek, 2009). Other factors include polypharmacy (Fitzgerald, 2011) and medication inertia (Fitzgerald, 2011), and other barriers include social and economic factors (Hill, Miller, DeGeest, & American society of hypertension writing group, 2010). The economic factors include unemployment, lack of insurance, cost of medical care and medications, and lack of transportation (Hill et al., 2010). Social factors include lack of social support, multiple co-morbidities, lack of choices in choosing treatment protocols within their own beliefs (Elliott, Ross-Degnan, Adams, Safran, & Soumerai 2007; Hill et al., 2010), social isolation (Russell, 2006), and low health literacy (Ho, Bryson, & Rumsfeld, 2009).

The World health organization (2003) categorized factors affecting medication adherence into five dimensions: 1) social-economic dimension, 2) healthcare system, 3) illness/condition-related, 4) therapy related, and 5) patient related (Ho et al., 2009; Osterberg & Blaschke, 2005; Hill et al., 2010). The socioeconomic dimension includes low literacy, higher medication cost, and poor social support. The healthcare system dimension includes poor quality of provider-patient relationship, poor communication, lack of access to healthcare, and lack of continuity care. The illness condition dimension includes asymptomatic chronic illnesses, and mental disorders such as depression associated with chronic illnesses. The therapy dimension includes complexity of regimen, and medication side effects. The patient-related dimensions include physical and sensory impairments, cognitive impairment, psychosocial and behavioral problems, a younger age, and non-Caucasian ethnicity (Hill et al., 2010; Ho et al., 2009; Osterberg & Blaschke, 2005).

Adherence Factors Specific for African Americans

Many researchers have suggest that low adherence to prescribed medications is associated with increases in morbidity, mortality, and increased healthcare costs

(Bandura, 2004; Gerber, Cho, Arozullah, & Lee, 2010; Bogner & DeVries, 2010), and African Americans bear the brunt of this disproportionate morbidity, and mortality, especially with cardiovascular diseases associated with diabetes, hypertension, hyperlipidemia, and stroke (Gerber et al., 2010; Lewis et al., 2010).

In 2002, the Institute of medicine (IOM) report ‘unequal treatment confronting racial, and ethnic disparities in health care’, which the United States congress commissioned, reported that African Americans with diabetes have received lower quality care, visited emergency care centers frequently, and made less visits to primary care (Bogner & deVries, 2010). In a pilot randomized controlled trial with inner city African Americans with diabetes (N = 58, Age range of 50-80 years) in Philadelphia, medication adherence was assessed at baseline, and at two, four, and six weeks using the medication event monitoring system. The study also included an assessment of depression associated with diabetes using the center for epidemiologic studies depression scale (CES-D). In all, fifty-eight participants were randomly assigned to an integrated intervention (N = 29), and to usual care (N = 29) groups. The study findings include that the intervention group had lower levels of AIC at 6.7 percent when compared to the group that received usual care, and whose AIC level was 7.9 percent, ($p < .05$). Also, the intervention group had fewer depressive symptoms at 6.9 vs. usual care at 16.6, ($p = .04$). Based on these study findings, the authors interpreted that African Americans suffer with depression and chronic illnesses such as diabetes, and this depression may be a potential factor leading to poor medication adherence. The same scholars warned that previous studies targeting African Americans have not addressed depression as a factor for poor medication adherence, and undertaking larger studies may be worthwhile (Bogner & deVries, 2010).

There are other factors that could potentially affect medication adherence in African Americans other than medication cost resulting in racial disparity (Gerber et al., 2010). Based on a number of studies, these scholars have suggested that low health literacy is associated with poor medication adherence (Gerber et al., 2010). The same scholars (2010) have cited Osborn, Paasche-Orlow, Davis, and Wolf (2007), who have done an extensive study on HIV health literacy in African Americans, have suggested that health literacy may mediate the relationship between the African American race, and adherence to HIV therapy (Gerber et al., 2010).

A survey on medication adherence by face-to-face interview with Medicare recipients of age sixty-five years, and above was conducted in Chicago on three principal adherence questions: 1) running out of medications before refilling the prescription, 2) following physician instruction on how to take medications, and 3) forgetting to take medications. A total of 489 participants responded to the survey, and 266 of them were African Americans (59 percent with a mean age of 78.2 years), and 189 were Caucasians (41 percent with a mean age of 76.8 years). The findings of the survey included that Caucasians were more likely than African Americans to report never running out of medications before refilling them at 90.2 percent versus 75.3 percent, and were more likely to follow physician instructions on how to take medications (90.1 percent vs. 77.6 percent). However, there was no significant difference between African Americans, and Caucasian participants in forgetting to take their medications (Gerber et al., 2010). From these survey findings, the authors have suggested that there are factors such as health literacy, depression, and health beliefs of African Americans that could have potential influence on their medication adherence behavior (Gerber et al., 2010), and it may be worthwhile to explore their health beliefs to have a greater insight, and understanding of their medication adherence behavior.

Health Beliefs of African Americans

Fears of being exploited for the sake of medical research have affected African Americans' health beliefs (Gamble, 1997). One of them is that they will be used as guinea pigs, just like the men who were used in the Syphilis study from 1932 to 1972 in Tuskegee, Alabama. Those men in that study were deliberately denied treatment for syphilis in order to study the natural history of syphilis (Gamble, 1997). Due to the fear of being used as guinea pigs in such fashion, African Americans have refused treatment for HIV/AIDS with protease inhibitors (Gamble, 1997), and many scholars have argued that the Tuskegee Syphilis Study is frequently described as the singular reason behind African Americans' distrust of the institute of medicine, and public health (Gamble, 1997).

African Americans also believe in folklore, and according to them, Caucasian medical students would kidnap African American people, usually at night in urban areas and take them to hospitals to be killed and used in medical experiments (Gamble, 1997). Gamble (1997) has cited anthropologist Gladys Marie Fry (1984, p.171) who had explained that the term “night doctor” or “night riders” is derived from the stories that victims were sought only at night by Caucasian medical students who were believed to have stolen cadavers for medical educational purposes and for medical research, even though anthropologist Fry (1984) did not find any evidence-based documents to prove the existence of such night riders (Gamble, 1997). Gamble (1997) cited folklorist Patricia Turner (1993) who contended in her writings on African American beliefs that Caucasian Americans historically have been, and continue to be ambivalent, and perhaps are even hostile to the very existence of African American people (Gamble, 1997).

The other beliefs include what some African Americans perceive as racial discrimination in their healthcare (Piette, Heisler, Herand, & Juip, 2010), and may more likely mistrust their healthcare providers when compared to Caucasian patients (Piette et al., 2010). Piette and colleagues (2010) have cited scholars Boulware, Cooper, and Ratner (2003), who have done extensive studies on African Americans' health beliefs on medical treatment, explaining that African Americans' medication-related beliefs are formed within their broader experience with the social institution (Piette et al., 2010), and as a result of undesirable past experiences with the medical community, African Americans may pose an ongoing barrier in gaining a desirable common understanding with their healthcare providers about the role of medications in the management of chronic illnesses (Piette et al., 2010).

Piette and colleagues (2010) have conducted a study by following survey methodology, and using a face-to-face interview guide. The survey took place in Flint, Michigan, an economically distressed city with type 2 diabetic patients who also received prescriptive medications from physicians, nurse practitioners, and physician assistants. The main purpose of this survey was to assess if there was any association between patients' race, and concerning medication-related beliefs. A total of 806 patients with the diagnosis of type 2 Diabetes participated in the study (N = 806; African Americans = 470 (58.3 percent), and Caucasians = 336 (41.7 percent)). The researchers used two types of questionnaires: 1) Beliefs about medication questionnaire (BMQ) (alpha reliability = 0.66), and 2) Beliefs about generic medications (alpha reliability = 0.87). A pilot survey with twenty-five participants from a diverse group was carried out prior to the full survey in order to establish validity, and reliability of these instruments. Patients reported their beliefs on a three-point Likert scale of agree, unsure, and disagree (Piette et al., 2010).

Findings of the study included that a large number of patients from both African Americans, and Caucasians expressed serious skepticism about the safety, and necessity of their prescription medications, and forty-two percent of patients believed that generics are not real medications, brand-name medications are safer than generics, and that insurance plans push generics to save themselves money at the expense of their health (Piette et al., 2010).

After controlling all potential confounding variables, the authors summarized the survey findings about the main differences in health beliefs between African Americans, and Caucasians that African American patients expressed more concerns about their prescription; nearly twice as many African Americans agreed that people who take prescription medications, should stop the treatments for a while every now, and again (20 percent vs. 11 percent, $p = .0005$), that most prescriptions are addictive (40 percent vs. 28 percent, $p = .0003$), prescription medications do more harm than good (25 percent vs. 17 percent, $p = .003$), and generic medications contain dangerous addictives (21 percent vs. 8 percent, $p < .0001$) (Piette et al., 2010). The authors, based on this survey's findings, have explained that beliefs about generic medications is troubling, and it may be a major potential barrier for medication adherence, and the differences in patients' medication-related beliefs did not help to explain racial differences. Also, it may be necessary to undertake further studies on patients’ beliefs on medications to gain a greater insight on medication adherence behavior (Piette et al., 2010).

In another face-to-face research interview by scholars Aikens and Piette (2009) in Flint, Michigan, by using well-validated scale “beliefs about medication questionnaire” (BMQ) with patients diagnosed with hypertension, and diabetes (N = 806) on satisfaction with medication information, and medication underuse, found out that those with the strongest concerns about medication harmfulness tended to underuse both types of medications because of cost, and other factors. The authors, from this study, explained that perceived necessity, and harmfulness are two different determinants in that perceived necessity was found to be related to a number of co-morbidities or illnesses, and the number of medications used, but perceived harmfulness was found to be related to psychosocial factors such as functional health literacy, and dissatisfaction with medication information received, and this perceived harmfulness was related to medication adherence, and its outcome (Aikens & Piette, 2009).

The authors further have explained that medication underuse was found to be related to more perceived medication harmfulness, and African Americans are generally more concerned about medication harmfulness than their Caucasian counterparts, and this notion prevails regardless of income, medication costs, and functional health literacy level (Aikens & Piette, 2009).

Lewis, and colleagues (2010) have explained in their qualitative study with community-dwelling African Americans with hypertension, that African Americans believe that hypertension is a stress-related illness promoted by emotional, and psychological stress, and controlled by stress reduction (Lewis, Askie, Randleman, &

Shelton-Dunston, 2010). They also believe that hypertension medications have more adverse effects such as frequent urination, lethargy, ankle edema, and are more physically debilitating than having hypertension (Lewis et al., 2010). In this way, African Americans believe that medications cause more adverse effects rather than healing (Lewis et al., 2010).

Health Literacy: An Important Factor for Medication Adherence

Kalichman and colleagues (2008) have suggested that several factors have potential influence on medication adherence behavior that can impede patients with chronic illnesses to take medications (Kalichman, Pope, White, Cherry, Amaral, Svetzes … Kalichman, 2008). These potential influencing factors include physical side effects, emotional distress, substance use, internalized stigma, and poor social support (Kalichman et al., 2008). The same scholars however, based on a number of studies on patients with HIV/AIDS medication adherence, have suggested that medication adherence greatly depends on patients' health literacy, and health literacy is particularly in demand for improving patients' knowledge, and comprehension on health messages, and prescribed medications. Furthermore, low health literacy skills are closely associated with inadequate knowledge on health, and poor comprehension of the treatment protocols (Kalichman et al., 2008).

The same scholars, in order to affirm that low health literacy is a potential factor for poor medication adherence, conducted a study based on two hypotheses: 1) lower health literacy would predict non-adherence with medications, and 2) lower health literacy is associated with poorer adherence over, and above other influencing factors. The study participants included a total of 145 patients diagnosed with HIV/AIDS, and given antiretroviral oral medications, and they were recruited through referrals, and word of mouth, were willing to participate in the study, and give voluntary consent for the study as well as unannounced pill counting through the telephone. Among these 145 participants, 100 were men, 44 were women, and one was transgender. According to ethnicity, ninety-three percent were African American, six percent Caucasian, and the remaining one percent included other ethnicities (Kalichman et al., 2008).

The study protocol included a reading comprehension testing using the validated instrument ‘test of functional health literacy in adults’ (TOFHLA), an office-based pill counting training, and calling participants at three intervals between 21-35 days for unannounced pill counting. In addition, pharmacy information from pill bottles was also collected for verification. Adherence was calculated as the ratio of pills counted relative to pills prescribed, and dispensed. Data analysis was done using logistic regression analysis to test hypothesis 1, and hierarchical logistic regression to test hypothesis 2. In addition, a sensitivity analysis to examine the same hierarchical association was done using 80 percent, and 90 percent adherence as the model-dependent variable. The authors reported odds ratios (OR), and 95 percent confidence intervals (CI) for each variable tested.

Based on this study, the authors confirmed hypothesis 1 that participants with lower literacy were significantly less likely to have taken medications at three different levels of clinically meaningful adherence: 80 percent, 85 percent, and 90 percent of pills taken. The hierarchical logistic regression model entered these characteristics: a) demographic, and health characteristics, b) emotional distress, internalized stigma, and social support, c) alcohol use, and d) literacy scores as predictors of 85 percent antiretroviral therapy (ART) adherence. The authors confirmed hypothesis 2 by the hierarchical logistic regression model that lower literacy was associated with poorer adherence over, and above all other factors entered into the model, including years of education. Based on these study findings, Kalichman et al., (2008) suggested that there is a reliable association between health literacy, and self-reported medication adherence even though the study had its methodological limitations (Kalichman et al., 2008).

In a cross-sectional randomized controlled trial with 152 study participants (N = 152) with proven cardiac health problems, Kripalani, and colleagues (2006) evaluated the effects of low literacy, medication complexity, and socio-demographics by measuring medication management capacity (MMC). The measures of MMC included functional skills such as these: 1) identifying medications correctly, 2) being able to open the containers or medication bottles, 3) describing the dose correctly, and 4) taking the medication at the right time. MMC complements measures of adherence were provided by self-report, pill count, and medication refill schedule. From this study, scholars were able to explain that the concept of medication management capacity and its application in a clinical study demonstrated ample evidence that low MMC predicts an increase in the utilization of emergency visits (ER), functional decline, and subsequent residence in assisted-living facilities. In addition, adults with low literacy were unable to identify their medications (Kripalani, Henderson, Chiu, Robertson, Kolm, & Jacobson, 2006).

The study participants included 94.1 percent African Americans, of whom 50.7 percent had inadequate literacy skills, and 28.9 percent had marginal skills. The other study participants included Caucasians (3.9 percent), Asians (0.0 percent), Hispanic/Latino (1.3 percent), and other (0.7 percent). In a univariate analysis, medication management capacity (MMC) was significantly associated with literacy ($p < .001$). In a multivariate analysis, patients with inadequate literacy skills had 10-18 times the odds of being unable to identify all their medications when compared to patients with adequate literacy skills ($p < .05$) (Kripalani et al., 2006).

Based on these study findings, these scholars suggested that adults with inadequate or low literacy skills have poor abilities to identify their medications, and low literacy skills may be a potential risk factor for poor comprehension of their medications, and adherence behavior. Furthermore, patients with poor literacy skills require varieties of methods or techniques to educate about their medications as a potential strategy to enhance medication adherence (Kripalani et al., 2006).

Thai and George (2010) have suggested from their systematic review of literatures on literacy, and self-management of asthma that low health literacy level is associated with poorer health status, less knowledge about chronic disease management, and lower rates of medication adherence (Thai & George, 2010). Some other scholars have suggested that lower health literacy is also correlated with higher rates of acute hospitalization, an increased utilization of emergency care, and acute care facilities for patients with asthma, and other chronic illnesses (Thai & George, 2010; Prasauskas & Spoo, 2006). Low literacy is strongly linked with other vulnerable factors including non-Caucasian race, older age, less formal education, and low socioeconomic status (Thai & George, 2010).

In addition, scholars have suggested that low health literacy in vulnerable populations is also associated with low numeracy skills (Thai & George, 2010), and this health literacy, and numeracy skills are paramount in asthma self-management, to count the peak flow measurements, and to manage other chronic illnesses (Thai & George, 2010; Prasauskas & Spoo, 2006). Based on their in-depth literature review on asthma self-management, and health literacy, Thai, and George (2010) have strongly recommended that knowledge transmission on any health condition does not depend on the written words of the literature, but greatly depends on as to how the knowledge is transferred, and how the skills are demonstrated (Thai & George, 2010). The same scholars have suggested that health literacy transmission requires effective communication tailored to the individuals based on their age, reading level, culture, health literacy ability, and numeracy skills (Thai & George, 2010).

Evidence suggests that there are numerous problems related to health because of lower health literacy (Marks, 2009; Wagner, Steptoe, Wolf, & Wardle, 2009). Problems arise because of low health literacy, including these: 1) difficulties in understanding health concepts, 2) difficulties in understanding the importance of medication adherence, 3) difficulties in doing health-related tasks such as monitoring blood pressure, and blood sugar levels, 4) difficulties with refills of medications, and 5) problems in keeping up with clinic appointments (Marks, 2009). In addition, low health literacy can affect one's listening abilities (Marks, 2009).

Marks (2009) cited scholar Wilson (2003) who has suggested that asking patients to restate the health information in their own words would facilitate, and increase one's ability to listen, and process the information (Marks, 2009). This teach-back mechanism would be helpful to both educator, and the patients, and if necessary, the information can be repeated until the patient is able to comprehend, and process the information (Marks, 2009). Providing health education that is culturally, and linguistically appropriate with clarity empowers patients to process the information with accuracy in the decision making process (Marks, 2009; Wagner et al., 2009).

Literature suggests that limited literacy may contribute to racial disparities in health (Osborn, Paasche-Orlow, Davis, & Wolf, 2007). To test this hypothesis, a total number of 204 patients, diagnosed with HIV/AIDS, and on medications, were recruited from the HIV/AIDS clinics by trained research assistants from Northwestern Memorial Hospital, Chicago, and the Louisiana State University Health Science Center at Shreveport, Louisiana. Participants, who fit with study criteria, were administered two kinds of tests, one to test their medication adherence, and the second one to test their literacy level (Osborn et al., 2007).

The first test was a “patient medication adherence questionnaire” (PMAQ) in which study participants had to report the missing HIV/AIDS medication, as to whether they had missed a dose of medication “yesterday,” “the day before yesterday,” “3 days ago,”, and “over the past weekend.” Participants, who reported a missing dose within this short period of time, were considered to be non-adherent, but participants who reported “no missing dose,” were then considered to be in full adherence. The second test was to assess the literacy level in which the study participants were administered “rapid estimate of adult literacy in medicine” (REALM) in which the study participants were asked to read aloud as many words as they could from a word-recognition list, composed of sixty-six health-related words that were arranged in the order from simple to complex. The scoring index was based on the total number of words pronounced with accuracy. The scoring index was as follows: 0-18 words pronounced correctly = third grade level or less, and 19-44 words pronounced correctly = fourth to sixth grade reading levels. The range 0-44 were considered to have a low literacy while 45-60 words indicated the seventh or eighth grade reading level, and were considered to have marginal literacy, and 61-66 words equaled the ninth grade or above, the reading level considered to be adequate.

To confirm the association between race, and literacy, regression analyses were performed with the African American race as the independent variable, and low literacy skills was the dependent variable. After controlling for age, and study size, the study confirmed a significant association between the African American race, and low literacy. In the same way, in regression analyses with the African American race as the independent variable, and medication adherence as the dependent variable, the study confirmed that African Americans were 2.40 (95 percent CI = 1.14-5.08; C statistic = 0.67) times more likely to be non-adherent to HIV medications than non-African Americans. However, when a literacy variable was added with the medication variable, the effect estimates of race diminished from 25 percent to non-significance.

The study confirmed that literacy remained a significant independent predictor of non-adherence with an adjusted odds ratio (ADR) = 2.12 (95 percent CI = 1.93-2.32). Also, African American patients were more likely to possess marginal or low literacy skills when compared to non-African American patients (52.1 percent vs. 14.3 percent, $p < 0.001$), and were significantly less likely to report adherence to their medication regimens in the past four days (60.1 percent vs. 76.8 percent, $p = 0.014$). The final report of the study was patients with low literacy were more likely to be non-adherent (52.2 percent) than patients with adequate literacy (30.0 percent, $p = 0.01$), and that low literacy is a significant problem in African Americans when compared with non-African Americans (Osborn et al., 2007).

In 2003, the National assessment of adult literacy board indicated that approximately half of the US population is either marginally or inadequately literate on health information that has a direct impact on health outcomes (Levinthal, Morrow, Tu, Wu, & Murray, 2008). Especially, for older adults with chronic illnesses, health literacy plays a crucial role in that they could navigate the essential health information related to their health, and utilize them in their self-management (Levinthal et al., 2008).

Based on this national literacy information, Morrow, and colleagues (2007) developed a pharmacy-based educational intervention including concepts of patient-centeredness, and patient preferences for patients with congestive heart failure (CHF). The patient-centered educational information was made simple, written in bigger font sizes of twelve to fourteen, and presented with a limited total of 251 words. Also, it included verbal counseling, a discussion on clinically relevant side effects of medications, and drug information with each intervention patient. Whereas in the standard pharmacy, instructions contain information written in smaller font sizes of eight to ten, and has too many words, with a minimum of 558 words, and included with these is a list of potential side effects of different medications, and drug interactions that may not be relevant to the patient. The presentation of patient-centered information was also relevant to patients' own schedule, timing, and schemas for organizing medication information. The presentation looked like this: 1) Identify medication, 2) How to take the medication, and 3) Possible Outcomes. Patients remembered these types of instructions better, and these instructions also contained pictorial memories with medication name, dose, and time information (Morrow, Weiner, Steinley, Young, & Murray, 2007).

The study participants included 236 community-dwelling volunteers who were diagnosed with congestive heart failure (CHF), and were taking medications for it. The volunteer sample was drawn from Wishard health services, Indianapolis, Indiana. The participants were randomly assigned to the patient-centered education intervention group (N = 83), and the pharmacy-based education control group (N = 153). The control group had a larger number of people because this group was selected, and planned for another cohort study to assess risk factors associated with deterioration of CHF. Both groups participated in the "short test of functional health literacy application" (STFHLA) that required seven minutes to administer, and measured the ability to read, and understand actual health-related passages with readability levels of 4.3, and 10.3 grade levels. Based on the Gunning-Fog index range, the scores were to be as follows: 0-16 = inadequate health literacy, 17-22 = marginal literacy and 23-26 = adequate literacy.

To assess the differences between the two groups based on a patient's preferences, patients were asked seven questions: 1) taking a missed dose, 2) side effects of the medication, 3) what the medication was used for (purpose), 4) medication name, 5) drug interactions, 6) how many tablets to take in a twenty-four hour period (daily dose), and 7) number of times to take the medication (schedule). In addition, patients were asked to indicate as to how familiar they were with standard pharmacy instructions at the rating scale of 1-3 from not familiar at all to very familiar. Statistical analyses included factorial analysis in order to present correlations between individual preference variables, and the common factor. Larger positive values of the composite measure indicated greater preferences for the patient-centered instructions over the standard pharmacy instructions across the seven individual preferences questions (Morrow et al., 2007).

In further regression analysis on patient preferences, and characteristics, the authors explained that the patient-centered instructions were more likely to be preferred by African Americans than by other participants. For African Americans, preferences also depended on familiarity with the instructions. Also, patient-centered instructions were more preferred by participants with lower levels of health-related literacy. In addition, older adults with CHF preferred the patient-centered instructions to learn more on medication adherence, and desired to know more on side effects of the medications. The authors suggested that these study findings have greater implications on design for patient education, that the design construction must include patient preferences, familiarity of the health topic, patients' comprehension level, and that patients with lower levels of health-related, and general cognitive abilities would be benefitted with pictorial, larger prints, and other characteristics of patient-centered instructions that support comprehension (Morrow et al., 2007).

Levinthal, and colleagues (2008) conducted a study as an extension of Morrow et al, (2007), study on cognition, and health literacy with patients who were diagnosed with hypertension (Levinthal et al., 2008). The main objective of this study was to investigate whether there was any association between cognitive ability, and health literacy in a population with diagnosis of hypertension, and with a wider age range (Levinthal et al., 2008).

A total of four hundred, and ninety-two community dwelling adults (N = 492) diagnosed with hypertension, aged twenty-one to ninety-two years, and taking an average of 7.8 prescribed medications, who fit with the inclusion, and exclusion criteria were recruited in the study. Among these participants, seventy-three percent were female, and sixty-eight percent were African American. After completing the collection of baseline data, study participants were randomly assigned to the pharmacy-based patient education program, the intervention group, and to the usual care, which was the control group. Prior to random assignment, all the participants completed STOFHLA, which has the score index of 0 to 36, in which 0-16 equals inadequate health literacy, 17-22 equals marginal literacy, and 23-36 is adequate literacy. Many scholars believe that STOFHLA is an instrument with good validity, and reliability, and that it is generally associated with health outcomes, indicating lower scores for older adults (Levinthal et al., 2008; Morrow et al., 2007).

Based on multivariate regression analyses, the study findings were suggestive of that health literacy was related to age, education, and race. When a cognitive variable was added as an additional twenty-four percent of variance, it greatly reduced the influences of age, education, and race at 75 percent, 40 percent, and 48 percent respectively. The authors concluded that when controlling for cognitive and sensory variables, the STOFHLA scores that were associated with age and education were reduced to a greater level. The findings indicated that while planning for future interventions at improving self-care for patients with a low literacy level, the planning should not impose, and demand on the patients' cognitive abilities, but must rather be tailored to the patients' strengths using familiar and simple concepts (Levinthal et al., 2008).

Friedman & Hoffman-Goetzl (2008), in their systematic review on literacy, and health literacy, found that most healthcare providers tend to overestimate patients' literacy skills, and knowledge, and assume that patients have full comprehension of verbal, and written instructions provided to them (Friedman & Hoffman-Goetzl, 2008). The same scholars have further explained that healthcare providers might not even understand, and consider patients' literacy, and comprehension abilities; likewise, patients with limited literacy skills do not want to or are reluctant to convey their inabilities to understand the instructions by their healthcare providers (Friedman & Hoffman-Goetzl, 2008). Adequate health literacy includes skills like reading, counting numbers, writing, and comprehension; without comprehension, reading, and other skills would become ineffective (Friedman & Hoffman-Goetzl, 2008).

Health literacy is a two-way process between patients, and healthcare providers, and it is an ongoing process (Friedman & Hoffman-Goetzl, 2008). In this way, adequate health literacy is greatly dependent on provider and patient relationships in that the healthcare provider remains proactive by searching current evidence-based information, accessing, and translating them into patients' language that will have a greater influence on patients' health behaviors, and bring better health outcomes (Friedman & Hoffman-Goetzl, 2008). In the next segment, patient-provider relationship will be explored to gain a greater understanding as to how this relationship could have a great impact on medication adherence in African Americans.

Provider-Patient communication is an important determinant of medication adherence

The role of communication between patient, and provider plays a vital role in establishing trust between patient, and provider (Benkert, Peters, Tate, & Dinardo, 2008), and allows the patient to make a high quality decision on his/her own healthcare (Wagner, Riopelle, Steckart, Lorenz, & Rosenfeld, 2010). Building a trusting relationship is paramount between a patient, and provider, and this is the central feature in health promotion, and communication (Benkert et al., 2008). Some other factors are also influenced positively because of this trusting relationship between patient, and provider whereby the patient has willingness to seek care, the level of satisfaction increases, and the patient remains adherent to medications, and treatment protocols, and returns to follow up clinic visits (Benkert et al., 2008). In addition, this trusting relationship is greatly dependent on providers' etiquette including constancy, caring, commitment, honesty, and maintaining confidentiality as prescribed by HIPAA standards (Benkert et al., 2008).

Wagner and colleagues (2010) have explained that patients are expected to make serious decisions in the context of chronic, and serious illnesses including cancer, HIV/AIDS, congestive heart failure (CHF), diabetes, uncontrolled hypertension, and stroke (Wagner et al., 2010). Even though patients will have a general understanding of their illnesses, they do not have an in-depth understanding or full comprehension of their illnesses, and their prognosis (Wagner et al., 2010), and this poor understanding is because of poor communication between the patient, and provider (Wagner et al., 2010).

Benkert, and colleagues (2007) have explained some of the problems in research findings related to a trusting relationship between the patient, and the provider in that the research was focused on the Managed care model in which the provider relationship was limited because of limited time given to care for their patients, and the studies' main focus was on resident physicians, and not on real healthcare providers (Benkert et al., 2008). Based on these study findings, these scholars have suggested that many providers did not recognize that African Americans suffer significant health disparities, and that they were assigned to dominant physicians who believed that African Americans were less intelligent, engage in highly risky behaviors such as substance abuse, and are less likely to adhere to treatment recommendations (Benkert et al., 2008). In some other research findings, physicians were found to be too dominant in their communication, and demonstrated less patient-centered communication with African Americans when compared with Caucasian patients (Benkert et al., 2008).

Cultural mistrust is another concept of patient-provider relationship in which African Americans have a tendency to distrust Caucasian healthcare providers because of a long history of racism, and unfair treatment that they had endured from the Caucasian people (Benkert et al., 2008; Benkert, Hollie, Nordstrom, Wickson, & Bins-Emerick, 2009). Benkert, and colleagues (2007) cited a previous scholar's work by Freedman (1998) on a counseling relationship in which African Americans' cultural mistrust resulted in negative consequences in counseling relationships, primary care relationships, and that especially African American women tend to be more critical of Caucasian physicians (Benkert et al., 2009).

Schoenthaler, and colleagues (2009) cited from the report of the Institute of Medicine (IOM) (2003) on unequal treatment in which the authors explained that the perceived quality of interpersonal communication within the patient-provider relationship is a potential mechanism for the worse health outcomes observed in minority populations (Schoenthaler, Chaplin, Allegrante, Fernandez, Diaz-Gloster, Tobin, & Ogedegbe, 2009). In addition, patients' perception of their providers greatly depends on providers' communication, and listening skills, showing respect while confronting negative behaviors, encouraging patients' active participation in decision making, and involving them in the technical aspects of their care (Schoenthaler et al., 2009).

Schoenthaler and colleagues (2009) conducted a cross-sectional study with African Americans with hypertension, and this cross-sectional study was part of an ongoing randomized controlled trial on counseling African Americans to control hypertension (CAATCH Trial) in the New York metropolitan area. Purpose of the study was to assess the patients' perception of their providers' communication on medication adherence in a cohort of patients who were enrolled in the CAATCH Study. A total of 439 African Americans (N = 439) were recruited for this study, whose blood pressure was either poorly controlled or remained uncontrolled, and a total of seventy-two healthcare providers that included physicians, nurse practitioners, and physician assistants were recruited from different races including Caucasians, African Americans, Hispanics, Asians, and East Indians.

The authors used a well-validated thirteen-item communication scale taken from the Health communication model, which has the ability in assessing patients' perception of their healthcare providers' communication, and the extent to which the providers encourage patients' participation in the treatment process. The responses to questions 1-11 were scored on a Likert Scale as follows: 1 = not at all to 4 = very much, questions 12-13 were scored as 0 = no or 1 = yes, and categorical measurement was used for items 12, and 13. All the responses on this thirteen-item scale were finally converted to a "z" score. By employing different statistical procedures, the authors standardized the measure, and preserved the nature of distribution for parametric analysis. From this analysis, the authors concluded that African American patients with hypertension who experience low income tend to rate providers' communication as more collaborative, and this collaborative communication facilitates better adherence to antihypertensive medications (Schoenthaler et al., 2009).

Halbert and colleagues (2009), based on their observational study that was conducted in the Pennsylvania Cancer Medical Center between 2003 to 2007 with patients who were newly diagnosed with prostate cancer by biopsy, and the Gleason Score, explained that lack of trust in healthcare providers, and the medical system is a significant barrier to effective communication, and use of clinical services, and this mistrust may contribute to poor health outcomes in racial minority patients (Halbert, Weathers, Delnoor, Mahler, Coyne, Thompson, … Lee, 2009). The authors described that the concept of trust explains the quality of relationship between the healthcare provider, and the patients (Halbert et al., 2009). The key influencing factors that affect this relationship include perceptions of healthcare providers' interpersonal skills, and technical abilities, suspicion of healthcare systems, and providers, expectation of unfair treatment, and perceived support from providers (Halbert et al., 2009). The same scholars further explained that African Americans, who have less experience with healthcare providers, tend to report low levels of trust of their providers (Halbert et al., 2009).

Another important determinant that influences trust includes patients' collectivism (Halbert et al., 2009). The construct of collectivism is drawn from the concept of culture that describes the extent to which interdependence, relationships, and cooperation with other is valued (Halbert et al., 2009), and individuals with lower levels of collectivism tend to place greater faith, and priority on their autonomy, independence, and self-direction (Halbert et al., 2009). The authors have cited scholars Gudykunst, Matsumoto, Ting-Toomey et al., (1996), and Devos, Spini, & Schwartz (2002) who have explained from their in-depth empirical work on human values, trust, and cultural individualism-collectivism, and individual values on communication in that it is possible that men with lower collectivism tend to be more skeptical of their healthcare providers, and system, and their communication style, and preferences may not have any clinical significance related to their health (Halbert et al., 2009).

The main objective of this observation study was to identify factors that have significant independent associations with mistrust among both African Americans, and Caucasians diagnosed with prostate cancer (Halbert et al., 2009). A group-based medical mistrust scale (GBMMS) was employed to evaluate mistrust in healthcare providers, and systems. The GBMMS is a twelve-item Likert-style scale that has the ability to measure suspicion on healthcare providers, and the healthcare system, expectation about racial discrimination by healthcare providers, and perceived support from providers. The authors reported that GBMMS had good face validity with validated measures of trust, and good internal consistency in this sample (Cronbach = .86). Higher scores indicated greater mistrust (Halbert et al., 2009). In addition, the authors included the religiosity scale with nine Likert-style items, and the collectivism scale with six Likert-style questions. The authors reported that these scales had acceptable internal consistency in this sample (Cronbach a: collectivism, a = .64; religiosity, a = .94). Higher scores indicated greater levels of collectivism, and religiosity (Halbert et al., 2009).

This study included a total of 196 participants including African Americans (n = 71), and Caucasians (n = 125) who had a face-to-face interview with trained researchers. All participants who were eligible for the study completed a baseline survey at the recruitment sites. Following the baseline survey, study participants were interviewed through the telephone by using a structured survey on socio-demographics, race, and treatment status, and assessed cultural factors, and mistrust, at three months, six months, and at twelve months in thirty minute interviews.

The study findings included socio-demographic variables by bivariate analysis in that African Americans reported a significantly greater mistrust on healthcare providers, and healthcare system. African Americans, who had a high school education or less, and who had been seeing their healthcare providers for more than three months, reported significantly greater mistrust when compared with their Caucasian counterparts on a multivariate analysis. In addition, lower levels of collectivism were associated significantly with greater mistrust. Also, there was a significant effect due to marital status in that the married Caucasians reported greater mistrust when compared with their African American married counterparts. The authors concluded from this study that it might be possible that men become disappointed with repeated interactions with healthcare providers when their concerns are not addressed with clarity. In addition, collectivism has a greater role and effect on mistrust in that when collectivism is decreased, mistrust is increased (Halbert et al., 2009).

In another prospective study, scholars Heckman, and colleagues (2009) investigated race-related differences in the treatment of headaches (migraines) by using longitudinal design (Heckman, Holroyd, Tietjen, O'Donnell, Hamada, Utley … Stillman, 2009). The authors, based on a number of studies, hypothesized that Caucasians who receive treatment for headaches, would respond to treatment better by showing greater reduction of headaches in frequency, severity, and disability, and a greater increase in quality of life (QOL) when compared with African Americans who received the same treatment (Heckman et al., 2009).

A total of 230 participants (N = 230) were recruited from four headache specialty care clinics throughout the state of Ohio. Out of these 230 participants, Caucasians were 171 (n = 171), and African Americans were 113 (n =113). The study participants who satisfied the criteria prescribed by the International headache society (HIS) were recruited. The authors reported that because of underrepresentation of African Americans for this study, physicians who recruited the study participants approached every African American who attended headache clinics and recruited them for the study, but among Caucasians, every fifth person was recruited (Heckman et al., 2009). Initial pre-assessment was done with all 230 participants, and reassured by the same physicians at one month, two months, and six months for follow up visits. Also, all the study participants completed a 23-item Headache Disability Inventory (HDI), and a fourteen-item migraine specific quality of life questionnaire (MSQL) at initial pre-assessment, one-month, two-month, and six-month follow up visits. They were also instructed to maintain a diary of their headache occurrences, and to bring the diary at one month, two months, and six months follow up. During the second clinic visit, all the participants were given preventive treatment for the headache with clear instructions to maintain a headache diary, and to bring the diary for analysis during the sixth month visit. By using the "intent-to-treat" approach, scholars analyzed the diaries on two specific measures: 1) headache specific quality of life, and 2) headache disability. SAS 9.1.3 version statistical software was used for all analysis with alpha level of 0.05 (Heckman et al., 2009).

Based on the analysis of these diaries, the authors concluded that African Americans had significantly poorer headache-specific quality of life, and more frequent severe headaches at pretreatment compared to Caucasian participants ($p < 0.05$). However, after the treatment, both African Americans, and Caucasians reported significant improvement in headache, frequency, disability, and quality of life, and African Americans reported reduction in headache severity; scholars further explained that these study findings did not support their hypothesis that Caucasians would respond more favorably to treatment than would African Americans, and this similar pattern was observed in other chronic conditions such as HIV/AIDS, diabetes, and cancer (Heckman et al., 2009).

The authors interpreted these study findings in that if African Americans and Caucasians have access to specialty care in a similar manner, both groups will respond to headache treatment equally, and in similar manner. The authors further contended that previous research studies that were done have shown poor clinical outcomes with African Americans, and these treatment outcome differences may be because of factors that have potential influence on African Americans, that include financial barriers, and delayed access to care, less trust in healthcare providers, and the healthcare system, poor patient-provider communication, and lack of health centers in their communities (Heckman et al., 2009). The same authors further explained that if African Americans are given equal access to healthcare regardless of their socioeconomic status, and healthcare providers speak their language, they would develop a trusting relationship with their healthcare providers resulting in improved healthcare outcomes (Heckman et al., 2009).

In a review on population issues on clinical trials, scholar Mosenifar (2007) explained that despite the efforts taken through legislation by the National Institute of Health (NIH) (1993) to include study participants from the underrepresented groups of people for clinical trials, the problem remains unresolved in that minority populations, diagnosed with multiple chronic illnesses, are not adequately represented in clinical trials (Mosenifar, 2007). While describing issues related to African Americans, disparities that exist based on their race must be consciously perceived, and acknowledged in clinical trials (Mosenifar, 2007), because this barrier exists at different levels that include patient, healthcare provider, the healthcare system, and the community, and this has a powerful impact on healthcare provider-patient relationships (Mosenifar, 2007). For example, African Americans perceive providing consent for any clinical trials is a prejudicial attitude towards African Americans because obtaining consent is mainly to protect the medical researcher, and at the same time, the patient's autonomy is sacrificed at the altar of medical research (Mosenifar, 2007). In this way, mistrust towards medical researchers, and the healthcare system becomes a tyrannical issue in clinical trials, resulting in poor adherence to medications, and medical therapy (Mosenifar, 2007).

To explore individuals' attitude on medical research and the differences in perception between African Americans and Caucasians in a cardiovascular study, Braunstein and colleagues (2008) conducted a self-administered survey in outpatient clinic settings at different sites in Maryland. Main purpose of the survey was to gain an understanding on individuals' attitudes about medical research, and physicians who conduct such drug trials, and their main reason for participating or refusing to participate in clinical trials. A total of 717 participants consented for the study, and followed through the survey protocol (N = 717). The survey explored whether African Americans differ in their perceptions related to risks, and benefits of participating in clinical trials, and distrust of medical researchers, and whether these factors together play a vital role in their perceptions preventing them from participating in clinical trials. The study key variable was "willingness to participate" (WTP) in clinical trials, and the other variables were attitudes, and perceptions. The study participants included 460 Caucasians (n = 460) = 64 percent, and 257 African Americans (n = 25) = 36 percent (Braunstein, Sherber, Schulman, Ding, & Powe, 2008).

All statistical analyses on all study variables were done using the Strata V 7.0 program. The important study variable "willingness to participate" (WTP) was measured on a five-point Likert Scale: very likely, likely, moderately likely, unlikely, and very unlikely by using the Wilcoxon rank sum statistical procedure (p value = 0.0002). By using a multiple regression analysis, the relationship between race, and WTP was analyzed, and the variables of perception, and attitude became more powerful influencing factors through multiple stepwise logistic regression analyses (Braunstein et al., 2008).

Based on these study findings, the authors concluded that African Americans expressed greater mistrust towards medical research, and the researchers at a much higher level, and perceived that joining any clinical trial would do more harm to them, and cause more injuries. In addition, African American women were more skeptical, and believed that scientists cannot be trusted at all. This mistrust ratio between African Americans, and Caucasians was 8:1 (33 percent vs. 4 percent; Braunstein et al., 2008).

The authors further explained that this greater mistrust in African Americans on clinical trials was caused by the Tuskegee Syphilitic Study (1932-1972) (Gamble, 1997; Benkert et al., 2009; Braunstein et al., 2008), and their past experiences with racism, ethnic biases, and social stigma (Gamble, 1997; Benkert et al., 2008; Benkert et al., 2009; Braunstein et al., 2008). Based on a number of previous qualitative studies on institutional racism (IOM, 2002), the authors further suggested that the healthcare system embraced perpetual, racial, and ethnic biases in a subtle manner (IOM, 2002; Halbert et al., 2009; Braunstein et al., 2008). To the best of their knowledge, no quantitative studies could be found to study WTP (Braunstein et al., 2008), and in the same manner scholars Benkert et al., 2007, and Benkert et al., 2009 have expressed that studies on medical mistrust were done using more qualitative methods with a very small sample population (Benkert et al., 2008; Benkert et al., 2009), and there is a greater need for quantitative studies to justify medical mistrust (Braunstein et al., 2008).

Related to attitudes about racism, medical mistrust, and satisfaction with hospital care among African Americans, and Caucasian cardiac patients, LaVeist, Nickerson, & Bowie (2000) conducted a telephone survey with patients who had multiple hospitalizations for cardiac health problems in 1995, and 1997. Purpose of the survey was to explore patients' attitude, and satisfaction of their hospitalization. Based on their medical needs report, these scholars identified 7,929 eligible participants. According to the guidelines of the American Heart Association (AHA), and the American College of Cardiology (ACC), patients were classified into Class 1 who must have coronary angiography (CA) (n = 2039, 29 percent), Class 2 who may or may not need CA (n = 344, 6 percent), and Class 3 who did not require CA (n = 5276, 67 percent). Trained researchers contacted class 1, and class 2 patients at six months, and twelve months of post hospitalization for a thirty-minute telephone survey (LaVeist et al., 2000).

According to the survey report, 15 percent were deceased, 1.1 percent could not be contacted, and 9.1 percent declined to enroll in the survey. In this way, the final sample size was 1784. All the consented participants were asked four survey questions, and requested to indicate their responses on a four-point Likert Scale: strongly disagree, disagree, agree, and strongly agree. The survey questions included these: 1) Do doctors treat African Americans and Caucasians the same? , 2) Is racial discrimination in doctors' offices common? , 3) In most hospitals, do African Americans and Caucasians receive the same kind of care? , & 4) Can African Americans receive the care they want as equally as Caucasians? (LaVeist et al., 2000)

Using bivariate and multivariate analytical methods, the authors concluded the survey findings. These findings include that both Caucasian, and African American patients indicated considerable mistrust of the medical care system; however, African Americans were more likely to report mistrust across all measures at a significant level ($p < .001$) when compared with Caucasians. In the bivariate analysis, African American patients showed dissatisfaction with the quality of care that they had received in the healthcare system at a significant level (p < .001). Both Caucasian, and African American patients did not agree with the statement of racism existing in the medical care system, but African Americans could easily acknowledge this statement, and go along with it in a significant way (p < .001). Related to patients' attitude on multivariate analysis, the existence of racism in the medical care system, and patients' level of dissatisfaction were found to be significant predictors of patients' satisfaction (p < .001). In other words, patients, who reported less satisfaction with medical care, were those who perceived racism in the medical care system, and were more distrustful of medical care (LaVeist, Nickerson, & Bowie, 2000).

The authors interpreted these findings that this persistent medical mistrust in African Americans was caused by the Tuskegee Syphilitic Study (Gamble, 1997) and their experiences with racism, ethnic biases, and social stigma (Gamble, 1997; Benkert et al., 2008; Benkert et al., 2009; LaVeist et al., 2000). In addition, LaVeist, and colleagues cited a number of scholars who have done qualitative studies on racism, and medical mistrust in African Americans (Ayanian et al., 1993; Ford et al., 1989; Franks et al., 1993; Gastonis et al., 1995; Giles et al., 1995; Whittle, et al. 1993), and who have suggested that African Americans undergo fewer medical procedures that are preventive in nature because of their mistrust in the healthcare system (LaVeist et al., 2000). While it may be very true that African Americans experienced racism, and social stigma that had led them to establish a strong pattern of negative heath belief systems, it would still be possible to cause a change in their attitudes, and health beliefs by increasing their self-efficacy through various ways of educating them on their healthcare (LaVeist et al., 2000; Benkert et al., 2008; Benkert et al., 2009). Self-efficacy, as described by author Bandura

(1977), is the people's conviction of their strength, and ability to bring change in their beliefs, attitudes, and performance (Bandura, 1977), and this concept will be discussed in the following section as to how it brings changes in African Americans with medication adherent behaviors with chronic illnesses.

Self-Efficacy enhances Medication Adherence

In the context of chronic illnesses, self-efficacy plays a vital role in that an individual requires a firm belief, and confidence in his/her abilities that he/she can manage their illness on their own with confidence (Kralik, Paterson, & Coates, 2010). Bandura (1977) defined self-efficacy as the conviction that one can successfully execute the behavior required to produce the outcomes (Bandura, 1977, p.79). For Bandura (1977), the concept of self-efficacy is a major determinant of people's health behavior in chronic illness management (Kralik et al., 2010; Bandura, 1977, 2004) in that the strength of one's belief in his/her capabilities (not necessarily true capabilities) to care for themselves with confidence is a good predictor of future health outcome (Kralik et al., 2010).

The author Bandura (1977) further explained that outcomes and self-efficacy are two different concepts (Bandura, 1977). The concept of "outcomes" specifically indicates that an individual believes that a particular course of action will produce a certain outcome; for example, individuals believe that taking medications for high blood pressure, diabetes, and asthma will control those illnesses, but the question is whether the individual can perform those actions with confidence (Bandura, 1977, 2004). However, the concept of "self-efficacy" indicates people's conviction in their own effectiveness that it allows them to face difficult challenges with confidence or cope with difficult situations such as taking medications for their chronic illnesses (Bandura, 1977, 2004).

Quite often, people are afraid of facing challenges in their lives (Bandura, 1977), and try to avoid such threatening situations (Bandura, 1977). This phenomenon is particularly true with African American people in that they are afraid of participating in any clinical trial (Benkert et al., 2008; Benkert et al., 2009; Gamble, 1997) or taking medications for chronic illnesses because of their past painful experiences (Gamble, 1997). Bandura (1977) explained that self-efficacy establishes a standard as to how people will use their efforts, and to how long they will continue persistently in the face of challenges, and especially in aversive situations (Bandura, 1977). People with more expectations and stronger efficacy will demonstrate active efforts even in the midst of difficulties (Bandura, 1977), remain persistent by actively engaging in their efforts, and ultimately gain mastery of their actions (Bandura, 1977). But in the face of difficulties, individuals who give up in a very early stage in a premature manner, retain their fears resulting in negative consequences (Bandura, 1977), and these fears become debilitating factors in their lives preventing them from accomplishing their desired goals (Bandura, 1977).

The important feature of self-efficacy is that it allows individuals to identify issues, set goals, and build commitment to actions by using problem solving methods (Kralik et al., 2010). According to Bandura (1977), self-efficacy beliefs provide a foundation for human motivation, wellbeing, and personal accomplishment. Also, people believe that their actions can produce the outcomes they desire to persevere in the face of difficulties (Bandura, 1977). The key argument on the role of self-efficacy belief is that it is human functioning, and is capable of evoking motivation, and these actions are based more on what they believe rather than on what is objectively true (Bandura, 1977). For this reason, peoples' behavior can be predicted better often at times by their beliefs that they hold about their own capabilities of accomplishing, because these self-efficacy perceptions help to determine what individuals with knowledge, and skills have (Bandura, 1977).

The authors Kralik, and colleagues (2010) explained that future health status, and health behaviors in people with chronic illnesses are greatly dependent on their self-efficacy, and changes in self-efficacy. The same authors further described that living with a chronic illness is an ever challenging experience, and people have to make considerable adjustments and adaptation to daily life that in turn requires changes in self-efficacy (Kralik et al., 2010). People with a higher level of self-efficacy have a higher level of confidence in their ability to follow medical recommendations (Gherman, Schnur, Montgomery, Sassu, Veresin, & David, 2011), and to expect a more meaningful positive relationship with their healthcare providers (Gherman et al., 2011). For this reason, a few scholarly studies on self-efficacy and chronic illness management will be explained in the next section.

Chen and colleagues (2010) conducted a randomized controlled trial in Taiwan by using the Pretest/Posttest design for a period of six weeks. The main purpose of the study was to assess the effects of self-efficacy intervention in self-care behaviors with asthma, and the self-efficacy of adult asthma (Chen, Shen, Chang, Wang, & Huang, 2010). The study participants were recruited through the adult asthma clinics in Taiwan from March 2, 2009 to January 31, 2010. A total of sixty patients, who fit with the inclusion, and exclusion criteria, were randomized to intervention, and control groups. Each group had thirty participants diagnosed with adult asthma, and both groups completed the pretest questionnaire prior to the study (Chen et al., 2010).

The intervention group received a self-efficacy intervention program that included watching a DVD for fifteen to twenty minutes, reading a self-efficacy education booklet, sharing their experiences with a support group of eight-to-twelve people, and a telephone interview. The illness-sharing support group lasted for forty-five minutes, and this support group offered support, shared information, fostered feelings of belonging, and provided a forum for discussion. In addition, the researcher spent fifteen minutes with each study participant to evaluate his/her confidence level (Chen et al., 2010).

The control group received conventional health education that included individualized oral health lessons, introduction to asthma medications, handling daily issues related to asthma such as avoiding upper respiratory infection, and antigens, and a telephone follow up at the fifth week of study. Both groups completed a posttest at the sixth week (Chen et al., 2010).

A descriptive statistical analysis method was designed using version 17.0 of Statistical package for the social sciences (SPSS) software. The authors reported their study findings in that participants, who received the self-efficacy intervention program, showed better self-care behaviors than participants in the control group who received the conventional outpatient educational program. The study findings included a significant difference in the intervention group in medication adherence ($p = .008$), self-monitoring ($p = .000$), avoidance of antigen ($p = .001$), regular follow up visits ($p = .000$), and regular exercise ($p = .016$). Also, self-efficacy improved significantly in this group in terms of both asthma attack prevention (p = .030), and management during asthma attacks (p = .017) (Chen et al., 2010).

The authors concluded their study findings that self-confidence that was built based on vicarious learning methods, and persuasive techniques (Bandura, 1977) played an important role in providing self-motivation, and adjusting to self-behaviors. Also, the DVD was a powerful persuasive tool. A self-efficacy booklet containing stories of other asthmatic patients' condition, and their coping mechanisms served as a powerful vicarious learning experience. The authors' final conclusion included that asthma self-care greatly depends on a patient's self-efficacy that emphasizes behavior change. In addition, self-efficacy must be incorporated in a patient educational program with any chronic illness (Chen et al., 2010).

Another study related to self-efficacy, and social support was conducted by using a two-group comparative descriptive design by scholars Chlebowy, and Garvin (2006). The purpose of the study was to investigate the relationship between psychosocial variables that included social support, self-efficacy, and outcome expectations to diabetic self-care behaviors, and glycemic controls in both Caucasians, and African Americans who lived in the southeastern states of the United States (Chlebowy & Garvin, 2006). The authors used a convenient sample for recruitment for this study. A total of ninety-one patients with type 2 Diabetes were recruited for this study. The study design included an educational program on type 2 Diabetes at three different locations or called sites A, B, and C. At site A, participants attended a diabetic educational program taught for two consecutive days by a multidisciplinary team. At site B, participants were scheduled for outpatient clinic visits, and taught by a physician, and a registered nurse or a clinical dietician. At site C, participants were recruited for an outpatient educational method by dialogue with a registered nurse or a clinical dietician (Chlebowy & Garvin, 2006).

The authors used four instruments for data collection, and those instruments included the social support questionnaire (AAQ), the self-efficacy questionnaire (SEQ), the outcome expectation questionnaire (OEQ), and the diabetic activities questionnaire (TDAQ) (Chlebowy & Garvin, 2006). All the study participants completed these four questionnaires. At site A, these four questionnaires were sent by mail to their residence with a self-addressed stamped return envelope prior to the first day of the educational program. At site B, participants completed those questionnaires immediately after the educational program at the clinic site. At site C, participants completed those questionnaires during the time of education. At A, and C, hemoglobin AIC levels were obtained from the participants' medical records, and at site B, the hemoglobin AIC level was obtained during the time of clinic visit.

The study results were analyzed by using the Pearson-product-moment correlation, and the findings included these: 1) on relationship between social support, and self-care behaviors: there was no significant relationship, among Caucasians or African Americans when the group was considered total, 2) on relationships between self-efficacy (SC), and self-care behaviors: there was no significant relationship, among Caucasians or African Americans when the group was considered as total or by race, 3) on relationships between outcome expectancy (OE), and self-care behaviors: there was a significant relationship between outcome expectation, and self-care behaviors. The OE score was significantly correlated with self-care behaviors ($r = 0.27$, $p = .01$). When compared with Caucasians, and African Americans, there was no significant relationships between OE, and self-care behaviors for Caucasians, but there was a significant relationship for African Americans between OE, and self-care behaviors ($r = 0.43$, $p = .03$), 4) in the relationship between social support, and glycemic control, there was no significant relationship when the group was considered total, and by race, 5) in the relationship between self-efficacy (SE), and glycemic control, there was no significant relationship when the group was considered total, and by race, and 6) in the relationship between outcome expectation (OE), and glycemic control, there was an insignificant relationship between outcome expectation, and glycemic control when the group was considered total, and by race (Chlebowy & Garvin, 2006).

Based on these study findings, the authors concluded in their report that social support was not significantly related to self-care behaviors, and glycemic control in both Caucasians, and African Americans. There was no significant relationship between self-efficacy (SE), and self-care behaviors, and glycemic controls. The authors cited scholars Ludlow, and Gein (1995) who found in their studies that there was no significant relationship between exercise self-efficacy, and glycemic control, and medication self-efficacy, and glycemic control (Chlebowy & Garvin, 2006). In the same way, another scholar Allison (2003), cited by Chlebowy, and Garvin (2006), found no significant relationship between self-efficacy, and glycemic control (Chlebowy & Garvin, 2006). However, the cited authors Ludlow, and Gein (1995) found in their study that participants with higher levels of general management self-efficacy, and diet self-efficacy had lower glycosylated hemoglobin levels (AIC) (Chlebowy & Garvin, 2006). The authors acknowledged that these differences in different studies might possibly be that different scholars might have used different self-efficacy scales for their studies. Also, the study participants were possibly exposed to previous diabetic education. Furthermore, increased self-efficacy will enable diabetic patients in overall diabetic management (Chlebowy & Garvin, 2006).

In another self-efficacy study, Schoenthaler, and colleagues conducted a randomized controlled trial with African Americans diagnosed with hypertension. The main purpose of the study was to assess whether self-efficacy mediates relationship between depressive symptoms, and medication adherence (Schoenthaler, Ogedegbe, & Allegrante, 2009). A total of 167 African American with hypertension were recruited by trained research personnel from twenty community health clinics in New York City who fit the research criteria. One week after recruitment, a baseline assessment was done on all study participants on demographics, hypertension history, and measures of self-report on medication adherence, self-efficacy, and depressive symptoms. In addition, patients' charts were reviewed for baseline blood pressure readings, and co-morbidities. Following baseline assessment, study participants were randomly assigned to the intervention group who received motivation guidance, and to the control group who received usual care. All participants from both groups were given three-month follow up appointments. The intervention group, after completing three months of a follow up visit, attended a motivational interview with those same trained researchers (Schoenthaler et al., 2009).

The study analyses included demographic data, co-morbidities, baseline depressive symptoms, self-efficacy, and medication adherence at the three-month follow up. By applying four regression statistical models, the authors tested these: 1) the effects of baseline depressive symptoms on three months of medication adherence, 2) the effects of baseline depressive symptoms on three months of self-efficacy, 3) the effects of three months of self-efficacy on three months of medication adherence, and 4) the combination effects of baseline depressive symptoms, and three months of self-efficacy on three months of medication adherence. Statistical significance was set at $p \leq .05$. Also, demographic variables, and co-morbidities were included in the Meditational Pathway Model if they were significant at $p < .05$. The authors found that the mediation effect was significant between depressive symptoms at baseline, and medication adherence at three months, and the combined effects of baseline depressive symptoms, and three months of self-efficacy on three months of medication adherence. The authors also used the Arioan version of the Sobel test to determine if the mediating effect of self-efficacy was statistically significant, and it proved statistical significance (Schoenthaler et al., 2009).

Based on their study findings, the authors explained that self-efficacy mediated the relationship between baseline depression symptoms, and medication adherence. Also, an individual's negative view of self and negative interpretation of their current experiences, and future events can explain as to how those negative attributes affect an individual's self-efficacy, and motivation. In those situations when those individuals are forced to meet the difficulties because of depression, they cast doubts on their abilities or evaluate their capabilities negatively, resulting in low self-efficacy. Furthermore, the authors found through this study, that lower educational attainment was a significant independent predictor of worse medication adherence (Schoenthaler et al., 2009).

The authors described that self-efficacy in the African American population plays a vital role in explaining their depressive symptoms, and its negative effect on medication adherence. This is because those depressed individuals do not recognize their depressive symptoms, and their influence on medication adherence, and they experience low self-efficacy resulting in poor medication adherence. The same authors suggested that these problems must be addressed through proper patient education targeting low self-efficacy, and depressive symptoms, thereby increasing their confidence to participate actively in their healthcare, and in medication adherence. The authors further challenged the healthcare systems, and healthcare providers to monitor their patients carefully for any signs of depression because of their co-morbidities, and chronic illnesses, and to provide patient-centered health education, thereby increasing their confidence in medication adherence (Schoenthaler et al., 2009). In the next section, the effects of education on medication adherence will be discussed.

A Special Note on the Mediation Variable

Scholars Baron and Kenny (1986) described this special statistical analysis method that can be used when a researcher applies a regression model for their analysis (Preacher & Hayes, 2004). Using the mediation variable could help to indirectly assess the effect of a proposed cause on some outcome through a proposed mediator (Preacher & Hayes, 2004). In the previous study by scholars Schoenthaler, and colleagues (2009), they proposed in their study, depression in African Americans as a causative variable, medication adherence as an outcome variable, and self-efficacy as a mediation variable (Schoenthaler et al., 2009). According to Preacher & Hayes (2004), a mediation variable can be any variable; however, a necessary component of a mediation variable is that it should show a statistically, and practically significant indirect effect on the causative, and outcome variables (Preacher & Hayes, 2004). The usefulness of a mediation variable is that it allows the researcher to go beyond merely descriptive analysis to a more functional understanding of the relationships among variables (Preacher & Hayes, 2004). The SPSS and SAS software will allow this computation because the Sobel formula is built into these pieces of software (Preacher & Hayes, 2004).

Educational Methods Pertinent for this Study

Providing education about chronic illness is a challenging task for every healthcare provider, and is a fundamental responsibility of every healthcare provider (McKenzie et al., 2009). Health education is a process of informing people about their illness, the need for taking medications, and the necessary steps to be implemented to prevent unnecessary negative consequences because of their illness (McKenzie et al., 2009).

It is essential on the part of every healthcare provider, taking measures beforehand to educate patients about their illness, especially with those patients who demonstrate fears, anxiety, disbelief, and concerns about taking medications because of inadequate knowledge about their illness, and severity of it (Brunton, 2011). In addition, the education should be reciprocal in which the healthcare provider actively listens to the patient’s concerns, receives feedback from the patient, and includes education about their illness, the reason for taking medications, short, and long-term goals, and benefits, the potential side effects of medications, what could be done to minimize those effects, and prevention of further complications because of illness (Brunton, 2011).

Furthermore, healthcare providers must maximize the opportunity given to them for health education by presenting the information in such a way that it really fits with the patient's literacy, and comprehension levels, by presenting the information at a fifth grade level to some patients (Brunton, 2011). It would be appropriate to use multiple formats to educate patients about their illness, by using visual aids, flip charts, brochures, and technology that provides information with clarity about illness, and medications (Brunton, 2011; Houston, Allison, Sussman, Horn, Holt, Tombaugh … Hullett, 2011).

DVD Method

Houston and colleagues (2011) conducted a randomized controlled comparison study with African Americans with hypertension (Houston et al., 2011). Before implementing the study, the authors collected stories about hypertension from African Americans who live in the inner cities of Alabama. Trained researchers carefully collected stories on hypertension from fourteen different African Americans. The stories were carefully recorded, listened to intently, and made into documentary DVDs to be used for educational purposes for African Americans. Prior to use, those DVDs were tested for cultural sensitivity, and appropriateness. Main hypothesis of this study was that patients in the intervention group would experience more favorable changes in blood pressure than those in the comparison group (Houston et al., 2011).

A total of 299 African American patients, between the ages of eighteen to eighty years, and having a proven diagnosis of hypertension from medical records were recruited for the study. All study participants were randomly assigned to intervention, and control groups, irrespective of their blood pressure control. The intervention group (n = 147) received DVDs that contained hypertension stories such as living with hypertension, the lesson on patient physician communication, and strategies to improve medication adherence. The control group (n = 152) received DVDs on health topics such as sodium-restriction diet, exercise, and dietary changes. All the study participants received their DVDs at baseline after their initial blood pressure was recorded. Patients were followed at three months, and at six-to-nine month period of time, and at each visit, their blood pressure was recorded three times at thirty-minute intervals (Houston et al., 2011).

In addition, the authors conducted another separate random assignment with patients whose blood pressure remained uncontrolled. The group was assigned to a group of ten, either to intervention or control group (comparison group). The comparison group, whose blood pressure remained uncontrolled, attended a DVD educational program in the clinic on “healthy habits action minute.” This DVD was specifically designed to bring a change in attitudes, and behavior, and they watched this DVD in the clinic (Houston et al., 2011).

The study was analyzed by using several statistical methods. Key findings in this longitudinal study included these: 1) Patients with baseline controlled blood pressure experienced no significant differential changes at three months, and at six-to-nine months, 2) Among patients with uncontrolled hypertension, reduction from baseline to three months favored the intervention group for both systolic, and diastolic blood pressure ($p = 0.012$), 3) Also, in this same group of patients, blood pressure reduction from baseline to six-to-nine months favored intervention group in both systolic, and diastolic blood pressure ($p = 0.119$), and 4) In the subgroup whose blood pressure remained uncontrolled, study participants experienced a slightly increased reduction in blood pressure levels, but the different responses were not significant (Houston et al., 2011).

In this longitudinal randomized controlled comparison trial in a sample of 299 (N = 299), the authors found that differences in blood pressure favored that intervention group. Also, participants who received DVDs on hypertension stories benefited because of the visual presentation. In this way, the authors concluded that real life stories combined with technology would be of great value in health promotion (Houston et al., 2011).

Lecture and Pamphlet Educational Methods

Powers and colleagues (2009) conducted a Cholesterol, Hypertension, and Glucose Education (CHANGE) study using a randomized controlled study design. The main goal of the study was to educate African Americans as to how they could modify cardiovascular risk factors, thereby reducing cardiovascular disease outcome (Powers, King, Ali, Alkon, Bowlby, Edelman, … Bosworth, 2009). The study participants included four hundred African Americans (N = 400) who provided consent for the study, and had high cholesterol, hypertension, and diabetes, proven by medical records (Powers et al., 2009). All study participants received an educational pamphlet on cardiovascular risk factors at the baseline interview before randomization. Following the baseline interview, study participants were randomized to intervention (n = 200), and control (n = 200) groups (Powers et al., 2009).

The intervention of the study was a combination of both behavioral, and medication management, an educational program administered by trained nurses who underwent cultural competency, and motivational interviewing training. The intervention also included monthly telephone calls educating patients with tailored information that was relevant, and pertinent specifically to this intervention group. This tailored information provided flexibility in educating patients on cardiovascular risk factors, monitoring blood sugar, and the importance of medication adherence. Also, these nurses served as liaisons between the primary care provider, and patients, and arranged for every three-month clinic visit with their primary care providers including laboratory appointments. The control group received normal primary care visits every three months (Powers et al., 2009).

Analyses of the study focused on testing the primary and secondary hypotheses. The primary hypothesis was that African Americans in the intervention group, who received a nurse-managed educational program, would have a reduction in systolic blood pressure by 5 mmHg, AIC by 0.5 percent, and LDL-D by 20 mgm/dL over a twelve-month period when compared with the control group who received education on cardiovascular risk factors by pamphlets at baseline interview. The secondary hypothesis was to analyze treatment group differences in baseline to twelve months, and change in the CVD-related health behaviors such as taking Aspirin, and other prescribed medications, diet, and exercise as well as changes made with CVD risk factors (Powers et al., 2009).

The statistical power was set at eighty percent through using SAS software. To detect a significant difference between the intervention, and control groups on systolic blood pressure by five mmHg, AIC by 0.5 percent, and LDL-C by twenty mgm/dL over twelve months, the Type I error was set at a = .05 level, and Type II error was set at b = .20 to get a statistical power of eighty percent. Based on this statistical analysis, the authors concluded that patients who received a nurse-managed educational program, demonstrated a significant difference in CVD-related health behaviors, and reduction in systolic blood pressure, AIC, and LDL cholesterol levels. In this way, using educational pamphlets and telephone reinforcements would be greatly beneficial to patients with chronic illnesses (Powers et al., 2009).

Peer Support with Group Discussion and Role Play

Heisler and colleagues (2010) described that peer support groups would allow patients to share their experiences with chronic illnesses, and to receive encouragement, and feedback from their peers (Heisler, Vijan, Makki, & Piette, 2010). The same scholars (2010) cited other scholars that include (Hayward, Manning, Kaplan, Wagner, & Greenfield, 1997; Saadine, Caldwell, Gregg, Engelgau, & Vinicor, 2006; and Vijan, Hayward, Ronis, & Hofer, 2005) who have suggested in their epidemiological studies with diabetic patients that an effective educational model is one that has a combination of both peer support groups, and one-on-one clinical teachings, and this combination module would improve clinical outcome, and can be used in all clinical settings where more chronic illnesses are taken care of (Heisler et al., 2010), while individuals with the same kind of illness meeting a group in a social setting are more relaxed, and willing to share their experiences with each other (Heisler et al., 2010). At these settings, people are more relaxed, and willing to talk openly when the group is guided by a nurse or a non-physician healthcare provider because they perceive that they all face the same challenges in their daily lives (Heisler et al., 2010).

To demonstrate that support groups can be more effective in increasing autonomous motivation, self-efficacy, and self-management care with diabetes, and thereby potential improvement in glycemic control, Heisler, and colleagues (2010) conducted a randomized controlled trial at two United States Veterans Healthcare facilities with 244 male patients. The authors' main objective was to compare two different support groups that included these: 1) reciprocal peer support (RPS), and 2) program with nurse care management (NCM). Following the consent signal, study participants were evaluated for their initial blood pressure, and hemoglobin AIC. Also, all the participants were requested to take a self-administered survey. Among these 244 participants, 216 (89 percent) completed laboratory work, and 231 (95 percent) completed the self-administered survey. Then, the study participants were randomly assigned to either the RPS or the NCM group (Heisler et al., 2010).

Following randomization, because the RPS group needed to have an even number of study participants, randomization algorithms were employed in order to have an equal number of participants who were closer in age. In addition, all study participants, researchers, and care managers were blinded. Also, the protocols for both support groups were concealed until all baseline information was obtained completely (Heisler et al., 2010).

In order to assess the effectiveness of the support groups, a total of fifteen care managers (nine in one VA, and six in second VA) were provided training in motivational interviewing, and in the application of empowerment to facilitate group discussions, encourage patients to identify diabetes-related behavioral goals, and values that are culturally competent, and to develop short-term goals of specific action to meet these plans. In addition, these care managers were given an additional two one-hour booster sessions, and encouraged to apply behavioral components while interacting with patients throughout the VA system. All study participants were educated on algorithms with insulin management but not with oral hypoglycemic medications (Heisler et al., 2010).

A total of 119 participants (n = 119) were enrolled in the NCM support group. The intervention in this support group included an enhanced version of usual care with care manager-led group sessions for 1.5 hours, assessment, and discussion of their blood pressure, laboratory values on AICs, encouragement to schedule follow up telephone calls or face-to-face meetings with their care managers, and educational materials on diabetic self-management (Heisler et al., 2010).

In the same manner, a total of 125 participants (n = 125) were enrolled in the RPS support group. The intervention for this support group comprised of care managers, and research assistants who led three-hour sessions, the evaluation, and discussion of their blood pressure readings, and their blood sugar levels, and a brief communication skills training. After the training, participants were paired with age-matched people, and encouraged to call their partners using the telephone interactive method once a week. Special communication tools were set up in such a way that they were not in need of exchanging their telephone numbers. These telephones recorded call initiation, frequency, duration of use, and initiated automated reminders once in seven days if they had not called each other. These telephone systems allowed them to leave voice mail messages to research staff or care managers. In addition, the participants received a DVD on communication skills, and a diabetes self-management workbook that would guide them with their peer telephone conversation. Furthermore, they were given options of attending three sessions for 1.5 hours in which study participants were actively involved in sharing their concerns, encouraging their group members, and planning new strategies in their action plans. The researchers, and care managers, who remained passive, facilitated these sessions thus allowing the group to lead, and be more actively involved.

The study findings were analyzed by mixed commands or simple linear multiple regressions in STATA 11.0 version statistical software because of its capabilities for advanced statistical procedures that include multilevel mixed-effects, linear regression models. The analyses included all the measurements taken at baseline and during intervention at three months, and at six months when the study was completed. The sample size was estimated prior to the study to provide eighty percent power with a two-sided a level of 0.05 to detect difference in Hemoglobin AIC level of 0.5 percent between groups. The key component of this intervention was pairing partners by age matched to form a real peer support group in the RPS intervention group. According to these scholars, previous studies that were done on support group interventions used qualitative methods whereas this present intervention that was based on randomized controlled trial was the first one to use a quantitative method, thus becoming an important study to explain as to how a peer support group becomes an essential part in the self-management of chronic illnesses (Heisler et al., 2010).

The study findings included that there was no significant difference in baseline characteristics among study participants in both groups ($P < 0.100$). In the HbAIC measurements, the RPS support group had a significant reduction from 8.02 percent to 7.73 percent, but the NCM support group had an increase from 7.93 percent to 8.22 percent at six months. These measures indicate that there was a 0.29 percent decrease in the RPS group, and 0.29 percent increase in the NCM group. By stratified analyses of HbAIC, the RPS support group had a mean decrease of 0.88 percent at six months, whereas the NCM group had a mean decrease of 0.07 percent. In addition, eight participants in the RPS group began their insulin therapy, whereas only one participant in the NCM group began insulin therapy (P = 0.20). Along with Insulin therapy, the RPS study participants reported increased adherence with oral hypoglycemic agents. At six months, the RPS support group reported greater increase in telephone conversation with their peers, thus receiving greater encouragement, and social support related to diabetic care when compared with NCM support (Heisler et al., 2010).

The authors, based on these study findings, concluded that people with chronic illnesses need more support in self-management, and this type of support could be provided through support groups (Heisler et al., 2010). Also, peer support groups, according to these scholars, are more cost-effective when compared with usual classroom lectures that are offered in the clinics (Heisler et al., 2010).

Summary

In this chapter, the body of evidence-based literatures on medication adherence with chronic illnesses has been explored. The primary population focus was inner city African Americans who live with chronic illnesses such as hypertension, hyperlipidemia, diabetes, and asthma/ COPD. Many randomized controlled studies on various topics, related to medication adherence by various scholars, were critically examined to explain the behavioral component of medication adherence, and to shed light on potential influencing factors that had contributed to non-adherence with medications. These potential influencing factors included 1) perception of chronic illnesses, and illness dimensions, 2) socioeconomic factors, 3) mistrust of healthcare, and the healthcare system, 4) depression due to chronic illnesses, 5) African Americans' health beliefs, 6)

Patient-Provider communication, 7) Poor health literacy, 8) racism, 9) low self-efficacy, and 10) failure of providing culturally competent health promotion, and lack of peer support.

The review of several literatures has demonstrated that medication adherence is a complex behavior subjected to human and environmental determinants. The literature described the important aspect of human nature as to how it influences human behavior. Many of these studies, and the statistical data reviewed concluded medication adherence with chronic illnesses can be improved, especially among African Americans if they are informed adequately with culturally competent health messages by providing education according to their comprehension levels. Chapter three will present methods, and interventions that will guide this research.

Chapter 3: Research Methodology

Overview

The main focus of this proposed study was to assess the effectiveness of different educational methods that include lectures, video presentations, role-playing, and group discussions to promote medication adherence in African Americans with chronic illnesses such as hypertension, hyperlipidemia, diabetes, asthma, and COPD. The study is based on the theoretical framework of the SCT of (Bandura, 1977), and the TPB of (Ajzen, 1991).

Review of the literature included several randomized controlled trials by various scholars who have explained that medication adherence is a paramount behavior to control mortality, especially in African Americans (Granger et al., 2008; Kripalani et al., 2007; McDonald et al., 2002). This study is particularly important for African Americans because of higher prevalence of cardiovascular disease affecting African Americans in a disproportionate manner when compared with other ethnic groups (Chobanian et al., 2003).

Results of various clinical trials on medication adherence by several scholars have demonstrated that there is a strong association between medication adherence with chronic illnesses, and reduction in morbidity, and mortality (Chobanian et al., 2003; Kripalani, Risser, Gatti, & Jacobson, 2009; Schoenthaler et al., 2009). To gain an in-depth understanding on chronic illnesses, and as how African Americans are disproportionately affected with chronic illnesses when compared with other ethnic groups, several scholars have conducted randomized controlled trials in various clinical settings, and have concluded that medication adherence becomes a significant determinant in the control of chronic illnesses, thereby reducing morbidity, and mortality (Chobanian et al., 2003; Kripalani et al., 2009).

Based on these scholars' report, evidence is clear that promoting medication adherence for patients with chronic illnesses is a major public health challenge, and these challenges have to be dealt with multipronged approaches (Chobanian et al., 2003; Kripalani et al., 2009; Levine & Green, 1985). For this reason, this chapter focuses on explaining methods employed through a randomized controlled trial to educate inner city African Americans with chronic illnesses, and who live in Chicago. The study purpose is to assess the effectiveness of educational methods that include lectures, video presentations, role-playing, and group discussions to promote medication adherence with chronic illnesses that include hypertension, high cholesterol, diabetes, asthma, and COPD.

Educational Methods: Lecture, Video, Role-Playing, and Group Discussions

The barriers for not taking medications have been studied and explained by various scholars (Kelly & Jorgenson, 2012). Because the factors influencing medication adherence are many and varied, various interventions are needed that will be appropriate and culturally sensitive to enhance medication adherence (Murray et al., 2004). Scholars Kelly and Jorgenson (2012) have explained that taking medications or not taking medications is a complex issue and there is no set gold standard to describe this complex behavior. Murray et al. (2004) explained that adults more than 50-years-old often have multiple chronic illnesses requiring multiple medications and interventions needed to increase and improve patient education. Therefore, increasing a patient's knowledge about his/her medications and self-efficacy allows him/her to make positive changes in health beliefs, increase adherence behavior, and learn to take responsibility for his or her own health (Murray et al., 2004).

The National Council on Patient Information and Education (NCPIE; 2007) has explained that in the United States, nonadherence affects people of all ages, both genders, and well educated people as well as people with minimal education (NCPIE, 2007). The NCPIE acknowledged that people in the United States have inadequate knowledge about significance of medication adherence as a critical element of their improved health. This non-adherence problem had been neglected and overlooked as a serious public health problem, and as a result, it has become one of the major national health problems resulting in approximately 177 billion dollars annually in total direct and indirect health care costs (NCPIE, 2007). Recognizing these nonadherence problems with medications is important, especially with chronic illnesses such as hypertension, diabetes, hyperlipidemia, asthma, COPD, and glaucoma. The NCPIE (2007) has recommended establishing a multidisciplinary approach to adherence education and management (NCPIE, 2007) in which the patient becomes an active member in this educational process (NCPIE, 2007).

The council further outlined strategies that could be implemented by healthcare providers in order to enhance health promotional activities to promote medication adherence (NCPIE, 2007). These strategies include using verbal discussion and written materials based on evidence to help patients understand the chronic condition, the need for taking medications, and value of taking medications (NCPIE, 2007), offering counseling with clearly written pamphlets (NCPIE, 2007), providing written information in a patient's own language (NCPIE, 2007), offering practical skills sessions such as monitoring blood sugar, reading medication names, being able to open the pill bottles, and reminders to take medications (NCPIE, 2007). Furthermore, application of these strategies through lectures, video presentations, group sessions, and role-playing involving community members will further strengthen adherence behavior (NCPIE, 2007). Some scholars have provided evidence for these educational methods in that they had applied, through randomized controlled trials, to bring social change with medication adherence.

This section explains a randomized controlled trial that took place in Sweden to assess the effectiveness of peer group education on diabetes. Adolfsson and colleagues (2006) conducted a randomized controlled trial at seven primary care centers for a period of one year in Sweden. The purpose of the study was to evaluate the impact of peer group education on empowerment with Type 2 diabetic patients, whether there will be an increase in knowledge, self-efficacy, and improvement in daily life demonstrated by laboratory values (Adolfsson, Walker-Engström, Smide, & Wikblad, 2006). A total of 101 patients were recruited and 88 patients agreed to participate in the study. The group was randomized to intervention group (*n* = 42) and control group (*n* = 46).

The aim of the study was to evaluate the impact of group education on empowerment on knowledge, self-efficacy, and satisfaction with daily life on patients with Type 2 Diabetes. Patients in the intervention group met twice in a week for forty-five minutes and were encouraged to share their experiences and problems that they encountered in their daily life. A nurse, well-trained on diabetic control served as group facilitator. The control group received routine diabetic care following Swedish national guidelines for diabetes, and they visited their provider twice a year. Both groups completed a 27-item validated questionnaire before and after the study (Adolfsson, Walker-Engström, Smide, & Wikblad, 2006).

The data analysis was done through SPSS Version 14.0. The scholars used student t test, Mann-Whitney U test for continuous variables for comparison between the groups, and ANCOVA to estimate between group differences in AIC and BMI. A two-tailed p-value < 0.05 was considered statistically significant at a 95% confidence interval. The authors reported that patients in the intervention group, after one year, demonstrated the level of confidence in knowledge, which was significantly higher when compared with the control group and no significant differences were found in self-efficacy and satisfaction with daily life. Based on these study findings, the authors concluded that education in group settings demonstrated significant increase in knowledge, but did not show significant differences in self-efficacy and satisfaction with daily life. The authors acknowledged all the study participants and all those who assisted with this study. The authors have acknowledged the limitations and challenges of this study and have made suggestions for improvement (Adolfsson, Walker-Engström, Smide, & Wikblad, 2006).

In another randomized controlled trial with African Americans diagnosed with hypertension, Schoenthaler and colleagues (2011) have examined the effects of role play in a group setting. The role play was about comprehensive lifestyle change with hypertension and it was followed by group-based counseling and motivational interviews (Schoenthaler, Luerassi, Teresi, Silver, Kong, Odedosu, … Ogedegbe, 2011). The role play concepts included regular exercise, taking medications, choosing a diet, and weight reduction. The study included a total number of 200 low income African Americans diagnosed with hypertension between the ages of 18 to 60 years old (Schoenthaler et al., 2011).

The study participants, who satisfied the study protocol, were randomized to intervention group (*n* = 100) and control group (*n* = 100) using SAS software. The intervention group attended ten group sessions comprised of role-playing and counseling within a period of three months. Each session lasted sixty to ninety minutes. The participant's blood sugar was monitored three times at five-minute intervals before each group session and an average reading was taken for each group session. The intervention group further received motivation through telephone contacts for another three months after the group sessions were completed. The blood pressure readings were taken at six-month intervals after the motivation interview was completed. The control group participants received regular blood pressure care and counseling through pamphlets and were followed in regular primary care clinics. Prior to the study, all study participants' blood pressures were taken as baseline readings for the study.

The data was analyzed using multivariate analyses of variance (MANOVA) and intent-to-treat statistical methods. The authors, based on the study findings, concluded that the intervention group's blood pressure improved by six to seven mm Hg on systolic blood pressure (SBP) and five to six mm Hg on diastolic blood pressure (DBP) when compared with the control group. The same authors have reported that there were many challenges with this study, especially with recruitment and retention of study participants in spite of providing adequate incentives given to the study participants. The same scholars further suggested that patient education on lifestyle changes require many different strategies and these strategies include role plays, audio-video presentations, counseling in groups or on an individual basis, written pamphlets and materials, motivation through peer group, and telephone reminders to be considered and included while planning an educational program (Schoenthaler et al., 2011).

Hill et al. (2009) conducted a randomized controlled trial in a primary care clinic in Canada with patients who were newly diagnosed with chronic obstructive pulmonary disease (Hill, Mangovski-Alzamora, Blouin, Ginyatt, Heels-Ansdell, Bragaglia, … Goldstein, 2009). The purpose of the study was to improve patient educational programs in the primary care clinics on self-care management (Hill et al., 2009). A total of 131 people were identified for the study and were given Bristol COPD knowledge questionnaire (BCKQ) to complete. Only ninety-three participants completed the questionnaire, and they were randomized to intervention group (n = 50) and the control group (n = 43) (Hill et al., 2009).

The intervention group received a special educational program by trained personnel who used video presentation, lecture, and a demonstration of as how to handle inhalers used in COPD. The education lasted sixty minutes and was repeated in the same way after one month. The educators followed the same educational strategies with the aim to increase a patient’s knowledge and self-efficacy on COPD self-management. At the end of each educational program, the intervention group completed the Bristol COPD knowledge questionnaire (BCKQ). Following the second month educational program, the intervention group received a manual with the title of “Living well with COPD,” which was written in simple language with several illustrations, with minimal medical jargon. Individuals in the control group received the usual care from primary care physicians without any special emphasis on education (Hill et al., 2010).

At the end of the third month, both groups completed the Bristol COPD Knowledge Questionnaire. Statistical analysis was performed using SAS software. Between and within-group differences were analyzed using ‘t’ tests. From these analyses, it was shown that the intervention group score increased from 27.6 to 36.5, whereas the control group score remained statistically almost the same, varying from 29.6 to 30.2 in the Bristol COPD Knowledge Questionnaire, with $p < 0.001$ and a confidence interval of 95%. The magnitude of change in the intervention group was greater when compared with the control group. Based on these study findings, the authors concluded that education on COPD self-management using videos, lectures, demonstration of skills, and providing a manual on self-management was very effective with newly diagnosed COPD individuals at the primary care clinic sites, in spite of providing education in a short duration (Hill et al., 2010).

Hesselink and colleagues (2004) conducted a randomized controlled trial in the Netherlands with patients diagnosed with asthma and chronic obstructive pulmonary disease (Hesselink, Penninx, van der Windt, van Dain, de Vries, Tvisk, … van Eijk, 2004). The purpose of the study was to assess the effectiveness of patient education on asthma and chronic obstructive pulmonary disease. A total of 663 patients were identified with asthma and chronic obstructive pulmonary disease from the medical records and they were invited to participate in the study. 276 patients responded and agreed to participate in the study. Randomization was done using a blinding method and patient allocation was done to both intervention and control groups. Prior to randomization, baseline assessment was done on all patients, and after stratification by age, study participants were allocated to intervention (n = 139) and control groups (n = 137) (Hesselink, et al., 2004).

The intervention had an educational program based on the Dutch Asthma Foundation that included information about disease, medications, inhaler techniques, recognizing allergic symptoms, and ways to control those symptoms. The evaluation of a patient’s knowledge and self-efficacy was measured at baseline, after one year, and after two years. The intervention group received education on asthma and COPD symptoms, medications to relieve symptoms and maintenance, inhaler techniques, social and environmental triggers, and ways to recognize the allergic symptoms and to take prompt action. Also, at the end of the educational program, they received the Dutch Asthma Foundation booklet which had detailed patient information on asthma and COPD self-management. The educational program was administered by general practitioner assistants who used video presentations, role plays, and counseling, for thirty minutes face to face. The control group received usual care from their general practitioners (Hesselink, et al., 2004).

Statistical analysis was done to determine the effectiveness of the intervention, with one year and two year follow ups, using linear and logistic multi-level analyses with MIWIN software, the levels that were included being patients, general practitioners, and general practitioner assistants. In addition, subgroup analyses were done to investigate whether the treatment effect varied between patients with the diagnosis of asthma or COPD, and COPD mixed with asthma, and between males and females. Based on these statistical findings the authors concluded that patients in the intervention group had shown significant improvement in inhalation technique, and medication compliance, but had no change in smoking cessation when compared with the control group (Hesselink, et al., 2004).

The authors acknowledged the staff that provided their valuable service for this research work, described the limitations of the study, and provided suggestions for future improvement in methodology. The same scholars explained the challenges that they had encountered with recruitment and retention of the study participants. Suggestions were provided to improve patient educational methods with chronic illnesses with the focus of bringing a social change through their self-care management (Hesselink, et al., 2004).

In this way, many scholars have described through their empirical study, the effectiveness of using educational methods in a variety of ways in spite of challenges that they had encountered in including group discussion (Adolfsson, Walker-Engström, Smide, & Wikblad, 2006), and role plays with various health promotional concepts (Schoenthaler et al., 2011); other methods they used included video presentations, lectures, demonstration of skills, pamphlets, and an educational manual (Hill et al., 2010); finally, lectures, videos, face-to-face counseling, and providing booklets could also be helpful (Hesselink, et al., 2004). The same scholars have provided evidence with clarity as to how these educational methods were effective in improving knowledge, self-efficacy, and change in health beliefs with chronic illnesses. The same scholars have further suggested implementing a variety of educational methods to increase knowledge and skills, and to improve health behaviors and self-management (Adolfsson, Walker-Engström, Smide, & Wikblad, 2006; Hill et al., 2010; Schoenthaler et al., 2011).

Bandura (1977), in his social cognitive theory, has explained that coping with the demands of everyday life such as taking daily medications, self-monitoring weight and blood sugar, doing regular exercise, and other activities would be exceedingly trying (Bandura, 1977, 2004). He has further explained that people can exercise some control over their behavior and their own self-reinforcement plays a vital role in successful self-directed behavior (Bandura, 1977). He firmly believes that higher cognitive capacities enable people to conduct most problem solving, and that the application of different pedagogical methods for teaching skills and imparting knowledge would become more crucial (Bandura, 1977). In this proposed study, the application of lecture, video, role play, and group discussion methods would be justified with a hope of bringing a social change in medication adherence among patients with chronic illnesses. Bandura (2004) had suggested using any educational method in health promotion to bring a social change that would increase self-management behavior (Bandura, 2004).

In summary, chronic illnesses continue to weigh more heavily on healthcare resources; thus educating on lifestyle changes, medication adherence and self-care management have become factors of paramount importance (Bandura, 2004; Butterworth, 2008). In this way, this proposed study would be justified in educating African Americans with chronic illnesses using lectures, video presentations, role-plays, and group discussions. Educating people, in addition to prescribing medications, should be the first fundamental responsibility of any healthcare provider (NCPIE, 2007).

The explained study design furthermore includes randomization, recruitment, selection of study participants, and inclusion, and exclusion criteria. The included study instruments are these: 1) Morisky medication adherence scale (MMAS), 2) Self-efficacy for appropriate medication use (SEAMS), and 3) Beliefs about Medication Questionnaire (BMQ-18). The other components are the place of study, and settings, ethical procedures involved protecting the study participants, and the study, and statistical procedures involved in analysis.

Research Design and Approach

Fisher (1935) for the first time introduced the concept of randomization (Pocock, 2009). Fisher's primary interest was to draw a valid unbiased empirical conclusion while working in the agricultural field that he treated experimental plots of lands with various crops, and fertilizers, by using random assignments (Pocock, 2009). Fisher (1935) explained that randomization in research yields two significant advantages: 1) it guards against any use of judgment or systematic arrangements leading to one treatment, thereby avoiding biases, and 2) it provides a basis for the statistical standard methods such as significance tests (Pocock, 2009). Creswell (2009) explained that in a time experimental design, the study participants are randomly assigned to groups, which means that the study participants are randomly assigned to the intervention group, and the control group (Creswell, 2009). This procedure eliminates potential biases among the characteristics of the participants that could affect the study outcomes so that any differences in outcomes can be attributed to the experimental treatment alone (Creswell, 2009). Scholar Marks (2003) cited author Hill (1953) who firmly believed, and acknowledged that randomization prevents biased estimates of the value of new therapies in clinical settings, and that randomization is necessary for accurate, and valid interpretation of statistical significance (Marks, 2003).

A single-blind randomized controlled trial with Pre-Test/Post-Test group design will be implemented in this study to assess the effectiveness of educational methods that include lectures, video presentations, role-playing, and group discussions to promote medication adherence with inner city African Americans who take medications for hypertension, high cholesterol, diabetes, asthma, and COPD.

Design: Group A R__________T0_______x____________T2

Group B R__________T0____________________T2

(Creswell, 2009)

A Single Blind Randomized Control Group Pretest/Posttest Design

In this randomized controlled design, all conditions are the same for both experimental, and control group with the exception that the experimental or intervention group is exposed to educational interventions whereas the control group is not exposed to intervention, and receives regular education on medication adherence (Cresswell, 2009; Dimitrov & Rumrill, 2003). The threats to internal and external validity will be controlled by conducting the study by following strict random selection of the study participants and informing the volunteers with clarity about the entire study methodology. The study will be conducted in one of the southwest communities of Chicago in a church that is predominantly attended by African Americans. The study participants will be African Americans between the ages of 18 to 65, who are able and willing to give their written consent. The study will use the same instruments as pretest and posttest to avoid confusion with instruments. The study participants will be randomly assigned to experimental and control groups to obtain the probability of being equally distributed in both group. The blinding and randomization will be done by computer.

The study participants from both groups will meet in the same church at a designated time but the volunteers carefully make sure that both groups are separated and meet in different rooms for the entire study time. The control group will receive the same education that was given to the experimental group after the study is completed and there will be no pretest and posttest. The study participants, who remained in the study for the entire period of study, would receive their incentives after the study was completed.

Randomized Pretest/Posttest Control Group Design

Randomly Assigned	Pre-Test	Treatment	Post-Test
Experimental Group: Group A	T1	X	T2
Control Group: Group B	T1		T2

Potential Bias in RCT

Bias is anything that sways away from the truth (Lewis & Warlow, 2004). In statistics, bias means "a tendency of an estimate to deviate in one direction from a true value" (Jadad & Enkin, 2008). Scholars Lewis & Warlow (2004) have argued that just because a study is designed as a randomized controlled trial it does not mean that it is an unbiased trial or will be without any bias (Lewis & Warlow, 2004). Some scholars have explained that even though the randomized controlled trial is considered the most powerful and strongest design for evaluating the effects of health information, the potential for bias is still possible during allocation, selection, treatment, and reporting of the study findings (Viera, Shrikant, & Bangduwala, 2007; Stolberg, Norman, & Trop, 2004). The authors have identified bias that includes allocation bias, selection bias, ascertainment bias, choice-of-question bias, and IRB bias (Viera, Shrikant, & Bangduwala, 2007; Stolberg, Norman, & Trop, 2004).

Steps to Minimize Bias

The proposed study recognizes the potential bias that could occur in this randomized controlled trial. For this reason, the processes of allocation concealment will be implemented in which study participants will not know to which group they are assigned to, and this allocation concealment will minimize potential selection bias and protect the randomization sequence before and until the intervention is given to the study participants.

The second step to minimize potential bias will be following blinding in which the researcher will be unaware of the identity of the study group, and data will be assigned codes such as intervention group data will be 'A' and the control group data will be 'B'. In this way, the ascertainment bias will be minimized during and after data collection. The codes can be broken once the analysis is completed (Jadad & Enkin, 2008).

The third step will be stratification of study participants in which study participants will be stratified according to their age and gender. Stratification according to the illness category may not be possible because of its clustering pattern in that one individual may have more than one diagnosis (Jadad & Enkin, 2008).

In summary, this proposed randomized controlled trial recognizes potential bias that can occur before, during, and even after completing the study. Scholars Jadad & Enkin (2008) have explained numerous types of potential bias that can hamper a randomized controlled trial. The same scholars have emphasized that in a randomized controlled trial, application of the allocation concealment process is pertinent and must be done with great care in order to avoid selection throughout the study. Blinding reduces ascertainment bias and protects the randomization sequence after allocation. For this reason, randomization will be done using computer technology (Jadad & Enkin, 2008).

Variables

The National High Blood Pressure Education Program that was presented along with the complete Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) emphasized that meeting medication adherence requirements is pertinent, and imperative in order to improve quality of life, and to foster public health of a community in general (Chobanian et al., 2003). Many scholars have explained that medication adherence deficits are disproportionately high among the African American population (Schoenthaler et al., 2009; Kripalani et al., 2009).

Based on a number of scholars' report on medication adherence with chronic illnesses, the city-dwelling African Americans experience morbidity, and mortality at an increased rate when compared with other city-dwelling ethnic minority populations (Schoenthaler et al., 2009) because of chronic illnesses, and a disproportionate higher incidence of poor medication adherence (Schoenthaler et al., 2009; Kripalani et al., 2009). For this reason, it would be worthwhile to investigate medication adherence behavior with chronic illnesses in inner city African Americans because empirical studies have shown compelling evidence that using different educational methods will improve medication adherence.

The study dependent variables include gaining knowledge, increasing self-efficacy, and change in beliefs on medication adherence. The independent variable of this study would be different educational methods such as lectures, video presentations, role-playing, and group discussions on medication adherence of patients with hypertension, high cholesterol, diabetes, asthma, and COPD. The application of the Pre-Test/Post-Test design method would allow one to measure the effectiveness of different educational methods as to if there would be any changes in cognitive skills, self-efficacy, and in health beliefs related to medication adherence. Three instruments that have proven validity and reliability will be used to measure these changes in the form of Pre-Test/Post-Test questionnaires. The details on validity and reliability of these instruments are explained in later paragraphs under the subheadings of each instrument. These instruments included are these: 1) Morisky Medication Adherence Scale (MMAS-8) to measure cognitive skills changes (Morisky, Ang, Krousel-Wood, & Ward, 2008), 2) Self-Efficacy for Appropriate Medication Use Scale (SEAMS-12) to measure changes in self-efficacy (Risser, Jacobson, & Kripalani, 2007), and 3) Beliefs about Medicine Questionnaire (BMQ-18) to measure changes in health beliefs (Horne & Weinmann, 1999).

Setting and Sample

This randomized controlled study will take place at Elim Christian Church, which is geographically located in a southwest side community of Chicago. At the beginning of the twentieth century, population growth in this community was very slow. After World War II, and the development of nearby Ford City, population growth increased. The initial population of the Southwest community was predominantly Irish Catholic until the 1990s. Initially, the neighborhood slowly grew with the construction of small coffee shops, and catholic schools, and much later, in the 1990s, the neighborhood began to diversify. In 1999, the New York Times published an article on this Southwest

Neighborhood, and explained the plight of African American people in it, and the difficulties that they were experiencing in integration within the communities. Thus, this neighborhood became predominantly an African American community in the late 1990s. The current population in this neighborhood is 39,558 African Americans (The Chicago Fact Book Consortium, 1995).

Elim Christian Church is located in this southwest neighborhood of Chicago serving the African American people in that neighborhood, and providing services in various ways. The church participants include African Americans of all age groups, and who come from diverse African American families. The church serves them in providing spiritual help, promoting education, and helping families who have economic, and social struggles. Step of Faith Ministries is a part of this church, and helps members of the congregation who have difficulties, and struggles in various ways. The church attendance falls within 200 to 300 people every week. Pastor Ford, who is a member, and the Pastor for Step of Faith Ministries, graciously accepted my request that the study be conducted in this church. The study problems will be drawn from this neighborhood.

The study targets the African American adult population from this southwest neighborhood who attend Elim Christian Church. African Americans, who take medications for hypertension, high cholesterol, diabetes, asthma, and COPD, will be self-identified. It may not be possible to survey the entire population of this southwest community who attend Elim Christian Church; it is necessary to conduct a test of power analysis for a sample size of 142 people to identify a statistically significant relationship (Frankfort-Nachmias & Nachmias, 2008).

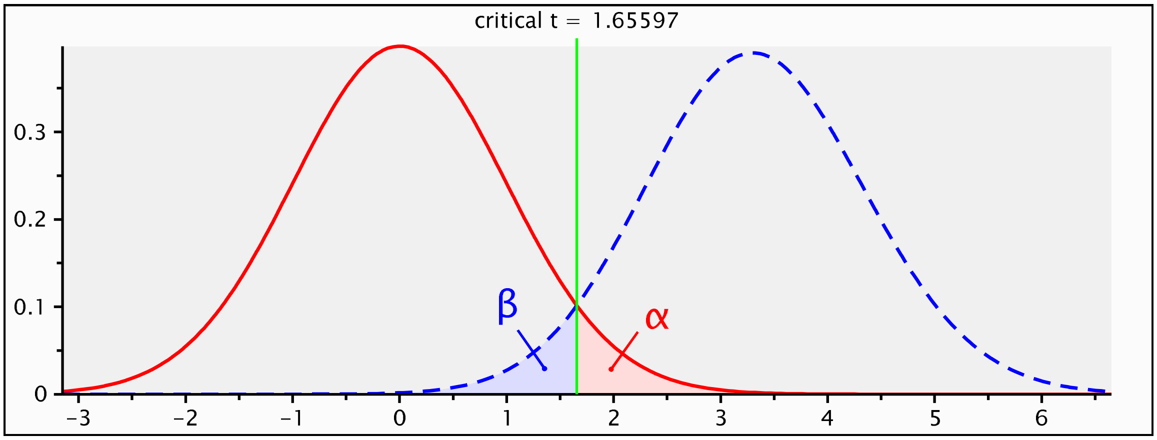
Sample Size Determination

Determining a sample size for any study is a priority in the early phase of design construction when challenges are still possible. Thus, it has become necessary to determine sample size for this proposed study. The study population for this study will be African Americans from the southwest community of Chicago. According to the US census reported in 2010, there are 16,451 African Americans living in this community. However, the sample size for the study will be determined based on the inclusion/exclusion criteria and the power analysis. The inclusion/exclusion criteria specified the age group of the study population and who will attend this local church where Step of Faith Ministry regularly conducts its meetings and worship.

Based on information gathered from the local pastor, the total number of people attending this church regularly ranges from 250 to 320 and sometimes there are a few more. This includes people less than eighteen years of age, approximately about 40 to 50 in number, and people of more than sixty-five years of age, about 8 to 10 in number. Thus, for the sample size determination, it is appropriate to include only people who are above eighteen years and less than 65 years of age. According to the above mentioned numbers, the average number of people who attend this church weekly will be 285 out of which, sixty people will not be included in the study because of the age limit criteria, resulting in a total of 225 adults being available for the study, and sample size for this proposed study will be determined from this total of 225.

Conventionally, alpha level and power are predetermined (Charles, Giraudeau, Dechartres, Baron, & Ravaud, 2009). For this proposed study, sample size determination was done using GPower analysis for both t test and ANOVA statistical measures, keep □

at 0.05 and CI at 95%, according to which, the sample size required for this study will be 140 to 145. The G Power Analysis for t test and ANOVA are shown in the next two pages.

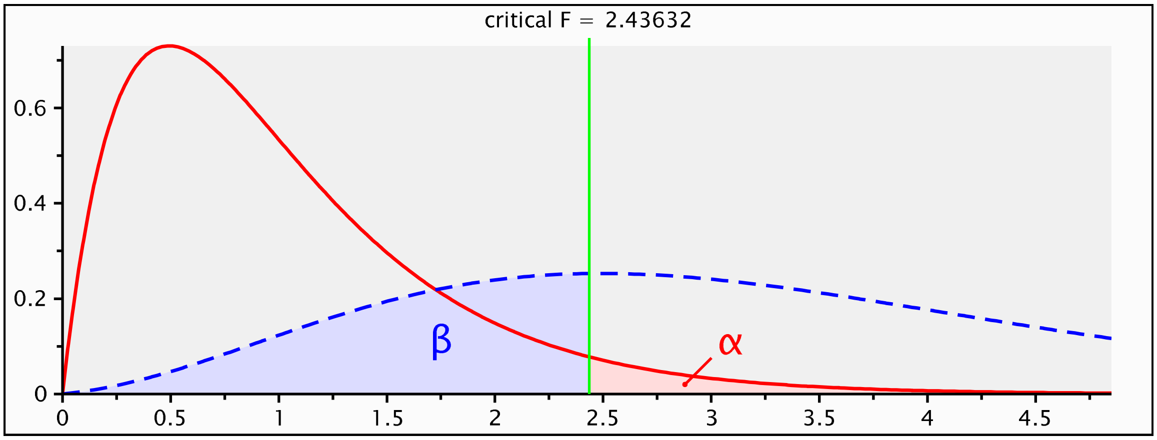


t tests - Correlation: Point biserial model

Analysis: A priori: Compute required sample size

Input:
Tail(s) = One
Effect size |ρ| = 0.27
α err prob = 0.05
Power (1-β err prob) = 0.95

Output:
Non-centrality parameter δ = 3.3179092
Critical t = 1.6559704
Df = 138
Total sample size = 140
Actual power = 0.9512123



```
F tests - ANOVA: Fixed effects, omnibus, one-way

Analysis:   A priori: Compute required sample size

Input:      Effect size f                  =  0.25
            α err prob                     =  0.05
            Power (1-β err prob)           =  0.64
            Number of groups               =  5

Output:     Non-centrality parameter λ     =  9.0625000
            Critical F                     =  2.4363175
            Numerator df                   =  4
            Denominator df                 =  140
            Total sample size              =  145
            Actual power                   =  0.6500379
```

To compare different educational methods on the gain of posttest versus pretest score, we can compare the difference as “Posttest-Pretest” for each method and then apply one-way ANOVA test.

The one-way ANOVA is designed to test whether or not all teaching method effects (deviation from the grand mean) are 0. This means that ANOVA tests the null hypothesis:

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4$

Versus H_a: $\mu_I \neq \mu_j$ for at least one pair $i \neq j$

The test procedure may be summarized in an ANOVA table:

Source of Variation	Sum of Squares (SS)	df	Mean Square (MS)	E(MS)	F
Between (Treatments)	SS_{Trt}	a-1	MS_{Trt}	$\sigma^2 + ((\Sigma n_i a_i^2)/(a-1))$	$(MS_{Trt})/(MS_E)$
Within (Error)	SS_E	N-a	MS_E	σ^2	
Total	SS_T	N-1			

Where "a" is the total number of education methods which is 4 here. "N" is the total sample size.

Under H_0, the test statistics

$F = (MS_{Trt})/(MS_E) \sim F(a-1, N-a)$

And our test statistics becomes an F-test. We reject H_0 for large values of F in comparison to an F(a-1, N-a) distribution. The p-value will be reported, which quantifies the strength of the evidence provided by the data against the null hypothesis.

Recruitment and Enrollment Procedure

Recruitment for the study will be done through posters, flyers, postcards, and bulletins posted in this southwest neighborhood on the south side of Chicago. The information will be posted in local businesses, Laundromats, schools, and local public places where African Americans pay their visits frequently, and also in Elim Christian

Church. A copy of the details of the study will be distributed to pastors of Elim Christian Church, Step of Faith Ministries, a psychologist, and two public health nurses who have agreed to assist with this study project. To facilitate recruitment of potential study participants, my contact number, and Step of Faith Ministries contact number will be given. Potential study participants who have met the study criteria irrespective of their adherence levels will be recruited for the study.

The potential study participants will be informed about three different questionnaires that they would be expected to answer before, and after each class. Confidentiality will be maintained throughout, and after the study. A summary of the final study findings will be shared with these study participants, and Step of Faith Ministries. Twenty-five dollars will be awarded to the study participants who remain in the entire study program. Healthy snacks, fruits, water, and drinks will be served to those study participants after each class.

Eligibility Criteria

Eligibility criteria will be determined by face-to-face and prescreening interviews that will be conducted at Elim Christian Church, and other locations in this southwest neighborhood that are convenient to the potential study participants. Prescreening information will include 1) Purpose of the study, 2) An explanation of voluntary nature, 3) Potential risks, and benefits of participating in the study, 4) Data collection method by using three types of questionnaires as pre-test, and post-test, 5) Maintaining confidentiality of the data collected, and compensation for participating in the study, 6) An informed consent, and 7) Contact information of Walden's representative with whom concerns related to the study can be addressed.

Other criteria will include that the potential participants will be between eighteen-to-sixty-five years of age, live in the southwest community, attend Elim Christian Church, be diagnosed with, and prescribed medications for hypertension, high cholesterol, diabetes, asthma, and COPD, willing to participate in the study for eight weeks, be able to provide a written voluntary consent, and an educational level of sixth grade. Elim Christian Church membership will not be required.

Exclusion criteria will include unwillingness to participate in the study, the person be less than eighteen years old or more than sixty-six years old, inability to sign the consent form, and those who do not have residence in the southwest side neighborhood.

Instrumentation and Materials

Promoting medication adherence with chronic illnesses has become a global initiative (Morisky et al., 2008) because poor medication adherence is a significant problem in clinical settings with chronic disease management (Morisky et al., 2008; Viols, Hoyle, Thorpe, Maciejewski, & Young 2011; Dunbar-Jacob & Mortisner-Stephens, 2001). Many scholars have reported in their studies that it is necessary to promote medication adherence to reduce cardiovascular morbidity, and mortality (Ogedegbe, Tobin, Fernandez, Gerin, Diaz-Gloster, Cassells … Ravenell, 2009; Morisky et al., 2008; Chobanian et al., 2003).

Scholars, who have done studies on medication adherence using the self-reporting method, have suggested that there is no “gold standard” for measuring non-adherence (Voils et al., 2011). Also, self-reporting methods lack validity, and reliability of statistical measures with precision, and accuracy (Voils et al., 2011). In addition, self-reports on medication adherence are influenced by various human factors including age-related health problems, language barriers, a poor relationship between provider, and patient, and various health beliefs (Williams et al., 2008). The other factors include chronic illnesses in themselves, and therapeutic inertia because of polypharmacy (Morisky et al., 2008; Fitzgerald, 2011), low literacy levels (Kripalani et al., 2009), and healthcare system complexities, and failures (Morisky et al., 2008). The instrument's validity and reliability are explained in the following paragraphs.

Morisky Medication Adherence Scale (MMAS-8)

The MMAS-8 is a well-validated, and widely recognized eight-item scale that Morisky, and colleagues developed (Morisky et al., 2008). Prior to this eight-item scale, a four-item scale was developed as a self-reporting measure in order to measure adherence behavior to prescribed antihypertensive medications (Morisky, Green, & Levine, 1986). Also, the authors reported that the reliability of this four-item scale was 0.61 (Cronbach a = 0.61) (Morisky et al., 1986). Many scholars used this four-item scale in a variety of clinical settings with various chronic illnesses because of the reported validity, and reliability of the scale that specifically addressed adherence to prescribed medication regimen (Ogedegbe et al., 2009).

This four-item scale was then further developed into an eight-item scale based on compelling factors surrounding the adherence behavior (Morisky et al., 2008). This eight-item scale was constructed based on the theory that explained failure to adhere to a medication regimen could occur because of the factors that have much influence on adherence behavior (Morisky et al., 2008). The authors established the validity, and reliability of the scale through a randomized controlled pretest, and posttest study design with a total of 1,367 study participants (N = 1,367) with hypertension in an outpatient setting (Morisky et al., 2008).

The authors reported that the current eight-item scale was significantly correlated with the four-item scale that was developed prior to this eight-item scale, and the correlation was 0.64, $p < .05$ on Pearson's Correlation. The internal consistency of the scale was 0.83 on Cronbach's alpha reliability ($a = 0.83$). The authors further reported that the sensitivity of the eight-item scale was found to be ninety-three percent, and the specificity was fifty-three percent. In the multivariate analysis with the variables including attitude, knowledge, patient satisfaction, coping, stress level, and medication complexity, the authors found that each variable was found to be significantly associated with adherence at level 0.05 (Morisky et al., 2008). Based on these findings, the authors explained that there is a greater need for patient education to increase knowledge on medication adherence (Morisky et al., 2008). Based on these scholars' compelling findings on validity, and reliability of this eight-item scale (MMAS-8), this scale will be used in this proposed study to assess the effectiveness of different educational methods to enhance medication adherence by testing knowledge gain using the pretest/posttest design method.

The authors have given clear guidance as to how to use this eight-item scale, and following their guidance strictly in this proposed study would facilitate the study to run effectively, and smoothly. Krousel-Wood and colleagues (2010) have demonstrated the usefulness of MMAS-8 in a cohort study of medication adherence among older adults (COSMO) conducted with 2,180 older adults with hypertension. The instrument was used at baseline, and after one year to determine if there were any associations between depressive symptoms, social support, and antihypertensive medication adherence in older adults. The authors verified medication adherence using MMAS-8 instrument through the self-report method on medication adherence with chronic illnesses. The authors have explained that the scale had the capability in facilitating in identifying the barriers to, and behaviors associated with medication adherence. The authors reported that MMAS-8 was reliable with alpha 0.83 (a = 0.83), and significantly associated with blood pressure control ($p = < 0.050$) in individuals with hypertension, and low adherence levels were associated with lower rates of blood pressure control. In this way, these scholars demonstrated that MMAS-8 had good reliability (a = 0.83), and proved its usefulness in assessing medication adherence with chronic illnesses (Krousel-Wood, Islam, Muntner, Holt, Joyce, Morisky … Frohlich, 2010).

In Malaysia, the Morisky Medication Adherence Scale (MMAS-8) was translated into the Malay natives' spoken language using forward, and backward translation procedure, and then the MMAS-8 Malay version was validated with a convenient sample of 223 Type 2 diabetic patients (N = 223) in an outpatient clinic (Al-Qazaz, Hassali, Shafie, Sulaiman, Sundaram, & Morisky, 2010). The authors reported that MMAS-8 had an acceptable test-retest reliability of 0.816 ($p < 0.001$), a moderate internal consistency with Cronbach's a = 0.675, sensitivity = 77.61 percent, specificity = 45.37 percent, the positive predictive value = 46.84 percent, and the negative predictive value 76.56 percent. In this way, Al-Qazaz, and colleagues (2010) confirmed that the Malaysian version of the MMAS-8 is a reliable and valid measure of medication adherence that can be used to measure medication adherence with chronic illnesses (Al-Qazaz et al., 2010).

In summary, many scholars have provided their evidence that the MMAS-8 has its proven validity, and reliability, and that it is an effective reliable research tool to measure medication adherence with chronic illnesses in the outpatient clinic settings (Morisky & DiMattteo, 2011). The authors have reported that the MMAS-8 was useful in assessing medication adherence with various chronic illnesses including ulcerative colitis, hypertension, and depression, and in complementary, and alternative medicine (Morisky et al., 2011). In this way, the MMAS-8 research tool was found to be a reliable valid tool (Morisky et al., 2011), and because of its proven validity, and reliability, the scale will be used in this proposed study. The scale will be used exactly as to how the authors have established it (Morisky et al., 2008).

The Self-Efficacy for Appropriate Medication Use Scale (SEAMS)

The main purpose of developing the Self-Efficacy for Appropriate Medication Use Scale (SEAMS) was to provide healthcare providers an effective assessment medication adherence tool in the management of chronic illnesses in outpatient settings with patients whose literary levels are inadequate (Risser et al., 2007). The theoretical foundation for the development of the SEAMS research tool was based on the Social cognitive theory; author Bandura (1977) has defined the concept of self-efficacy as "one's conviction to perform a required behavior successfully to produce an outcome" (Bandura, 1977; Kripalani et al., 2009). Kripalani, and colleagues (2009) explained that patients with inadequate literacy have serious difficulties to identify their own medications, are unable to differentiate medications from one another, are most likely to misinterpret medication labels, and their additional warning signs (Kripalani et al., 2009).

Gazmararian and colleagues (2006) demonstrated in their studies with antiretroviral medication adherence that patients with inadequate literacy were unable to read medication terminologies, and to understand, and comprehend the need for medication adherence. In addition, their responses on self-reporting of medication adherence were biased (Gazmararian, Kripalani, Miller, Echt, Rent, & Rack, 2006). Kripalani, and colleagues (2007) explained that patients with inadequate literacy have difficulties in understanding, comprehending, and remembering medication names, and instructions that are written on medication levels (Kripalani, Robertson, Love-Ghaffari, Henderson, Praska, Strawder, … Jacobson, 2007).

The effects of inadequate health literacy and its consequences have impacted many areas of healthcare, resulting in health disparities, low self-efficacy, poor self-care management, and poor health outcomes (Kripalani et al., 2007). Kalichman, and colleagues (2005) have explained in their study on assessing medication adherence, and self-efficacy in low-literacy patients that a self-efficacy scale that would assess medication adherence, and self-efficacy in low-literacy patients with clarity is lacking, and the construction of a new tool would be very challenging (Kalichman, Cain, Fuhrel, Eaton, DiFonzo, & Entl, 2005). Based on these compelling pieces of empirical evidence, Scholars Risser, Jacobson, & Kripalani (2007) have developed a self-efficacy scale (SEAMS), tested for its validity, and reliability, with the purposes that the scale would be a valuable tool to healthcare providers in the assessment of medication adherence in outpatient clinic settings, and as a research tool to be used by researchers to assess self-efficacy with medication adherence with chronic illnesses in a population with inadequate literacy levels (Risser et al., 2007).

Development of the SEAMS

Scholars from a multidisciplinary team who had specialized knowledge, and skill in medication adherence, and health literacy, were involved in the development of the SEAMS, including the analysis of its validity, and reliability (Risser et al., 2007). These scholars were selected from the specialized fields of medicine, literature, health education, medication use, and psychology, and they reviewed a large number of literature on self-efficacy from the fields of medicine, and nursing with the focus of identifying an instrument that could be effectively used to assess self-efficacy with medication adherence with chronic illnesses in a population with low literacy (Risser et al., 2007).

Unable to find an appropriate instrument that would fit well with this study, the scholars selected questions from different self-efficacy instruments, and reviewed the content of those selected questions with a critical lens to identify if there would be any challenging questions that would place an undue hardship in patients with low literacy who live with multiple chronic illnesses. The same scholars rephrased the difficult questions, and simplified them in order to reflect the concepts of chronic illnesses, medication adherence, and inadequate literacy levels. These scholars conducted a pilot study in 2004 with ten volunteers with inadequate literacy, who received a cognitive interview with the newly developed study questions, and they received feedback from their study participants who provided their suggestions to change words, and terminologies that would be appropriate for people with inadequate literacy, and at the same time fit well with this newly developed instrument. In this way, scholars developed the first set of SEAMS instrument with twenty-one (21) items (Risser et al., 2007).

The same scholars who developed the scale, established a three-point Likert response scale to indicate the level of confidence in taking medications: 1 = confident, 2 = somewhat confident, and 3 = very confident. The study participants were asked to identify their confidence level correctly under different difficult circumstances using this Likert response scale. The potential scores ranged from 21 to 63, and these scholars' interpretation of scores suggested that higher scores indicated a high level of self-efficacy for medication adherence.

Reliability, Validity Assessment, and Final Refinement of the SEAMS

To establish reliability and validity of the scale, the scholars conducted a randomized controlled trial with 436 study participants (N = 436) who completed the twenty-one items SEAMS at the baseline. The study population included predominantly African Americans (91.1 percent), and women (55.7 percent), and the mean age was 63.8 years. Also, they were diagnosed with multiple co-morbidities including hypertension (99 percent), high cholesterol (87 percent), diabetes (45 percent), and coronary heart disease.

The reliability of the initial SEAMS was determined by Cronbach's alpha coefficient method for its internal consistency, and the scale overall showed a = 0.90. The test/retest reliability was performed as a second approach with ninety-six study participants from the control group who had completed the follow-up interview at three months, and the performance of the scale was moderate by Spearman's statistical method (p = 0.62, P = 0.0001).

The Principal component factor analysis method was used to analyze the validity of the twenty-one of the initial SEAMS. This method provided clarity to each item in the scale. Those items that did not perform well or did not show clarity on the concept of self-efficacy were deleted because of their vagueness. In this way, the final SEAMS was constructed with only thirteen items.

A factor analysis was performed again to test the validity of this final thirteen-item scale. The authors were able to identify with clarity the two dimensions of self-efficacy with medication adherence. Factor 1 showed self-efficacy for taking medications under difficult circumstances, and Factor 2 showed self-efficacy for continuing to take medications under certain conditions. Cronbach's alpha was 0.86 for factor 1, and 0.79 for factor 2.

Reliability analysis for the final SEAMS was performed, and the scale showed inter-item correlations in this thirteen-item scale of 0.20 to 0.71, and Cronbach's alpha of 0.89 (a = 0.89). The mean of the inter-item correlations in the thirteen-item scale was 0.28. The two subscales, taking medications in difficult circumstances, and in uncertain conditions, were 0.46, and 0.39 respectively. The authors confirmed that the test-retest reliability of the thirteen-item scale was adequate by Spearman's method (p = 0.57, P = .0001).

Criterion related validity of this thirteen-item scale was assessed by the Morisky medication adherence scale (MMAS), and the scale showed a strong correlation with medication adherence by Spearman's p = 0.51, P = .0001 indicating the strong evidence for the criterion-related validity of the self-efficacy scale. In this way, scholars from different fields of expertise developed SEAMS-13, and analyzed it for its psychometric properties. These scholars reported that the scale is valid, and reliable to assess self-efficacy for medication adherence with various chronic illnesses with patients with different literacy levels.

The availability of SEAMS 13, and its use with chronic illnesses could have an important implication for healthcare providers in that it can be used to assess self-efficacy with medication adherence because of its proven validity, and reliability. The scale can be used to assess self-efficacy with patients with multiple co-morbidities, and who take multiple medications. SEAMS-13 is also a valuable tool in that it can be used with patients with different levels of literacy. Finally, the scale can be used to assess self-efficacy along with the Morisky medication adherence scale (MMAS) because of its contribution to the SEAMS in assessing Spearman's criterion related validity (Risser et al., 2007).

Beliefs about Medicine Questionnaire (BMQ)

The 'beliefs about medicine' questionnaire (BMQ) was developed by British Scholars Horne, Weinman, & Hankins in 1999. The purpose of developing this instrument was to assess people's beliefs about medications or medicines (Horne et al., 1999). The authors had two main reasons for developing this instrument: 1) To gain an in-depth insight into the pragmatic factors that relate to the delivery of healthcare, and 2) To develop psychological models based on the theoretical reasons that provide clarity in understanding patients' illness-related behaviors including medication adherence (Horne, 2000).

Some scholars have explained that healthcare delivery was based on the biomedical model in the United Kingdom, and in other developing countries in which illness is believed to be due to the disturbances in physiological functioning (Horne, 2000). The author cited scholars Engel (1977), Kaplan (1990), Berkman & Breslow (1983), Pennebaker (1982), Wilkinson (1990), and Marmot et al., (1984) who have explained that the biomedical model tends to assume that diseases are manifested in the body, and are separated from the psychosocial interactions of the mind, and the outcome of the illness was greatly determined by the nature of the illness, extent of the disease, and the efficacy of treatment. The same scholars have further suggested that socioeconomic factors have strong powerful influence on the etiology of illness, and the biomedical model failed to recognize psychosocial and economic determinants that could have a profound influence in people's beliefs on healthcare, and medicines (Horne, 2000).

Horne (2000) further cited scholars McGavak (1996), and Myers, and Midence (1998) who have acknowledged the limitations of the biomedical model in that it did not recognize the influences of human, and socioeconomic determinants when non-adherence to medications was a significant health problem; instead, the model was applied to gain more knowledge, and understanding of etiological factors of illness, and to explain the treatment outcomes. In other words, the model did not address the real current health problem (Horne, 2000). However, of the present time, the trend is changing, and there is a greater emphasis placed in understanding as to how people make decisions about their health based on their own beliefs, and the social context in which the decisions are made (Horne, 2000).

Based on the previous scholars' empirical findings, Gatti, and colleagues (2009) explained that patients' beliefs were significantly correlated with medication adherence (Gatti et al., 2009). Some other scholars (2007), through a meta-analysis on medication adherence, reported that there was a significantly positive correlation between patients' adherence, and their perception of disease severity (DiMatteo, Haskard, & Williams, 2007). The same scholars have further explained that peoples' beliefs on medications were more consistent in predicting medication adherence than demographic variables (DiMatteo et al., 2007). Gatti, and colleagues (2009) reported, after reviewing many scholars' report on medication adherence, that approximately twenty percent of the variance in adherence behaviors were to be attributed to a patient's beliefs about medications (Gatti et al., 2009), and their perceptions of medications, whether necessary to take, and their concerns about the potential harmful effects of medications (Gatti et al., 2009).

Taking medications as prescribed is dependent on two factors, one's ability to take medications, and motivation (Horne, 2000). The author explained that in previous studies, scholars have focused more on unintentional non-adherence behaviors including forgetfulness, inability to follow instructions, poor understanding, and physical disabilities (Horne, 2000; Gatti et al., 2009). However, according to some scholars, non-adherence could arise from intentional reasons including negative health beliefs (Gatti et al., 2009), and poor decision-making (Horne, 2000; Gatti et al., 2009). These scholars have described that negative health belief often times leads to a conscious decision by patients to not take medications (Gatti et al., 2009). The same scholars have further explained that when patients are faced with self-management of their illnesses, they are forced to make decisions in their own, and ultimately it is the patient who decides when to adhere or not to adhere to the prescribed medication regimen (Gatti et al., 2009).

Lehane and McCarthy (2007) have suggested that behaviors that are mediated by irrational decision-making processes could also play a major role in the prevalence, and persistence of non-adherence (Lehane & McCarthy, 2007). The same scholars (2007) cited Brahm and Brahm (1981) who have explained the Theory of Psychological Reactance that was tested in many areas of mental health fields (Lehane & McCarthy, 2007). By this theory, individuals may suffer with uncomfortable motivational reaction to a threat or removal of an individual's freedom to determine their own health status; when the individuals are faced with uncomfortable motivational reaction, they tend to make wrong choices, and do the opposite of what is required of them. In this way, individuals, even with potential health risks, ignore therapeutic regimens resulting in non-adherence to medications (Lehance & McCarthy, 2007).

The concept of self-management of chronic illnesses has gained a great momentum in this present healthcare management (Horne, Weinman, & Hankins, 1999; Horne & Weinman, 1998; Horne, 2000; Bandura, 2004; Gatti et al., 2009) with an emphasis on taking appropriate medications as being the key for successful management of chronic illnesses (Horne & Weinman, 1998; Horne, 2000; Bandura, 2004). Horne (2000) cited scholars Barker (1995), and Marinker (1997) who have explained that patients have to be encouraged, and motivated to take part an active role in their healthcare (Horne, 2000), and this concept has received broad support from many other scholars (Horne & Weinman, 1998; Horne et al., 1999; Bandura, 2004). According to these scholars, the role of the healthcare provider is to recognize, and to respect patients' rights in treatment choices, his/her health beliefs, and decision-making processes, and to move them forward towards a positive goal (Horne, 2000; Bandura, 2004; Gatti et al., 2009).

Prescribing medications involves a prescriber's responsibilities: discussion, and explanation of medications to their patients, negotiating with integrity, and educating patients on pharmacological factors including side effects of medications (Horne, 2000). This course of health promotion work demands the prescriber to demonstrate greater understanding to a patient's health behavior, and beliefs (Horne, 2000). Based on a large number of scholars' report on health beliefs, Horne (2000) identified that an individual's health beliefs range from specific to general (Horne, 2000), and they interact with health behaviors (Horne, 2000). To explain the interaction between health beliefs, and medication-taking behavior on a scale, Horne (2000) suggested quantitative studies on medication beliefs, and this very idea had led the scholar to develop an instrument "beliefs about medicine questionnaire" (BMQ) to assess people's beliefs about medications (Horne, 2000).

Development of BMQ

The development of BMQ was based on the theory of planned behavior (TPB) (Horne et al., 1999). The theory of planned behavior (TPB) is an extension of the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The core concept of TRA is the individual's intention to perform a behavior (Ajzen, 1991). The concept of intention explains as to how individuals try their best to perform a behavior, and this performance is based on the individual's motivation (Ajzen, 1991). According to Ajzen (1991), intentions would be expected to influence performance to the extent that the person has behavior control, and that performance should increase with behavioral control to the extent that the person is motivated to try (Ajzen, 1991, p.183).

In the theory of TPB, perceived behavioral control is the central concept (Ajzen, 1991). The concept of perceived behavioral control plays an important role in an individual's judgment (Ajzen, 1991). Also, the concept of perceived behavioral control is almost compatible to Bandura's (1977, 1982) concept of perceived self-efficacy, which is concerned with an individual's judgment as to how well one can execute courses of action required to deal with prospective situations (Ajzen, 1991; Bandura, 1977, 1982). The theory of planned behavior explains a relationship among beliefs, attitudes, intentions, and behavior (Ajzen, 1991). In this way, according to the theory of planned behavior, perceived behavioral control along with behavioral intentions can be used to predict behavioral achievement (Ajzen, 1991). In other words, performance of a behavior is a joint function of intentions, and perceived behavioral control (Ajzen, 1991).

BMQ 18: Development and Analysis

Horne and colleagues (1999) generated a wide range of beliefs on medications after reviewing a large number of empirical studies by various scholars on medication adherence, and health beliefs, and simplified those beliefs into specific and general beliefs by using the principal component analysis (PCA) method (Horne et al., 1999). The authors further analyzed specific and general beliefs by the Confirmatory Factor Analysis Method. To prove validity of specific, and general beliefs, the authors used the PCA method again resulting in the development of thirty-five patients (N = 35) who were receiving medications for their chronic illnesses; twenty patients with hemodialysis, and fifteen with myocardial infarction participated in a qualitative study through an interview method. These patients were asked to mark their responses on those thirty-five belief statements on a Likert Scale (1 = strongly agree, 2 = agree, 3 = uncertain, 4 = disagree, and 5 = strongly disagree). These interviews were conducted in the clinics to obtain a patient's own perspectives on beliefs about medications, and not what was socially desirable. After completing the interview, the authors further analyzed those responses by using the PCA method, and eliminated the influences of other variables that were far from the central theme. This procedure allowed the choosing of only those statements that were fit with specific and general beliefs. In this way, the authors developed a new BMQ scale with eighteen belief statements: Specific-necessity-5, Specific-concerns-5, General-overuse-4, and General-Harm-4) (Horne et al., 1999; Horne, 2000).

Testing the Specific Belief Statements using the Exploratory PCA

By using the Exploratory PCA Method, the authors tested the sixteen specific belief statements with 120 (N=120) cardiac patients. The goal was to identify a simple factor structure from the responses of cardiac patients for a single diagnostic group of illnesses, and to test whether the identified simple factor structure would fit with other illness groups such as asthma, diabetes, and kidney failure (Horne et al., 1999). In addition, the authors aimed at as to how to explore representation of medication as a broad concept rather than beliefs that might be unique to a particular group (Horne et al., 1999).

Testing the Simple Factor Structure

To test the Simple Factor Structure, the authors used confirmatory factor analysis by applying Pearson's correlations statistical method. The aim was to assess whether the Simple Factor Structure that was identified through the exploratory PCA truly reflected the theoretical model. Using the repeated PCA method, the authors identified the stability of Simple Factor Structure by testing the responses of cardiac patients to factor items obtained from asthma, diabetes, and kidney failure. In addition, by using further PCA general belief statements, specific belief statements were separated (Horne et al., 1999). In this way, the PCA Method allowed the authors to identify those beliefs pertaining to medications, and facilitated those beliefs to be grouped under four themes: two under specific beliefs, and the remaining under general beliefs (Horne et al., 1999; Horne, 2000).

General Beliefs about Medications (BMQ General)

The authors explained two major themes that they had identified in general beliefs: 1) General-harm and 2) General-overuse. The beliefs about general-harm included those beliefs that reflected the intrinsic nature of medications that people perceive as harmful, addictive, prolonging dependence, and long-term use, and poisonous. The beliefs, related to general overuse, included the beliefs that natural medications are much safer than the allopathic medications, and that doctors tend to overprescribe allopathic medications. In this way, by applying the PCA method, the authors summarized the identified general beliefs into general harm, and overuse themes.

Specific Beliefs about Medications (BMQ Specific)

In the same way, using the PCA method, the authors identified two specific themes from the specific beliefs: necessity, and concerns. The authors summarized those specific beliefs from the responses of 524 patients who were diagnosed with a range of chronic illnesses including asthma, diabetes, psychiatric illnesses from outpatient clinics, cardiac, and general medical, and renal problems. The necessity beliefs included those beliefs that were perceived by people as necessary for maintaining or improving health now, and in the future. The concern beliefs included those beliefs that cause concern about adverse effects of medications, becoming too dependent on medications, and those medications that would cause disruption in daily life (Horne et al., 1999; Horne, 2000).

Testing the Validity and Reliability of the BMQ

Horne (2000) cited scholar Babbie (1992) who had explained that the validity of the questionnaire refers to the extent that it provides data that relate to commonly accepted meanings of a particular concept; in other words, a questionnaire is said to be valid when it correctly measures what it is supposed to measure (Horne, 2000). The authors used criterion-related validity, and discriminant validity testing measure to measure the validity of the BMQ-18.

Criterion-Related Validity

The assessment of criterion-related validity was done on each of the BMQ scale items: specific-necessity, specific-concerns, general-harm, and general-overuse, and they were done based on these assumptions:

1) Specific-necessity: Patients with stronger beliefs in the necessity of medications would be less likely to believe that they can cope without medications; thus, specific-necessity beliefs would be negatively correlated with the scores on the item, “I can cope without medication.” Beliefs about the necessity of prescribed medications would also be dependent on a patient’s perception of illness because of the time duration as to how long the illness will continue. Patients, who perceive that their illness would last for a longer period of time with increased symptoms, will have stronger beliefs in the necessity, and the scores on specific necessity would be positively correlated.

Evidence for the criterion-related validity of the specific-necessity scale was shown by the authors to have negative correlation between scale scores, and responses to the statement, “I can cope without my medications” ($p = -0.44$; $n = 78$; $p < 0.001$);, and positive correlations with scores on the illness perception questionnaire on timeline ($p = 0.49$, $n = 77$; $p < 0.001$), and identity ($p = 0.24$; $n = 76$; $p < 0.05$).

2) Specific-concerns: The authors hypothesized that patients with grave concerns about their medications exhibit doubt, and distrust, would seek more detailed information about their prescribed medications, and make plans to alter their current treatment. Thus, there would be positive correlation on the specific-concern scale on the items “lack of trust in prescribed medications”, and “desire to change present treatment.” In addition, patients, who perceive of themselves to be more susceptible to adverse reactions to their prescribed medications, could possibly exhibit stronger concerns about medications. Thus, the specific concern scale shows positive correlation with a score on the sensitive soma scale, which assesses perceptions of personal sensitivity to the adverse effects of medications.

Evidence on the criterion-related validity of the specific concerns scores on the asthmatic group were positively correlated with the statements “I cannot always trust my medications” ($p = 0.33$; $n = 78$; $p < 0.005$), and “I would like to change my present treatment” ($p = 0.37$; $n = 78$; $p < 0.001$). The hypothesis on specific-concerns was negatively correlated with responses to the statement “I have been given enough information about my medications” ($p = -0.45$; $n = 78$; $p < 0.001$). Specific concerns on adverse reactions were assessed by sensitive soma scale with general medicine, and cardiac patients ($p = 0.5$, $n = 211$, $p < 0.001$).

3) General-Harm: Patients, who believe that medications are essentially or intrinsically harmful, believed that it was better for them to not take their medications. Thus, the items on the scale “It is better to do without medication”, and “I can cope without my medications” would be positively correlated on the General-Harm Scale. Those patients also believed that they were more susceptible to adverse reactions to their medications. Thus, scores on the General-Harm Scale would show a positive correlation with a score on the sensitive soma scale.

4) General-Overuse: There would be a positive correlation on the General-Overuse Scale with items “I can cope without my medicine”, and “It is better to do without medications.”

Evidence on the criterion-related validity of the General-Harm, and General-Overuse Scales showed that there was a correlation on the General-Harm Scale with the statement, “It is better to do without medications” with p value ($p = 0.23$, $n = 78$; $p < 0.05$). Also, the responses to the statement, “I can cope without my medication,” correlated significantly in the predicted direction with both General-Harm ($p = 0.24$; $n = 77$; $p < 0.05$), and General-Overuse scales 9p = 0.34; $n = 78$; $p < 0.005$). Correlations between the RAM Scale, and Specific Concerns ($p = -0.28$; $n = 210$; $p < 0.001$), General-Overuse ($p = -0.19$; $n = 210$; $p < 0.01$), and General-Harm ($p = -0.06$, $n = 210$; $p > 0.05$). In this way, criterion-related validity demonstrated that these scales were in the direction as to how the hypothesis was predicted, except that the General-Harm beliefs failed to reach statistical significance on the RAM Scale (Horne et al., 1999; Horne, 2000).

Discriminant Validity of BMQ-18

The discriminant validity of the BMQ-18 was done based on the patients' abilities as follows: 1) To differentiate between their illnesses, and treatment modalities and 2) To take their prescriptions to a community pharmacy or to choose alternative or complementary therapies (Horne et al., 1999).

1) Beliefs on specific necessity: Beliefs about the necessity for prescribed medications would be influenced by the medications prescribed for their illnesses, and the effects of medications on symptom relief would be very important to patients. The authors compared diabetic, and asthma patients in that if they failed to take their medications, they would become ill, but if they took their medications, their symptoms would be relieved. In this way, the Specific Necessity Scores would differentiate patients with different diagnoses, and the scores would be higher on the specific-necessity Scale for those who take their medications, and had symptom relief.

2) Beliefs on specific concern: Beliefs about specific concern were associated with the adverse side effects of medications, and also drugs such as steroids, and tranquilizers that are necessary for symptoms relief in asthma, and psychiatric conditions, but at the same time abused in sports that receive increased media attention. In this way, the assumption was that specific-concern scores would discriminate among patients who would have higher mean scores than other illness groups.

Discriminant Validity Testing on Specific Necessity and Specific Concern Beliefs

Discriminant validity testing was done on specific-necessity and specific-concern belief statements by ANOVA with linear contrast, and post-hoc Turkey's HSD statistical methods. The mean scores on the BMQ were compared across illness samples including asthma, diabetes, renal failure, cardiac problems, psychiatric illness, and general medical illness. By this method, the authors confirmed their assumptions that patients with diabetes had significantly higher specific-necessity scores than all other groups of patients, asthmatic patients had a higher mean score than the psychiatric group of patients, the psychiatric group of patients had the lowest mean score on specific necessity, and finally the asthmatic, and psychiatric groups had significantly higher specific concern scores. The discriminant validity for specific-necessity was $p < 0.01$, and for specific concerns was $p < 0.01$.

Discriminant Validity on General-Harm and General-Overuse

People, who believe that medications are essentially harmful, and seek complementary or herbal medications, would have higher mean scores on general-harm, and general-overuse. The authors confirmed their assumptions by doing ANOVA with linear contrast, and post-hoc Turkeys' HSD that patients, who visit complementary and herbal stores, would have significantly higher scores on both the general-harm, and general-overuse than patients who take their prescriptions to a regular pharmacy. The p value on post-hoc Turkeys' HSD was ($p > 0.05$) a correlation between BMQ scales $p < 0.01$ (Total N = 524) (Horne et al., 1999).

Reliability of the BMQ-18 Scale

The authors reported that the internal consistency of the scale was ranging from 0.65 to 0.86 across the range of illnesses except that the three statements on the General-Harm Scale of the diagnostic group include asthma, cardiac problems, and general medicine. The Spearman correlations (p value) were used to assess test-retest reliabilities between initial scores, and repeated scores for each of the scale ($p < 0.001$). Based on these statistical measurements, the authors confirmed that Cronbach's alpha (a) for each diagnostic group indicated that both the BMQ specific, and general scales have satisfactory and acceptable internal consistency, and test-retest reliability of the scale were encouraging, and the scale can be used with flexibilities in a novel manner (Horne et al., 1999; Horne, 2000).

Summary of BMQ-18

Scholars Horne et al., (1999) developed BMQ-18 based on the theoretical model of the theory of planned behavior (TPB) (Ajzen, 1985). Main purpose of developing the scale was to gain a deeper understanding as to how people's beliefs play a vital role in medication adherence with chronic illnesses. The authors acknowledged that patients make decisions about taking medications based on their beliefs about illness, and treatment, and their expectations of outcome. The decision to take or not to take medications greatly depends on patients' beliefs, and perception of their illnesses, and this decision identifies the role of medication beliefs in treatment adherence. Based on this concept, the authors identified specific and general beliefs, and developed a pool of thirty-four statements resulting in the early development of the BMQ Scale.

By using the Principal Component Analysis or Factor Analysis Method, the initial thirty-four statements were simplified. A qualitative study methodology was employed with twenty hemodialysis patients, and fifteen myocardial infarction patients ($N = 35$) in order to gain a deeper understanding of a patient's perceptions, and beliefs on illness, and treatments. The authors applied PCA or factor analysis method until they were able to identify with clarity the BMQ-18 with specific and general beliefs. Specific beliefs were based on a patient's concerns, and necessity, whereas general beliefs were based on general-harm, and general-overuse.

Testing the validity of the scale was done by criterion-related validity, and discriminant validity. The criterion-related validity was based on the predictions of the scale, and it demonstrated that both of the specific and general scales were related to constructs. The discriminant validity of the specific and general scales demonstrated that the scale was able to distinguish between different illnesses and treatment modalities.

The internal consistency of the scale was tested by Cronbach's alpha, and test-retest reliability statistical methods. The internal consistency of the scale was found within the range of 0.65 to 0.86 across the range of illnesses except the three statements on the general-harm scale of the diagnostic groups including asthma, cardiac, and general medicine. The test-retest reliability was done using Spearman's correlations, and the p value was ($p < 0.001$). The authors explained that reliability of the BMQ Scale was found to be within the acceptable limits (Horne et al., 1999; Horne, 2000).

The authors acknowledged the limitations of the scale that the initial interview method provided an ordinal rather than an interval measure of adherence behavior. Secondly, though the beliefs and behaviors were closely associated, the direction of causality could not be ascertained. Thirdly, medications were prescribed for many co-morbid conditions along with the primary diagnosis. Fourthly clinical significance of non-adherence was not evaluated. In spite of all these limitations, the authors suggested using the BMQ-18 Scale by a quantitative study method in assessing patient's beliefs about their medication would help to identify the type of beliefs associated with adherence as medication adherence is a complex phenomenon influenced by many factors (Horne & Weinman, 1998).

Data Collection and Analysis

Data Collection on Knowledge gained using Pretest-Posttest Methodology

Data will be collected on knowledge gained using the Morisky medication adherence scale (MMAS) as the pretest-posttest method. The MMAS contains eight items (Morisky et al., 1986). Response categories are Yes/No for each item with dichotomous responses, and a five-point Likert response for question number 8. The same authors have reported an alpha reliability = 0.83, and RMSEA < .01. RMSEA = the root mean square error of approximation. RMSEA is one of the Factor Analysis Methods to confirm validity, and reliability of the MMAS (Morisky et al., 2008).

Data collection on self-efficacy using SEAMS as the Pretest-Posttest Methodology (Risser, Jacobson, Kripalani, 2007)

The SEAMS contains thirteen items, and the responses will be given on a three-point Likert scale: 1 = Not confident, 2 = Somewhat confident and 3 = Very confident. Principal component factor analysis was used to prove the validity of the

SEAMS. The thirteen-item SEAMS was proven with good internal consistency, and Cronbach's alpha = 0.89 (Risser, Jacobson, Kripalani, 2007).

Data Collection of Health Beliefs using the BMQ-18 Scale by using the Pretest-Posttest Methodology

The BMQ-18 Scale is an eighteen-item scale. The scale is an ordinal scale using a five-point Likert Scale with the following given responses: 1 = Strongly agree, 2 = Agree, 3 = Uncertain, 4 = Disagree, and 5 = Strongly disagree.

The authors have reported that the internal consistency of the scale was within the range of 0.65 to 0.86 (Horne & Weinman, 1998; Horne et al., 1999; Horne, 2000).

Analysis

Goals

1.) To assess the effectiveness of educational methods including lectures, videos, role-playing, and group discussions on medication adherence with African Americans who take medications for hypertension, high cholesterol, diabetes, asthma, and COPD.
2.) To compare the differences between the experimental, and control groups in knowledge gained, self-efficacy, and change in health beliefs.
3.) To apply descriptive, and inferential statistical methods appropriately using SPSS.
4.) To interpret the findings based on the analysis.
5.) To prepare the findings for presentation.

Research Question

Central Question

Is there any significant effect of using different educational methods in enhancing medication adherence in African Americans with chronic illnesses?

Hypothesis to be tested

Hypothesis 1: Knowledge gain; Pretest/Posttest-MMAS

Do different educational methods have significant effects on knowledge gain in medication adherence in African Americans with chronic illnesses?

Independent Variable: Educational Methods

Dependent Variable: Knowledge Gain

H_0: There will be no significant difference in knowledge gained on medication adherence between the intervention group and the control group

$H_0 = m_1 = m_2$

H_a: There will be a significant difference in knowledge gained on medication adherence between the intervention group and the control group

$H_a = m_1 > m_2$

Hypothesis 2: Self-efficacy Pretest/Posttest SEAMS

Do different educational methods have a significant effect in increasing self-efficacy on medication adherence in African Americans with chronic illnesses?

Independent Variable: Educational Methods

Dependent Variable: Increase in self-efficacy

H0: There will be no significant difference in self-efficacy on medication adherence between the intervention group and the control group

H_0: $U_1 = U_2$

H_a: There will be a significant difference in self-efficacy on medication adherence between the intervention group and the control group

H_a: $U_1 > U_2$

Hypothesis 3: Health Beliefs Pretest/Posttest BMQ 18

Do different educational methods have a significant effect in changing health beliefs in African Americans with chronic illnesses?

Independent Variable: Educational Methods

Dependent Variable: Change in Health Beliefs

H_0: There will be no significant difference in change in health beliefs on medication adherence between the intervention group and the control group

$H_0 = m_1 = m_2$

H_a: There will be a significant difference in change in health beliefs on medication adherence between the intervention group and the control group

$H_a = m_1 > m_2$

Educational methods = lecture, video presentation, role play, and group discussion on chronic illnesses such as hypertension, hyperlipidemia, diabetes, asthma, and COPD to enhance medication adherence

Descriptive Statistics

Demographic Characteristics

1.) Age group categorization

Experimental Group		Control Group	
Category	Percent	Category	Percent
18-35		18-35	
36-45		36-45	
46-55		46-55	
56-65		56-65	

2.) Frequency of distribution of age

Experimental Group	Control Group

3.) Gender Variable

Experimental Group			Control Group		
	Male	Female		Male	Female
Mean			Mean		
Median			Median		
Mode			Mode		
S. D.			S. D.		

4.) Income Variable in thousands

Experimental Group			Control Group		
	Male	Female		Male	Female
0-15			0-15		

16-20	16-20
21-25	21-25
26-30	26-30
31-35	31-35

5.) Educational Variable

Experimental Group	Male	Female	Control Group	Male	Female
High School Incomplete			HS Incomplete		
High School			High School		
Associate Deg			Associate Deg		
College Deg			College Deg		

Effect of educational methods on knowledge gain

(Item = MMAS)

	Mean Pretest knowledge score	SD	Mean Posttest Knowledge score	SD
Control Group				
Intervention Group				

Effect of educational methods on self-efficacy

(Item = SEAMS)

	Mean Pretest Self-efficacy Score	SD	Mean Posttest Self-efficacy Score	SD
Control Group				
Intervention Group				

Effect of educational methods on health beliefs

(Item = BMQ 18)

	Mean Pretest on health beliefs score	SD	Mean Posttest on health beliefs score	SD
Control Group				
Intervention Group				

t statistical test will be applied if the distribution of scores is normal with group comparison; if the distribution of scores with group comparison is non-normal, use Mann-Whitney U Test (Cresswell 2009)

Comparison of Educational Methods with Posttest

	Experimental Group Posttest $\overline{x}$	SD	Control Group Posttest $\overline{x}$	SD
Lecture			Routine Education with Pamphlets	
Video Presentation			Routine Education with Pamphlets	
Role Play			Routine Education with Pamphlets	
Group Discussion			Routine Education with Pamphlets	

To compare different educational methods on the gain of posttest versus pretest score, we can compute the difference as "Posttest – Pretest" for each method, then apply one-way ANOVA test.

The one-way ANOVA is designed to test whether or not all teaching method effects (deviation from the grand mean) are 0. I.e., ANOVA tests the null hypothesis:

$$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4$$

Versus H_a: $\mu_i \neq \mu_j$ for at least one pair $i \neq j$

The Test Procedure may be Summarized in an ANOVA Table:

Source of Variation	Sum of Squares (SS)	df	Mean Squares (MS)	E(MS)	F
Between (Treatment)	SS_{Trt}	a-1	MS_{Trt}	$\sigma^2 + ((\Sigma n_i a_i^2)/(a-1))$	MS_{T}^{rt}/MS_{E}
Within (Error)	SS_E	N-a	MS_E	σ^2	
Total	SS_T	N-1			

Where “a” is the total number of education methods, which is 4 here. “N” is total sample size. Under Ho, the test statistics

$F = (MS_{T}rt)/(MS_{E})\sim F(a - 1, N - a)$

And our test statistics becomes an F-test. We reject H0 for large values of F in comparison to an F (a – 1, N – a) distribution. The p-value will be reported, which quantifies the strength of the evidence provided by the null hypothesis.

Summary

Using SPSS software will allow this statistical analysis. The analysis will include both descriptive and inferential statistical analysis methods. The descriptive statistical analysis method will be used for univariate variables, and inferential statistics will be used to analyze bivariate and multivariate variables.

Concept Clarification

- Normal distribution of scores = The scores are normally distributed on a bell-shaped curve when plotted on graph
- Non-normal distribution of scores = The scores are not normally distributed on a bell-shaped curve when plotted on graph

Summary of Chapter 3

Chapter 3 includes a brief summary of the study, and a description of the research design, and its approach through a randomized controlled trial. Also explained are the potential study participants, place, setting, sampling method, enrollment procedure, and the inclusion, and exclusion criteria for the study. Furthermore, the study instruments are explained with clarity with its psychometrics that includes the Morisky medication adherence scale (MMAS), the self-efficacy for appropriate medication use scale (SEAMS), and the beliefs about medications questionnaire (BMQ). Finally explained is the data collection method, and the statistical procedures that would be possibly used to analyze the study findings.

This randomized controlled trial recognizes potential threats to internal and external validity such as history, maturation, diffusion, testing, and mortality because of the nature of chronic illnesses and the interaction among the selected population due to the setting, treatment, and history (Creswell, 2009).

Chapter 4: Results and Analysis

Introduction

I conducted a single-blind randomized controlled trial on medication adherence with the purpose of assessing the effectiveness of using different educational methods with chronic illnesses such as hypertension, hyperlipidemia, diabetes, asthma, and COPD with African Americans between the ages of 18 to 65 and who live in Chicago. The study was built on the theoretical base of the SCT (Bandura, 1977) and the TPB (TPB) (Ajzen 1991, 2007).

Scholars have emphasized that poor adherence to medications with chronic illnesses is one of the barriers in controlling and reducing chronic illnesses, reducing morbidity and mortality, improving quality of life, and reducing health care costs (Bandura, 2004; Kripalani et al., 2007; Ogedegbe, et al., 2007; Österberg & Blaschke, 2005). Kelly and Jorgensen (2012) and Bandura (2004) argued that nonadherence to medications is a complex behavior; therefore, it is necessary to provide appropriate education on medications prescribed to control chronic illnesses to increase knowledge and self-efficacy and to bring a change in health beliefs by implementing different educational methods with an emphasis on prevention of consequences that chronic illnesses cause and to learn self-management through medication adherence (Bandura, 2004; Kelly & Jorgenson, 2012; Murray et al., 2004).

Purpose

For the purpose of this quantitative study, a single-blind randomized controlled trial, using the pretest/posttest design was chosen (Cresswell, 2009). Main focus of this study was to assess the effectiveness of using different educational methods including lectures, video presentations, role plays, and group discussions to see if there would be a significant effect in increasing knowledge and self-efficacy and a change in health beliefs through these educational methods. Three well validated tools were used as Pretest/Posttest to assess the effectiveness of these educational methods: Morisky Medication Adherence Scale (MMAS; Morisky 2008) to assess knowledge gain, Self-Efficacy for Appropriate Medication use Scale (SEAMS; Kripalani et al., 2007) to assess increase in self-efficacy, and Beliefs about Medicine Questionnaire (BMQ-18; Horne, et al., 2000) to assess the change in health beliefs.

Research Questions and Hypotheses

A central research question was formulated based on this purpose of the study: Is there any significant effect of using different educational methods in enhancing medication adherence in African Americans with chronic illnesses?

Hypotheses

1. Knowledge Gain; Pretest/Posttest-MMAS

Do different educational methods have significant effects on knowledge gain in medication adherence in African Americans with chronic illnesses?

$H_0 1$: There will be no significant difference in knowledge gained on medication adherence between the intervention group and the control group.

$H_1 1$: There will be a significant difference in knowledge gained on medication adherence between the intervention group and the control group.

2. Self-Efficacy; Pretest/Posttest-SEAMS

Do different educational methods have a significant effect in increasing self-efficacy on medication adherence in African Americans with chronic illnesses?

$H_0$2: There will be no significant difference in self-efficacy on medication adherence between the intervention group and the control group.

$H_1$2: There will be a significant difference in self-efficacy on medication adherence between the intervention group and the control group.

3. Health Beliefs; Pretest/Posttest-BMQ-18

Do different educational methods have a significant effect in changing health beliefs in African Americans with chronic illnesses?

$H_0$3*:* There will be no significant difference in health beliefs on medication adherence between the intervention group and the control group.

$H_1$3*:* There will be a significant difference in health beliefs on medication adherence between the intervention group and the control group.

Preview of Chapter 4

This chapter begins with a brief review of the previous chapter, a description of the study purpose, research questions, and the hypotheses of this randomized controlled study. Data entry for the analysis was done using SPSS Version 21.0 for Windows. Research questions were examined and the hypotheses were tested through ANOVA statistical methodology. Descriptive statistical analysis was used to describe sample demographics and the research variable. The study took place in a southwest community of Chicago for a period of eight weeks with the African Americans. A total number 210 people agreed to participate in the study, 144 participants were randomized, 72 to the experimental group, and 72 to the control group. The number of study participants varied from week one to week five. From weeks, six to eight, the number of study participants remained the same. The highest number of study participants was 44 in the experimental group and 17 in the control group. This chapter ends with findings of the study analysis that are shown in tables and texts. In chapter 5, a further explanation will be given on the analysis.

Data Collection

Recruitment

The recruitment process began after the Institutional Review Board (IRB) of Cook County Hospital and Healthcare System gave their approval to conduct the study in a south side community of Chicago. The volunteers, who were approved by the IRB to assist in this study, posted the fliers in malls, marketplaces, laundromats, restaurants, bus and train stops, politicians' offices in the south side community, and in the churches of the south side community of Chicago. The colorful flyer contained a brief description of the study, purpose of the study, and the voluntary nature of the study and invited African Americans who fit the study criteria to participate. The flyer also contained the telephone numbers of volunteers to contact if they were willing to participate in the study. In addition, the flyer assured confidentiality of the participants throughout the study.

Volunteers Profile

There were a total number of six volunteers, in addition to African Americans, members of Step of Faith Ministries, and people who attended the Southside church, regularly. These volunteers included two pastors, two nurses, one business manager, and a pharmacy technician; they participated in the IRB testing and received a certificate from the IRB that allowed them to assist in this study. Prior to the recruitment procedure, these volunteers were fully informed about the study, the Pretest/Posttest questionnaires, and the voluntary nature of the study; that they had to maintain confidentiality about the study participants at all stages of the study. They were reminded not to use coercion at any stage. Volunteers and the principle investigator (PI) had debriefing sessions together once a week, from the beginning of the study until the study was completed. All the sessions were held at the church where the study was conducted.

The recruitment phase lasted for eight weeks. A total of 210 African Americans from this Southside community of Chicago consented to participate in this study. Study volunteers obtained the information from these willing participants and submitted them to a senior researcher who was authorized by the IRB to do randomization for this study. This study required a total of 190 to 200 study participants. The volunteers informed those study participants who were selected through randomization about the beginning date of the study, time, and the place. The researcher (PI) passively remained active by guiding those volunteers without getting involved directly in the recruitment process.

Randomization

Randomization was done through computer by a well-trained senior researcher authorized by IRB. A total number of 144 willing participants were randomized and 72 participants each were assigned to the control and experimental groups. The PI did not get involved with the randomization process (PI was blinded).

Data Analysis

Data were entered into SPSS version 21.0 for Windows. Descriptive statistics were conducted to describe the sample demographics and the research variables used in the analysis. Frequencies and percentages were calculated for nominal data, such as gender and age. Means and standard deviations were calculated for continuous data, such as knowledge and self-efficacy scores. Cronbach alpha reliability testing was conducted on each of the subscales created (knowledge, self-efficacy, and health beliefs).

Research Question 1

Do different educational methods have significant effects on knowledge gain in medication adherence in African Americans with chronic illness?

$H_0$1: There will be no significant difference in knowledge gained on medication adherence between the intervention group and the control group.

$H_1$1: There will be a significant difference in knowledge gained on medication adherence between the intervention group and the control group.

To examine Research Question 1, an analysis of variance (ANOVA) will be conducted to assess if the difference in knowledge scores is significantly different by the control and experimental groups. The ANOVA is the appropriate analysis to conduct when the goal is to assess if there is a significant difference in a continuous variable by a nominal variable (Pallant, 2010). The continuous dependent variable is the knowledge difference score, created by subtracting the pretest knowledge score from the posttest knowledge score. The nominal independent variable is group, with levels control and treatment. Prior to analysis, the assumptions of normality and equality of variance will be assessed.

Research Question 2

Do different educational methods have significant effects on increasing self-efficacy on medication adherence in African Americans with chronic illness?

$H_0$2: There will be no significant difference in self-efficacy on medication adherence between the intervention group and the control group.

$H_1$2: There will be a significant difference in self-efficacy on medication adherence between the intervention group and the control group.

To examine research question 2, an analysis of variance (ANCOVA) will be conducted to assess if the difference in self-efficacy scores is significantly different by the control and experimental groups. The ANCOVA is the appropriate analysis to conduct when the goal is to assess if there is a significant difference in a continuous variable by a nominal variable (Pallant, 2010). The continuous dependent variable is the self-efficacy difference score, created by subtracting the pretest self-efficacy score from the posttest self-efficacy score. The nominal independent variable is group, with levels control and treatment. Prior to analysis, the assumptions of normality and equality of variance will be assessed.

Research Question 3

Do different educational methods have a significant effect in changing health beliefs in African Americans with chronic illnesses?

$H_0$3: There will be no significant difference in health beliefs on medication adherence between the intervention group and the control group.

$H_1$3: There will be a significant difference in health beliefs on medication adherence between the intervention group and the control group.

To examine research question 3, a multivariate analysis of variance (MANOVA) will be conducted to assess if there was a significant difference in the four health beliefs difference scores by the control and experimental groups. The MANOVA is the appropriate analysis to conduct when the goal is to assess if there were significant differences in multiple dependent variables by a nominal independent variable (Pallant, 2010). The continuous dependent variables are the four health beliefs (necessity, concerns, overuse, and harm) differences scores, created by subtracting the pretest health belief score from the posttest health beliefs score. Prior to analysis, the assumptions of normality and equality of covariance matrices will be assessed. If the MANOVA is significant, then the individual ANOVAs will be interpreted as well.

Results

Descriptive Statistics

A total of 263 observations (or data sets), including control and experimental groups were taken. Participation in both groups varied on a weekly basis, with weeks six, seven, and eight having the largest participant count (44, 17%). There were 150 (57%) observations that were taken for the experimental group and 113 (43%) that were taken for the control group. Due to the fact that the same participant could come multiple weeks, frequencies and percentages of the demographics should be interpreted with caution. Majority of the overall observations were from females (158, 60%). Most of the observations came from participants who had high blood pressure (193, 73%) and had high cholesterol (135, 51%). Majority of the observations were *not* from participants with diabetes (145, 55%), from those with asthma (168, 64%), or from those with COPD (203, 77%). The most-common age group of the observations was 56-65 years old (122, 46%). Frequencies and percentages for observation demographics are presented in Tables 1 through 5.

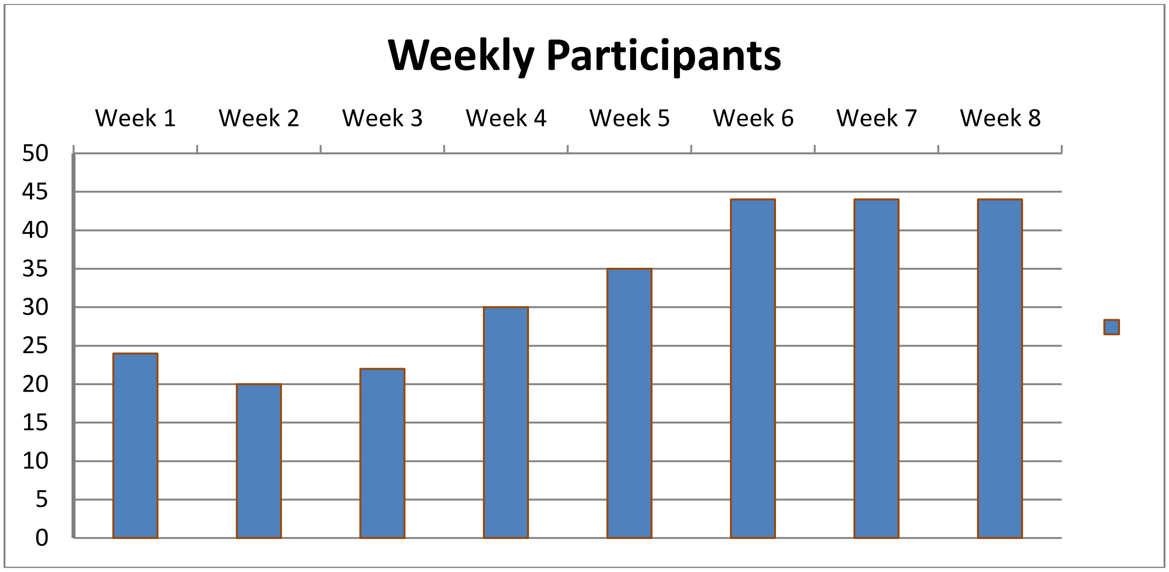


Figure 1. Bar Graph on Weekly Participation

Table 1

Frequencies and Percentages for Observation Demographics (See Graph 1)

Demographic	*n*	%
Week	Participants	
1	24	9
2	20	8
3	22	8
4	30	11
5	35	13
6	44	17
7	44	17
8	44	17
Total observations from all eight weeks	263	
By control and experimental groups		
Control group	113	43
Experimental group	150	57
By Gender		
Female	158	60
Male	105	40

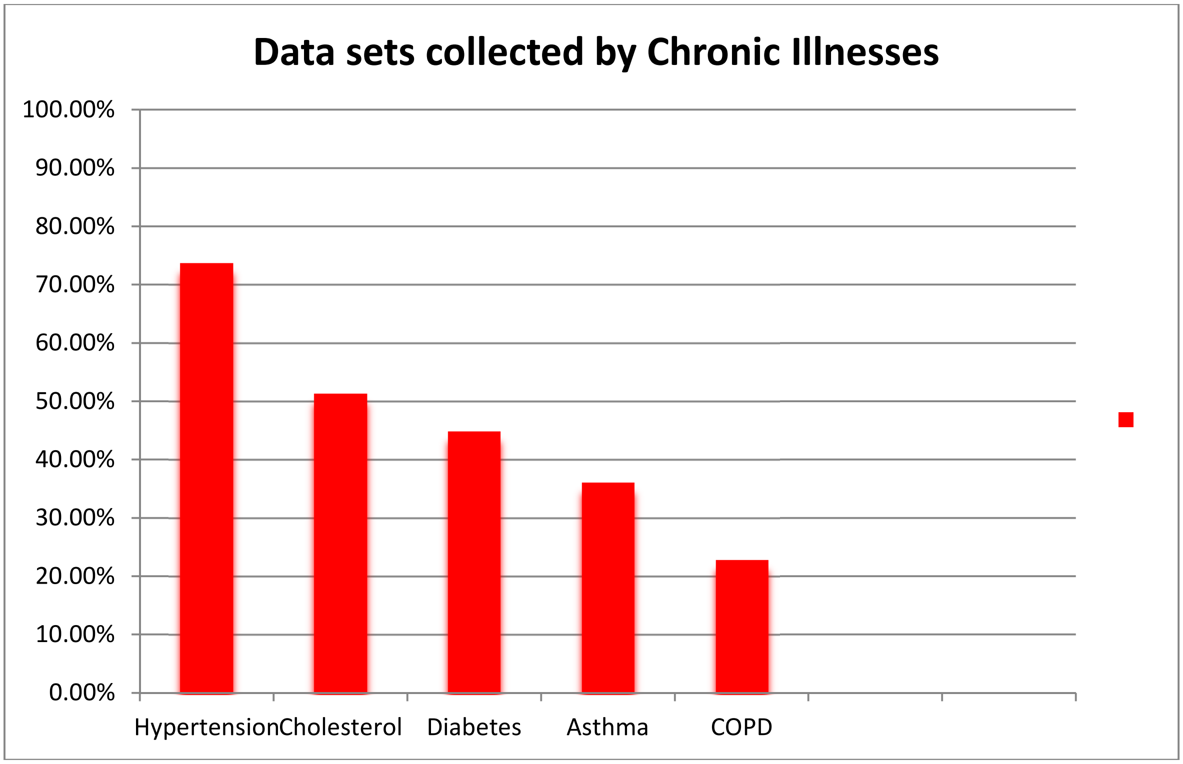


Figure 2. Bar Graph on Chronic Illnesses

Table 2 *Demographics of Chronic Illnesses*	**n**	**%**
By Blood Pressure levels		
Not high	69	26
High	194	74
By Cholesterol levels		
Not high	128	49
High	135	51
By Diabetes incidence		
Does not have	145	56
Has	118	44
By having Asthma		
Does not have	168	64
Has	95	36
By having COPD		
Does not have	203	77
Has	60	23

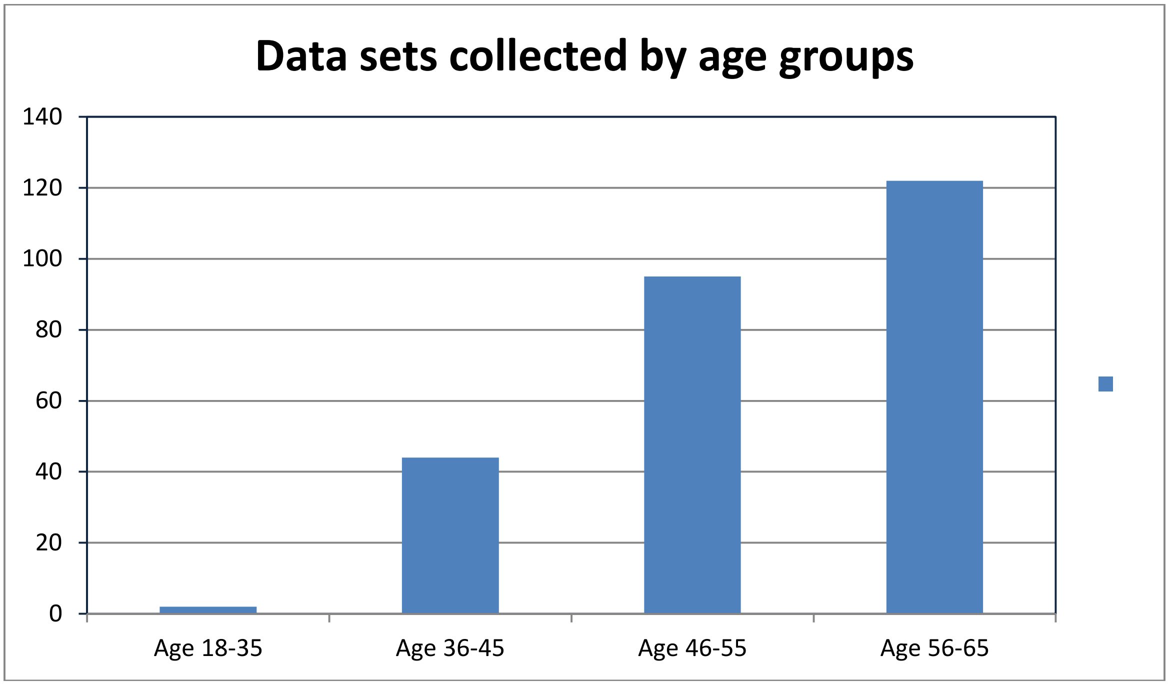


Figure 3. Bar Graph on Age Group

Table 3

Demographics of Age Group	n	%
18 – 35	2	1
36 – 45	44	17
46 – 55	95	36
56 – 65	122	46

Note. Percentages may not total 100 due to rounding error. (This applies for all demographic tables).

Scores were created for knowledge, self-efficacy, and health beliefs at pretest and posttest. The difference between the pretest and posttest was calculated by subtracting the pretest score from the posttest score. Cronbach's alpha test of reliability was conducted on each of the pretest and the posttest scores. Reliability showed that all subscales had at least good reliability (> .80) or excellent reliability (> .90; George and Mallery, 2010). Table 4 below shows the descriptive statistics for the pretest, posttest, and difference scores for each of the variables.

Table 4

Descriptive Statistics for Pretest, Posttest, and Differences Scores

	Pretest			Posttest			Difference	
Variable	*M*	*SD*	α	*M*	*SD*	α	*M*	*SD*
Knowledge	4.73	1.96	.87	5.31	1.88	.84	0.59	1.37
Self-efficacy	2.12	0.60	.86	2.37	0.47	.87	0.25	0.46
Health beliefs - necessity	2.48	0.90	.97	2.34	0.95	.80	-0.13	0.89
Health beliefs - concerns	3.09	0.91	.93	3.14	0.94	.79	0.05	0.84
Health beliefs - overuse	3.10	1.00	.91	3.13	1.03	.82	0.02	0.67
Health beliefs - harm	3.47	0.77	.92	3.70	0.80	.83	0.23	0.70

Prior to addressing the research questions, age and gender were assessed for as covariates. A series of Pearson correlations were conducted for age and the difference scores while a series of point-biserial correlations were conducted for gender and the differences scores. Results of the correlations showed that self-efficacy difference scores were related to age (*r* = -.18, *p* = .003) and to gender (*r* = .12, *p* = .046), suggesting that participants who were younger and those that were male tended to have a larger difference in their self-efficacy score from pretest to posttest. Because these variables were related to self-efficacy, they were used as covariates for research question two. Gender was also related to health beliefs – harm (*r* = .19, *p* = .002), suggesting that male participants tended to have a higher difference in health beliefs – harm scores from pretest to posttest compared to females. Although gender was related to health beliefs – harm, it was not treated as a covariate for the MANOVA for research question 3 as it was not related to any other health beliefs scores. Results for the correlations are presented in Table 5.

Table 5

Results for Covariate Correlations

Score	Age	Gender
Knowledge	-.08	.02
Self-efficacy	-.18**	.12*
Health beliefs - necessity	-.03	-.11
Health beliefs - concerns	.02	.05
Health beliefs - overuse	.10	-.03
Health beliefs - harm	-.01	.19**

Research Question 1

Do different educational methods have significant effects on knowledge gain in medication adherence in African Americans with chronic illness?

$H_0$1: There will be no significant difference in knowledge gained on medication adherence between the intervention group and the control group.

H_a1: There will be a significant difference in knowledge gained on medication adherence between the intervention group and the control group.

To assess research question 1, an analysis of variance (ANOVA) was conducted to assess if there were significant differences in the difference scores for knowledge by control and experimental groups. Prior to analysis, the assumption of normality was assessed with a Kolmogorov Smirnov (KS) test. Results of the test were significant ($p < .001$), suggesting that normality was violated. However, with a large sample size, normality can be violated with little effect on Type I error (Stevens, 2009). The assumption of equality of variance was assessed with a Levene's test. The results of the test were not significant ($p = .911$), meeting the assumption.

Results of the ANOVA were not significant, $F(1, 261) = 0.17$, $p = .678$, suggesting that there were no differences in the knowledge differences scores by the control and experimental groups. Since the ANOVA was not significant, the null hypothesis cannot be rejected. Results of the ANOVA are presented in Table 6. Means and standard deviations for knowledge differences scores by group are presented in Table 7.

Table 6
ANOVA Results for Knowledge Difference Scores of Groups (Exp, Cont.)

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Control and Experimental Groups	0.33	1	0.33	0.17	.678	.00
Error	494.81	261	1.90			

Table 7
Means and Standard Deviations in Knowledge Difference Scores by Group

Group	*M*	*SD*
Control	0.54	1.38
Experimental	0.61	1.37
Total	0.58	1.37

An additional ANOVA was conducted to assess if there were differences in teaching styles used in the experimental group (lecture, video, role play, and group discussion). Equality of variance was not met with the Levene's test (*p* = .003), and thus a more-stringent alpha level of .025 was used for the ANOVA. Results of the ANOVA were not significant, *F*(3, 146) = 0.91, *p* = .441. This suggests that no teaching style was significantly better than the others. Means and standard deviations for knowledge difference scores by teaching style are presented in Table 8. Results for the ANOVA are presented in Table 9.

Table 8
ANOVA Results for Knowledge Difference Scores by Teaching Style

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Teaching Style	5.13	3	1.71	0.91	.441	.02
Error	276.19	146	1.89			

Table 9
Means and Standard Deviations in Knowledge Difference Scores of experimental group by Teaching Style

Group	*M*	*SD*
Lecture	0.83	2.00
Video	0.38	1.10
Role play	0.78	1.24
Group discussion	0.49	1.08
Total	0.58	1.37

Research Question 2

Do different educational methods have significant effects on increasing self-efficacy on medication adherence in African Americans with chronic illness?

$H_0$2: There will be no significant difference in self-efficacy on medication adherence between the intervention group and the control group.

H_a2: There will be a significant difference in self-efficacy on medication adherence between the intervention group and the control group.

To assess research question 2, an analysis of covariance (ANCOVA) was conducted to assess if there were significant differences in the difference scores for self-efficacy by the control and experimental groups after controlling for age and gender. Prior to analysis, the assumption of normality was assessed with a Kolmogorov Smirnov (KS) test. The results of the test were significant ($p < .001$), suggesting that normality was violated. However, with a large sample size, normality can be violated with little effect on Type I error (Stevens, 2009). The assumption of equality of variance was assessed with a Levene's test. The results of the test were not significant ($p = .671$), meeting the assumption.

Results of the ANCOVA were not significant, $F(1, 259) = 0.96$, $p = .328$, suggesting that there were no differences in the self-efficacy differences scores by the control and experimental groups. Since the ANCOVA was not significant, the null hypothesis cannot be rejected. Results of the ANCOVA are presented in Table 10. Means and standard deviations for self-efficacy differences scores by group are presented in Table 11.

Table 10
ANCOVA Results for Self-Efficacy Difference Scores by Group Controlling for Age and Gender

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Control and Experimental Groups	0.19	1	0.19	0.96	.328	.00
By Age	2.53	1	2.53	12.63	.001	.05
By Gender	1.40	1	1.40	6.97	.009	.03
Error	55.26	261	0.21			

Table 11
Means and Standard Deviations in Self-Efficacy Difference Scores by Group

Group	*M*	*SD*
Control	0.26	0.46
Experimental	0.25	0.46
Total	0.25	0.46

An additional ANCOVA was conducted to assess if there were differences in teaching styles used in the experimental group (lecture, video, role play, and group discussion) after controlling for age and gender. Equality of variance was met with the Levene's test (p = .091). The results of the ANCOVA were not significant, $F(3, 144)$ = 0.73, p = .538. This suggests that no teaching style was significantly better than the others. Means and standard deviations for self-efficacy difference scores by teaching style are presented in Table 12. Results for the ANCOVA are presented in Table 10.

Table 12

ANCOVA Results for Self-Efficacy Difference Scores by Teaching Style Controlling for Age and Gender

Source	*SS*	*df*	*MS*	*F*	*p*	Partial η^2
Teaching Style	0.44	3	0.15	0.73	.538	.02
Age	0.61	1	0.61	3.03	.084	.02
Gender	1.36	1	1.36	6.79	.010	.05
Error	28.87	144	0.20			

Table 13

Means and Standard Deviations in Self-Efficacy Difference Scores of experimental group by Teaching Style

Group	*M*	*SD*
Lecture	0.18	0.49
Video	0.34	0.50
Role play	0.26	0.50
Group discussion	0.23	0.35
Total	0.25	0.46

Research Question 3

Do different educational methods have a significant effect in changing health beliefs in African Americans with chronic illnesses?

$H_0$3: There will be no significant difference in health beliefs on medication adherence between the intervention group and the control group.

H_a3: There will be a significant difference in health beliefs on medication adherence between the intervention group and the control group.

To examine research question 3, a multivariate analysis of variance (MANOVA) was conducted to assess if there were differences in the health beliefs difference scores (necessity, concerns, overuse, and harm) by control and experimental groups. Prior to analysis, the assumption of normality was assessed with KS tests. Results of the test were all significant ($p < .001$), suggesting that normality was violated. However, Stevens (2009) suggests that normality violations have little effect on Type I error. The assumption of equality of covariance matrices was assessed with the Box's M test. Results of the Box's M test were significant ($p < .001$), suggesting that equality of covariance matrices was violated. As such, the Pillai's Trace statistic will be interpreted for the MANOVA, which is a more-conservative statistic for the MANOVA (Pallant, 2010).

Results of the MANOVA were not significant, $F(4, 258) = 0.46$, $p = .765$, suggesting that there were no differences in the health beliefs difference scores by control and experimental groups. Since the MANOVA was not significant, the individual ANOVAs were not interpreted. In addition, the null hypothesis cannot be rejected.

Results of the MANOVA are presented in Table 14. Means and standard deviations for the health beliefs are presented in Table 15.

Table 14

MANOVA Results for Health Beliefs Difference Scores of Groups (Exp,Cont)

Source	MANOVA *F*(4, 258)	ANOVA *F*(1, 261)			
		Necessity	Concern	Overuse	Harm
Control and Experimental Groups	0.46	1.37	0.29	0.05	0.41

Table 15

Means and Standard Deviations for Health Beliefs Difference Scores by Group

Health beliefs score	Control		Experimental	
	M	*SD*	*M*	*SD*
Necessity	-0.21	0.71	-0.08	1.01
Concern	-0.13	0.89	0.02	0.92
Overuse	0.08	0.78	0.05	0.84
Harm	0.03	0.64	0.02	0.69

An additional MANOVA was conducted to compare the health beliefs scores by teaching style. The assumption of equality of covariance matrices was assessed with the Box's M test. Results of the Box's M test were not significant at the .001 level ($p =$ .002), suggesting that equality of covariance matrices was met.

Results of the MANOVA were not significant, *F* (4, 379) = 1.20, *p* = .285, suggesting that there were no differences in the health beliefs difference scores by teaching style. Since the MANOVA was not significant, the individual ANOVAs were not interpreted. With the MANOVA not being significant, there was no leadership style that was best among others for health belief scores. Results of the MANOVA are presented in Table 16. Means and standard deviations for the health beliefs are presented in Table 17.

Table 16
MANOVA Results for Health Beliefs Difference Scores by (Exp+Ctrl) Group

Source	MANOVA *F*(12, 379)	ANOVA *F*(1, 146)			
		Necessity	Concern	Overuse	Harm
Control and Experimental Groups	1.20	1.02	2.26	1.73	0.73

Table 17
Means and Standard Deviations for Health Beliefs Difference Scores of Experimental Group

	Lecture		Video		Role Play		Group Discussion	
Health beliefs score	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Necessity	-0.03	0.83	-0.24	1.05	-0.19	1.00	0.11	1.11
Concern	0.28	0.73	-0.19	0.85	0.09	0.79	0.12	0.70
Overuse	0.20	0.86	0.08	0.73	-0.03	0.60	-0.14	0.55
Harm	0.41	0.73	0.22	0.82	0.18	0.49	0.23	0.74

Summary of Chapter 4

A single-blind randomized controlled trial was conducted to assess the effectiveness of using different educational methods such as lecture, video presentation, role-playing, and group discussion to enhance medication adherence among patients with chronic illnesses such as hypertension, diabetes, hyperlipidemia, asthma, and COPD. The study took place in a church in a southwest community of Chicago, once a week for a period of eight weeks. The study was conducted exactly as how it was planned and explained in the methodology section of Chapter 3. The study participants were only African Americans men and women, eighteen to sixty-five years of age, who were diagnosed with and prescribed medications for hypertension, hyperlipidemia, diabetes, asthma, and COPD, and also gave their willing consent to participate in the study.

The data was analyzed using SPSS Version 21.0 for Windows. Descriptive statistics was performed to describe the sample demographics and research variables used in analysis. Frequencies and percentages were calculated for nominal data such as gender and age. Means and standard deviations were calculated for continuous data on dependent variable scores. The hypotheses were analyzed using ANOVA statistical method and shown in tables. Summary of the research findings, limitations of the study, and recommendations for future actions are explained in chapter 5.

Chapter 5: Introduction

In this chapter, I explain the purpose and nature of the study and the compelling reason for the study to be carried out. Briefly summarized, the pertinent findings of the study, the interpretation of the findings within the scope of empirical findings, and the theoretical underpinnings that allowed this study to be designed and carried out are explained through various scholars. The limitations of this study are explained, recommendations were made for further studies on health promotion with medication adherence and chronic illnesses, as was how education on medication adherence could bring a positive social change in the management of chronic illnesses; thus, this would have a greater impact in reducing morbidity, mortality, and healthcare costs.

Purpose: Review of the Purpose, Nature, and Reason for the Study

The purpose of this quantitative study was to assess the effectiveness of using four different educational methods such as lecture, video presentation, role play, and group discussion in enhancing medication adherence among African American men and women between 18 to 65 years of age, who live in a southwest community of Chicago, are diagnosed with hypertension, hyperlipidemia, diabetes, asthma, and COPD, and are prescribed medications for these chronic illnesses. The study was designed to measure statistically as how these educational methods the independent variables have impacted the dependent variables, knowledge, self-efficacy, and change in health beliefs. The study further examined the independent variables, the educational methods by comparing one against another to assess which educational method was more effective in this study.

Nature of the Study

The study was conducted as a single blind, randomized controlled trial with a pretest/posttest design. Both experimental and control groups received education on medication adherence on hypertension, hyperlipidemia, diabetes, asthma, and COPD. The experimental group received education through lectures, videos, role-playing, and group discussions. The control group received education through pamphlets only. Both groups completed the pretest prior to education and posttest after the education. Three well-validated scales were used as pretest/posttest in this study.

Reason for this Study

The main reason for conducting this single blind randomized controlled trial was to examine whether using different educational methods would be more effective in enhancing medication adherence among African Americans with chronic illnesses by increasing knowledge, self-efficacy, and changes in health beliefs. In this way, one could bring about a positive social change through increasing medication adherence among African Americans resulting in a reduction of morbidity, mortality, and healthcare costs, and improving quality of life.

Summary of the Key Findings

Hypothesis 1

1. Do different educational methods have significant effects on knowledge gain in medication adherence in African Americans with chronic illnesses?

$H_0$1: There will be no significant difference in knowledge gained on medication adherence between the intervention group and the control group

$H_1$1: There will be a significant difference in knowledge gained on medication adherence between the intervention group and the control group

The results of the ANOVA were not significant *F* (1,261) = 0.17 and *p* = .678, suggesting that there were no differences in the knowledge differences scores by group. Because the ANOVA was not significant, the null hypothesis cannot be rejected (Table 3).

Hypothesis 2

Do different educational methods have significant effects in increasing self-efficacy on medication adherence in African Americans with chronic illness?

$H_0$2: There will be no significant difference in self-efficacy on medication adherence between the intervention group and the control group.

$H_1$2: There will be a significant difference in self-efficacy on medication adherence between the intervention group and the control group. The results of the ANCOVA were not significant, *F* (1,261) = 0.01, *p* = .914, suggesting that there were no differences in the knowledge differences scores by group. Since the ANCOVA was not significant, the null hypothesis cannot be rejected (Table 5).

Hypothesis 3

Do different educational methods have a significant effect in changing health beliefs in African Americans with chronic illnesses?

$H_0$3: There will be no significant difference in health beliefs on medication adherence between the intervention group and the control group

$H_1$3: There will be a significant difference in health beliefs on medication adherence between the intervention group and the control group

A multivariate analysis of variance (MANOVA) was conducted to assess if there were differences in health beliefs difference scores including necessity, concerns, overuse, and harm by group. The results of the MANOVA were not significant F (4,258) = 0.46 and p = .765, suggesting that there were no differences in health beliefs difference scores by group. Since the MANOVA was not significant, the null hypothesis cannot be rejected (Table 7).

Results

Descriptive Statistics

A total of 263 observations were taken. Participation varied on a weekly basis from week one to week five and weeks six to eight, which had the highest number of participants, 27 in the experimental group and 17 in the control group.

The majority of the overall observations were from females (158, 60%)

Most of the observations came from participants who had high blood pressure (193, 73%) and had high cholesterol (135, 51%)

The majority of the observations were not from participants with diabetes (145, 55%), or from those with asthma (168, 64%), or from those with COPD (203, 77%)

The most common age group of the observation was 56-65 years old (122, 46%)

Educational Methods

Based on the statistical findings, all the four educational methods received equal scores, which means that no one single educational method was better than the other educational method

Interpretation of the Findings

Hypothesis 1: Knowledge Gain

Do different educational methods have significant effects on knowledge gain in medication adherence in African Americans with chronic illnesses?

H_0: “There will be no significant difference in knowledge gained on medication adherence between the intervention group and the control group”

H_a: “There will be a significant difference in knowledge gained on medication adherence between the intervention group and the control group”

Analysis of Variance (ANOVA) was conducted to see whether there would be significant differences in the **difference** scores for knowledge. Results of the ANOVA were not significant, $F(1,261) = 0.17$, $p = .678$, suggesting that there were no differences in the knowledge differences scores by group. Since the ANOVA was not significant, the null hypothesis cannot be rejected.

Discussion

Failure to reject the null hypothesis on knowledge gain could have resulted because of a few potential reasons as many scholars have suggested based on their empirical findings. One of the most important suggestions that scholars have given was prevailing poor health literacy among African Americans. The National Council on Patient Information and Education (NCPIE), whose main task is to improve communication and information between patient and healthcare providers to improve medication adherence, suggested that poor health literacy is a significant problem among African Americans resulting in poor understanding and comprehension of health information leading to poor knowledge gain (as cited in Kourek, 2009). Kalichman et al.

(2008) suggested in their studies on HIV/AIDS medication adherence that health literacy plays a vital role in gaining knowledge on medication adherence and that health literacy is particularly in demand for improving a patient's knowledge, comprehension on health messages, and adherence to prescribed medications. In addition, low health literacy skills are closely associated with inadequate knowledge and poor comprehension (Kalichman et al., 2008). Kripalani and colleagues (2006) have explained that low literacy skills may be a potential risk factor for poor comprehension and inadequate knowledge gain (Kripalani et al., 2006).

Marks (2009) and Wagner et al., (2009) have explained that low health literacy in vulnerable populations could affect their listening skills, resulting in difficulties to process the health information (Marks, 2009; Wagner et al., 2009). A few other scholars have explained that low health literacy is also associated with low numeracy skills (Thai & George, 2010). Low health literacy and low numeracy skills could have played a subtle role in this study with pretest and posttest questionnaires that the null hypothesis could not be rejected in knowledge gain.

Another potential reason for failing to reject the null hypothesis on knowledge gain is possibly due to depression and fatigue associated with chronic illnesses as the Institute of Medicine (IOM) reported in 2002 (Österberg & Blaschke, 2005; Ho et al., 2009; Hill et al., 2010). This chronic depression and fatigue associated with chronic illnesses could cause physical, sensory, and cognitive impairments (Österberg & Blaschke, 2005; Hill et al., 2010), resulting in difficulties in processing health information on medication adherence (Österberg & Blaschke, 2005). This subtle nature of chronic depression and fatigue could have caused difficulties to study participants in understanding and comprehending Pretest and Posttest questionnaires in that the null hypothesis on knowledge gain could not be rejected statistically.

In summary, the null hypothesis on knowledge gain could not be rejected by statistical method. This might have happened because of possible factors associated with the study participants: low literacy levels in that no one had completed high school, inherent fatigue and depression associated with chronic illnesses, lack of adequate numerical skills because of low literacy levels, and sensory defects because of depression and fatigue. These factors could have played a significant role among the study participants, causing difficulties with understanding and comprehension of Pretest/Posttest questionnaires of MMAS in spite of assistance offered from the volunteers with Pretest/Posttest questionnaires.

Hypothesis 2: Self-Efficacy

Do different educational methods have significant effects on increasing self-efficacy on medication adherence in African Americans with chronic illnesses?

H_0: There will be no significant difference in self-efficacy on medication adherence between the intervention group and the control group

H_a: There will be a significant difference in self-efficacy on medication adherence between the intervention group and the control group

To see if there would be significant differences in the difference scores for self-efficacy by group after controlling for age and gender, the team conducted an analysis of covariance (ANCOVA). The results of the ANCOVA were not significant, F(1,259) = 0.96, p = .328, suggesting that there were no differences in the self-efficacy differences scores by group. Since the ANCOVA was not significant, the null hypothesis cannot be rejected. In this way, the null hypothesis cannot be rejected in the second hypothesis.

Discussion

Failure to reject the null hypothesis by statistical analysis on increase in self-efficacy could be due to the fact that the role of self-efficacy depends greatly on human functioning and this depends on an individual's knowledge and skills (Bandura, 1977). The authors Kralik and colleagues (2010) explained that future health status and health behaviors in people with chronic illnesses are greatly dependent on their self-efficacy and changes in it. In the context of living with chronic illnesses that require people to have self-efficacy in self-management of their illness, they have to make considerable adjustments and adaptations to daily life changes that require changes in self-efficacy (Kralik et al., 2010). In order to make changes in life, one has to gain knowledge and skills (Bandura, 1977).

In 2008, Friedman & Hoffman-Goetzl warned the healthcare providers that they tend to overestimate a patient's literacy skills and knowledge that the patients have full comprehension of verbal and written instructions provided to them when in fact they do not have such skills, and this lack of cognitive skills is often found among vulnerable populations (Friedman & Hoffman-Goetzl, 2008). In this study, the participants were all African Americans with one or more chronic illness and their educational level was that of a high school level. Perhaps the volunteers and the researcher might have overestimated their cognitive skills while doing the pretest and posttest; the study participants also did not want to convey their inabilities with their reading and comprehension of the pretest and posttest questionnaires. This low literacy level and poor comprehension possibly directly contributed to failure to reject the null hypothesis on self-efficacy.

Gamble (1977) explained that African Americans are very fearful of any research activities because of past experiences with racism and that they would be used as guinea pigs (Gamble, 1977). Initially, the concept of medication adherence seen on the invitation could have created some kind of fear about the study, because some of the study participants had expressed this fear in that they would be asked to try some kind of new medication for diabetes and hypertension. This kind of fear is real for the study participants, especially among African Americans because of the past history of racism associated with research activities, and this fear could have prevented them from expressing their self-efficacy on the SEAMS Scale through pretest and posttest questionnaires on self-efficacy that had possibly resulted in failure to reject the null hypothesis.

IOM (2002), Österberg & Blaschke (2005), Ho et al. (2009), and Hill et al. (2010) have explained that chronic illnesses can cause depression and fatigue because of their chronicity in nature and that they have a negative impact on self-efficacy, knowledge gain, and motivation (IOM, 2002; Österberg & Blaschke, 2005; Ho et al., 2009; Hill et al., 2010). Schoenthaler and colleagues (2009) have explained in their study with African Americans with hypertension that they suffer with depression and this depression has a negative impact on self-efficacy (Schoenthaler et al., 2009). Manifestation of depression in this study may not be directly seen, but could have had an impact on SEAMS questionnaires through Pretest and Posttest that resulted in failure to reject the null hypothesis.

Self-efficacy plays a vital role in the self-management of chronic illnesses and it is a major determinant in behavioral change (Bandura, 1977, 2004). Increase in self-efficacy greatly depends on knowledge gain on health literacy and it is necessary to impart knowledge on medications. Kripalani and colleagues (2006) and Kalichman and colleagues (2008) have explained that health literacy is vital to increase self-efficacy and low health literacy skills are closely associated with inadequate knowledge, poor comprehension, and low self-efficacy (Kripalani et al., 2006; Kalichman et al., 2008). In this study, the study participants could have experienced low self-efficacy because of low health literacy levels that could have reflected on the SEAMS Scale with pretest and posttest, and this could have an impact on the null hypothesis in that the statistical method did not reject it.

In summary, in this present study, the null hypothesis on self-efficacy score was not rejected by ANCOVA statistical method. In other words, the scores on self-efficacy have failed to demonstrate statistical significance; thereby, the statistical method could not reject the null hypothesis. Possible explanation for this could be factors associated with the study participants including fear of any research activities, depression and fatigue associated with chronic illnesses, and low literacy levels among study participants. Living with chronic illnesses is a major challenge for African Americans and gaining self-efficacy on medication adherence is another challenge and they are influenced due to individual factors such as fear, depression, fatigue, inadequate literacy skills, and poor comprehension, which could have a direct impact on the null hypothesis.

Hypothesis 3: Health Beliefs

Do different educational methods have a significant effect in changing health beliefs in African Americans with chronic illnesses?

H_0: There will be no significant difference in health beliefs on medication adherence between the intervention group and the control group

H_a: There will be a significant difference in health beliefs on medication adherence between the intervention group and the control group

A multivariate analysis of variance (MANOVA) was conducted to assess if there were differences in health beliefs difference scores including necessity, concerns, overuse, and harm by group. The results of MANOVA were not significant, F (4,258) = 0.46, p = .765, suggesting that there were no differences in health beliefs difference scores by group. Since the MANOVA was not significant, the individual ANOVA scores were not interpreted. In addition, the null hypothesis cannot be rejected.

Failure to reject the null hypothesis on health beliefs may have various reasons. The first reason is that African Americans are fearful and uncomfortable when they hear about any research related to health that requires their participation. They are afraid that they will be exploited and experimented with new medication and will be used as guinea pigs. In 1997, scholar Gamble described that African Americans are fearful of any medical research that requires their participation because of the past history with syphilis study in Tuskegee, Alabama from 1932 to 1972, where the men who were diagnosed with syphilis were deliberately denied treatment in order to study the natural history of syphilis (Gamble, 1997). This past history on medical research with African Americans has a strong negative impact because the fear that percolates within them in that they do not want to be involved with any research (Gamble, 1997).

The beliefs system of African Americans, related to medications with chronic illnesses, has its base not only from the past history on medical research, but also their experiences with social stigma, racial discrimination, and economic deprivation play a vital role in that they do not trust the medical community (Piette et al., 2010). This mistrust with medical research continues to prevail among African Americans in that they consider medications to be more harmful than doing good and some even consider them to be poison (Piette et al., 2010).

Low health literacy is another contributing factor for their beliefs about medication adherence. Low health literacy in African Americans induces fear and doubts about medications in that they are dissatisfied with the information related to medications (Aikens & Piette, 2009). In this present study, the study participants' educational level was less than high school, and this low literacy could have had an impact on this research question. The study participants were honest and raised concern about generic medications prescribed for hypertension and other chronic illnesses. They believe that generic medications are the root cause for medication allergies and intolerance, and this fear will have a deleterious effect on medication adherence that will take time to completely eradicate.

African Americans believe that stressful life situations can cause hypertension and other illnesses (Lewis et al., 2010). Stressful life situations can cause emotional and psychological distress that could prevent them from being adherent to their prescribed medications. In addition, they believe that hypertension medications can cause serious adverse effects and sometimes could be physically debilitating. They believe that chronic illnesses are caused by stressful situations and medications are not the only answer, and that these stressful conditions have to be dealt with adequate social support in a realistic way.

In summary, in regard to research question 3 on health beliefs, the null hypothesis could not be rejected by the Multivariate Statistical method (MANOVA). The possible reasons could be based on their beliefs including the fear of being used in medical research, low health literacy that they did not understand and comprehend the validated tools, persistent mistrust about medications, the fear of social stigma, racial disparities, and economic deprivation, past history of slavery and discrimination, and stressful life conditions that were not adequately dealt with. Out of all these reasons, fear, doubts, and low health literacy levels could have contributed to this failing to reject the null hypothesis.

Discussion

Failure to reject the null hypothesis on health beliefs may have various reasons. The first reason is that African Americans are fearful and uncomfortable when they hear about any research related to health that requires their participation. They are afraid that they will be exploited and experimented on with new medications and will be used as guinea pigs. In 1997, scholar Gamble described that African Americans are fearful of any medical research that requires their participation because of the past history with syphilitic study in Tuskegee, Alabama from 1932 to 1972 in which the men, who were diagnosed with syphilis were deliberately denied treatment in order to study the natural history of syphilis (Gamble, 1997). This past history on medical research with African

Americans has a strong negative impact because the fear that percolates within them is that they do not want to be involved with any research (Gamble, 1997).

The belief system of African Americans, related to medications with chronic illnesses, has its base not only from past history on medical research, but also from their experiences with social stigma, racial discrimination, and economic deprivation have played a vital role in that they do not trust the medical community (Piette et al., 2010). This mistrust with medical research continues to prevail among African Americans in that they consider medications are more harmful than good, and some even consider them to be poison (Piette et al., 2010).

Low health literacy is another contributing factor for their beliefs about medication adherence. This low health literacy in African Americans induces fear and doubts about medications in that they are dissatisfied with the information related to medications (Aikens & Piette, 2009). In this present study, the study participants' educational level was less than high school and this low literacy could have an impact on this research question. The study participants were honest and raised concern about generic medications prescribed for hypertension and other chronic illnesses. They don't trust generic medications and believe that they cause medication allergies and intolerances; this fear could result in poor medication adherence and it is going to take time to eradicate it completely.

African Americans believe that stressful life situations can cause hypertension and other illnesses (Lewis et al., 2010). The stressful life situations can cause emotional and psychological distress that prevents them from being adherent to their prescribed medications. In addition, they believe that hypertension medications can cause serious adverse effects, and sometimes even physically debilitating ones. They believe that medications are not the only answer for the chronic illnesses that stressful life conditions cause and these conditions have to be dealt with adequate social support in a realistic way.

In summary, in research question 3 on health beliefs the null hypothesis could not be rejected through the Multivariate Statistical Method (MANOVA). The possible reasons could be based on their beliefs, including the fear of being used in medical research, low health literacy in that they did not understand and comprehend the validated tools, persistent mistrust about medications, the fear of social stigma, racial disparities, economic deprivation, past history of slavery and discrimination, and the stressful life conditions that were not adequately dealt with. Out of all these reasons, fear, doubts, and low health literacy levels could have contributed to this failing to reject the null hypothesis.

Comparison of Educational Methods

In this study, four different educational methods were used to educate African Americans with chronic illnesses on medication adherence. These educational methods include lecture, video presentation, role-playing, and group discussion, and they were used to increase knowledge, self-efficacy, and change in health beliefs on medication adherence with chronic illnesses. Statistical analysis was done through comparing these educational methods with each other to see which one was better among these four. ANOVA with research question 1, ANCOVA with 2, and MANCOVA with 3 were used for analysis. These statistical findings suggested that no educational method was better than the other, or all four educational methods were equal in their performance.

Discussion

This statistical finding on educational methods can be interpreted and explained in two ways. Scholar de Young (2009) had explained that to improve medication adherence with chronic illnesses, there is no single particular method that will bring behavioral change (de Young, 2009). Chodosh and colleagues (2005) have explained that there is no accepted single educational method that has shown improvement in medication adherence and it is necessary to combine various educational methods to bring conviction in people to change their behavior (Chodosh et al., 2005). The same authors have explained that it is paramount to include cultural sensitivity and clarity of the subject while educating people on medication adherence (Chodosh et al., 2005; de Young, 2009). In the context of chronic illnesses, it is imperative to understand that people are prescribed many medications for different illnesses at the same time because they come in clusters. This paradigm requires an in-depth understanding and comprehension about their medications and illnesses, especially people with low literacy and numerary skills. From what these authors have found, this study analysis supports their view.

In addition, when no educational method is better than the other one by statistical analysis, we can argue that all the four educational methods were equally good because they were developed based on sound theories applied in this study and peer-reviewed scholarly reports by various scholars. Furthermore, the educational materials were obtained from national health organizations such as the National Institute of Health (NIH), the Agency for Healthcare Research and Quality (AHRQ), and the materials were pretested for cultural sensitivity and quality. In this way, all the four educational methods were possibly effective, equally based on these arguments.

Another interpretation of these statistical findings is that no educational method was better than the other one could be that the study participants either did not understand or comprehend the meaning of questions or they were afraid to express themselves on paper. (Kalichman et al., 2008; Kripalani et al., 2006) have suggested in their studies with low literacy skills and medication adherence that there is a reliable association between health literacy and self-reported medication adherence (Kalichman et al., 2008; Kripalani et al., 2006). Both literary skills and education level are of significant importance in medication adherence with chronic illnesses. As suggested by the scholars in their studies, the association between the literacy and medication adherence, it is possible that this current study also could have impacted by the low literacy levels of the study participants. In this way, the statistical findings on educational methods could have an impact in this study resulting that no educational method was better than the other one among these four educational methods.

Covariates of this Study

Gender

In this current study, the majority overall observations were reported from females (158, 60%). There is no scholarly evidence to explain as to why women's participation was higher than that of men in this study. One possible explanation could be that the pastor and the deacons of Step of Faith Ministries were all women and that their contacts and influence with their people could have brought more women than men for this study.

Chronic Illnesses

From the statistical analysis, it was evident that most of the observations were obtained from people who were diagnosed with and were taking medications for high blood pressure and high cholesterol. Scholars Kripalani et al., (2007), Ogedegbe et al., (2007), and Schoenthaler et al., (2009), who have done extensive empirical studies on African Americans and the medication adherent behavior, explained that African Americans suffer more with hypertension than any other ethnic group and they have a much higher prevalence of hypertension and high cholesterol than diabetes and asthma. They pay frequent visits to emergency healthcare facilities and have frequent hospitalization because of the consequences that they suffer with hypertension (Kripalani et al., 2007; Ogedegbe et al., 2007; Schoenthaler et al., 2009). This scholarly report by various authors provides adequate support for this study analysis in that African Americans suffer with high blood pressure and high cholesterol more than any other ethnic group and more than diabetes and asthma.

Age Group

The highest study participants in this current study were between 55 to 65 years old. The possible explanation for this finding is that this age group might have been affected by chronic illnesses more than the younger age group of African Americans as they had indicated in the study and they wanted to hear more about their chronic illness management. Another explanation may be possibly that they were free from the family and other social responsibilities. In addition, they were regular members of Step of Faith Ministries and regularly attend the meetings and activities pertaining to Step of Faith Ministries. The explanations are quite contrary to the scholars' evidence, who have explained in their studies that African Americans suffer with hypertension and high cholesterol at a much younger age when compared with other ethnic groups (Ogedegbe et al., 2007; Gerber et al., 2010; Lewis et al., 2010; IOM, 2002). In this study, the main focus was to assess the effectiveness of four educational methods and not which age group will do better in pretest and posttest than the other group. This statistical finding might have affected the outcome of the research questions that the study had failed to reject to the null hypothesis in three of the research questions and explain any differences among the educational methods.

Weekly Participation

This study required a total number of 144 African Americans with chronic illnesses and who are prescribed medications for the chronic illnesses. A total number of 210 people agreed to participate in the study and out of 210 study participants, 144 were randomized who fit with study criteria to experimental and control groups. The recruitment beginning and end dates and the study beginning and end dates were clearly spelled out. Out of this randomized group, only a small number of people attended the classes during the first three weeks, the number slightly increased during the fourth and fifth week, and more numbers of study participants came on the sixth week; these participants remained in their respective groups during the seventh and eighth weeks of the classes.

It is important to explain as to why these variations happened in this study with the study participants. This study population was only African Americans and the outcome of this study might have been affected by some of the factors pertaining to African Americans. Scholar Gamble (1997) had explained in detail that African

Americans are fearful to participate in any health research because of their past experiences with the medical community (Gamble, 1997). Some other scholars have explained that African Americans are more likely to mistrust their healthcare providers; medication-related beliefs are framed within their broader experiences with the social institution and their undesirable past experiences with medical research, African Americans may pose an ongoing barrier in gaining a desirable common understanding with any health-related scientific activity (Piette et al., 2010). These possible factors could have impacted this current study outcome resulting in failing to reject the null hypotheses in all research questions and to explain any differences among the educational methods.

In summary, the covariates of this study are explained including gender, chronic illness, age group, and week participation and described as to how these variables could have influenced this study outcome. The limitations of this study are discussed in the next section.

Limitations of this Study

This single-blind randomized controlled study was designed to assess the effectiveness of using four different educational methods to enhance medication adherence with chronic illnesses by increasing knowledge, self-efficacy, and change in health beliefs among African Americans between the ages of 18 to 65 years, who live in a southwest neighborhood of Chicago. In this way, the study was limited to only a small population of African Americans who live in this neighborhood and did not include other African Americans who live very close to this neighborhood, are diagnosed with the same health problems, and could have benefitted through this educational program. In this study, the African American population was chosen very specifically because of their vulnerability of getting chronic illnesses at a much higher rate when compared with other ethnic groups; in addition, they suffer with poor health (Ogedegbe et al., 2007; Coulter & Ellins, 2007) and are less like to adhere to prescribed treatments and self-care plans (Bandura, 2004; Schectman et al., 2002).

In this study, only a small group of African Americans were included. The study was limited to other racial and ethnic groups who may be diagnosed with and are taking medications for the same chronic illnesses and who also would have been benefitted from this educational program. The inclusion criteria for this study were clearly spelled out in that only African Americans, who live in the southwest neighborhood of Chicago, would be selected for this study. For this reason, other racial and ethnic groups were limited to this study.

Several other factors may have contributed to these limitations of this study. It was hypothesized that though these four different educational methods, there would be an increase in knowledge, self-efficacy, and change in health beliefs on medication adherence and that it would be demonstrated through the statistical analysis method. On the contrary, three research questions failed to reject the null hypothesis, which means that the study participants did not understand the questionnaires. In spite of their ability to provide their written consent, the study participants possibly did not understand or comprehend the meanings of questionnaires and therefore the instruments might have been filled out erroneously. This is a limitation in this study in that the researcher assumed that the study participants have understood the questionnaires because they were able to provide consent with clarity and spoke with comprehension and never had expressed their difficulties in comprehension with the questionnaires. All the study participants' educational level was less than high school, but in this study health literacy was not intended for study.

Another potential factor could have been the life circumstances that these study participants face daily in their neighborhoods such as intimidation and irrational gun violence (reported in the Chicago Tribune, September 19, 2013), which could have an effect on this study in that they were afraid to participate in the study in a leisurely manner, and many, who promised to participate in the study, did not participate.

The other factors such as socioeconomic factors, lack of family and social support systems, the use of tobacco, and recreational drugs and alcohol (Hill et al., 2010), social isolation (Russell, 2006), and low health literacy (Kripalani et al., 2007; Ho, Bryson, & Rumsfeld, 2009) could have an impact on this is three research questions. Also, these variables were not the focus of this study, but could have indirectly affected the study outcome.

Gamble (1997) expressed that African Americans are always afraid to participate in any health-related study because of their past experiences with research work. This scholar's suggestion may have a credible truth in that these past experiences may continue to act as a barrier for any future studies with African Americans (Gamble, 1997).

In summary, this study recognizes the limitations including that this study specifically included only African Americans who live in a southwest neighborhood of Chicago and who attend Step of Faith Ministry Activities. We were unable to recruit other African Americans and other ethnic groups because of the study's set limitations with the inclusion and exclusion criteria. This study focused on assessing the four different educational methods to enhance medication adherence among African Americans who live in a southwest neighborhood of Chicago and who are diagnosed with and are taking medications for hypertension, hyperlipidemia, diabetes, asthma, and COPD. Several other factors including low literacy, poor numerical skills, environmental and neighborhood factors, lack of family and social support, economic factors, and persistent fear resulted from past history could have had an indirect impact on this study, even though these variables were not a part of this study. Based on these study limitations, recommendations are suggested in the next section.

Recommendations

Increase Sample Size

Perhaps the major limitation of this study is that it relied on a small group of English-speaking African Americans within a distinct geographical location in Chicago when a larger population of African Americans from nearby neighborhoods could have been included in this study. This limitation can have an effect on external validity in this study. Therefore, it is recommended that this study be replicated by including a larger population drawn from the neighborhoods of Chicago. It would be an added benefit to assess by comparing African Americans living with chronic illnesses in other geographical locations such as living in different counties in Illinois and other states such as New York, Washington DC, California, Texas, Atlanta, and Pennsylvania because sampling from a larger population could not only guarantee a large subject pool, but also may yield further knowledge about medication adherence behavior with chronic illnesses with different regions in the United States.

Include Various Ethnic Groups

While this study included only a small group of African Americans to examine the effectiveness of using four different educational methods to enhance medication adherence with chronic illnesses, it may be an added benefit to research itself when other non-English-speaking ethnic groups are included in the study employing the same validated tools to determine their specific issues related to their adherence behavior. For example, immigrants from Spanish-speaking regions and other languages spoken by Asian countries are also at risk for not only suffering with diabetes and hypertension, but the consequences that they face because of chronic illnesses. To replicate this study with non-English-speaking groups, the tools have to be translated in their own languages, and when they are employed in their languages, it is possible that they may yield a full range of information about their medication adherence behavior in that it may lend richness to the research itself. In Malaysia, the Morisky Medication Adherence Scale (MMAS-8) was translated into the Malay native's spoken language using forward and backward translation procedures (Al-Qazaz et al., 2010). In this way, these validated tools can be translated into people's spoken languages in order to increase their understanding and comprehension of this particular human behavior.

Replicate Using Mixed Research Methodology

Employing mixed research methodology while replicating the study using the same tools may be an added benefit to research methods that allow the researcher to understand this particular human behavior with a renewed perspective. Mixed Research Methodology will allow the researcher to use both quantitative and qualitative research methods. By employing both research methods, the researcher will be able to gather detailed information on medication adherent behavior through qualitative study, collecting information in a systematic way through the quantitative study and blending those responses from both research methods to yield a meaningful response, which will ultimately provide an increased understanding of this medication adherent behavior.

Include These Tools As A Part Of Regular Health Records

These three tools could be added as part of the regular history and physical health record. While people wait to see their healthcare providers, these tools could be administered in the waiting area through the nurses and medical assistants, and could be administered in the waiting area by the nurses and medical assistants, and keep them ready for the healthcare provider that will allow the provider to give valuable counseling and positive reinforcements accordingly on medication adherents behavior.

Summary

In summary, this present study could be replicated by using the same educational methods and the validated tools. To gain a meaningful understanding of this particular medication adherent behavior, increase the sample size of the population to be studied, provide opportunities to non-English-speaking members by translating those tools in their spoken languages, include people from different neighborhoods, employ mixed research methodology, and make recommendations to public health and health sciences organizations in that these validated tools become part of the health records, and it can be administered to people while waiting to see their healthcare provider. This will allow the healthcare providers to bring social change in medication adherent behavior through positive reinforcement and counseling.

Implications for Positive Social Change

This study aimed at bringing a positive social change in medication adherence behavior with chronic illnesses: hypertension, hyperlipidemia, diabetes, asthma, and COPD. The treatment of chronic illnesses often requires long-term use of pharmacotheraphy. Haynes and colleagues (2002) have explained that increasing the effectiveness of adherence interventions will have a far greater impact on the health of the people than any improvement in specific medical treatment (Haynes et al., 2002). For this reason, it is pertinent and imperative to use various educational methods to increase knowledge and self-efficacy and change in health beliefs, thus aiming at inducing a behavioral change with medication adherence. It is also the responsibility of the agencies, who develop, promote and implement the policies pertaining to health promotion with chronic illnesses, to take into consideration the lifestyle of the vulnerable population and their educational and socioeconomic standards because poverty and low health literacy have a direct impact on chronic illnesses.

For example, people with low health literacy could impose many challenges on healthcare providers, especially when they are unable to read and understand the medication labels and are thus unable to follow the medications that will result in non-adherence. These challenges include expressing disbelief, doubts about medications, and fears of side effects of medications. The policies, related to health promotion with chronic illnesses, consider these patients' factors and address the short and long-term goals, especially for people with low literacy aiming at controlling chronic illnesses, thereby reducing morbidity and mortality, promoting quality of life, and reducing healthcare costs.

The short-term goals are to include clear explanations on medications in a patient's spoken languages with clear instructions to allay the fear about side effects of medications. The long-term goals are to include techniques such as home monitoring of blood sugar, using inhalers with proper techniques that will lead to gaining confidence in self-management of their illnesses through gaining knowledge on health risks and benefits, increasing confidence in self-management, and changing their health beliefs. The short-term goals are to function as guiding principles for daily action, whereas the long-term goals are to bring a social change in the self-management of chronic illnesses that will result in improving quality of life through enhanced medication adherence and a reduction in the national healthcare costs.

Furthermore, the health policies aimed at community health promotion need to include the health needs of the aging population. In this present study among the study participants, the highest age group was 55 to 65 years old. Quite often, the healthcare providers have a tendency to believe that older people with multiple comorbidities will show more adherence to their prescribed medications than the younger age group. Many scholars have refuted this assumption explaining that non-adherence is a pervasive problem and it is prevalent among all age groups (Bandura, 2004; Simpson, 2006; Gatti et al., 2009). It is pertinent and imperative to develop non-discriminatory policies related to health promotion so that all age and ethnic groups, in the community, could be engaged in health promotion on medication adherence with chronic illnesses.

In addition, there should be validated tools to measure the outcome of health promotion with chronic illnesses. Policies that are developed without tools to measure the outcome may not be very effective in health promotion. Policymakers must realize that better community health becomes that national wealth; therefore, it is necessary to allocate necessary funds and set the highest standards while measuring the outcome of health promotion and the healthcare providers must strive to attain this highest standard without ambiguity. Measuring the outcomes will allow patients to develop and practice better educational methods to enhance medication adherence, to improve self-management techniques and quality of life, and thus reduce the healthcare cost.

Traditionally, health promotion takes place at the bedside with an individual patient or in a small group in clinical-based settings. Health promotion in small settings may be of use only for a small group of people, but health promotion that takes place in the communities may have a greater impact on the community's health, especially when community leaders, church leaders, community social workers, and other volunteers from the community are included and involved in health promotional activities. In addition, the effectiveness of health promotion will be far greater than the health promotion that takes place in small clinical settings. In addition, the available community resources could be pulled together and be utilized for health promotion. For example, using a church basement to conduct a community awareness program on chronic illnesses such as hypertension, stroke prevention, smoking cessation, control of diabetes, and awareness of allergies could become very valuable to the members of the community when age-appropriate educational materials are used. In this study, the members of Step of Faith Ministries became actively involved and served as volunteers and assisted in this entire program and they live in the same community. In this way, the available resources within the communities could be utilized to promote health promotion.

Another scope of practice is that health promotion needs to focus on healthcare providers, physicians, non-physician healthcare providers, nurses, social workers, and nutritional support groups and they have to be included and engaged in health promotional activities, especially on medications, dietary adherence, and self-management of their illnesses. Controlling chronic illnesses requires a multi-disciplinary approach and these healthcare providers have to be informed adequately in that individuals have their own mindset and that behavioral change takes its own course. Scholar Bandura (2004) explained that health habits are not changed by an act of will (Bandura, 2004). For this reason, healthcare providers must strive to bring the best out an individual through education and positive reinforcement that will lead to behavioral change with self-efficacy.

In summary, social change with chronic illnesses depends greatly on the individuals, healthcare providers, policymakers, and the community leaders. Social change with medication adherence is no panacea for individuals who have multiple comorbidities and are on multiple medications. Poor medication adherence or non-adherence is a pervasive behavior of age groups of all ethnicities. This study was done only with African Americans with hypertension, hyperlipidemia, diabetes, asthma, and COPD, and who live in a southwest community of Chicago. The purpose of this study was to assess the effectiveness of using four different educational methods by increasing knowledge, self-efficacy, and change in health beliefs. Even though this study was done using only African Americans, the concept of social change with medication adherence is applied to all peoples who take medications for chronic illnesses. It requires a multi-disciplinary approach with short-term and long-term goals. Knowledge and self-efficacy are the foundations to cause change in health beliefs, resulting in behavioral change, and ultimately leading to a reduction in morbidity and mortality, the improvement of quality of life, and a reduction in healthcare costs.

Conclusion

Medication adherence is a complex human behavior. Many scholars have explained through their empirical findings that medication non-adherence has become a major public health problem resulting in increased healthcare costs, especially when taking care of chronic illnesses. The same scholars have argued that there are many determinants: individual, social, environmental, healthcare system, healthcare providers, and healthcare laws and regulations. All of these are possible reasons for this non-adherent behavior. Furthermore, there are challenges that act as impediments: low health literacy, low numerical skills, knowledge deficit on health matters, inadequate self-efficacy, beliefs about medications, and lack of trust in the current healthcare system.

For this reason, this present randomized controlled trial was focused on assessing the effectiveness of using four different educational methods to enhance medication adherence among African Americans who live in a southwest community of Chicago and who were diagnosed with and prescribed medications for chronic illnesses. Education is a powerful tool to bring transformation in any individual. In the same way, health promotion with various educational methods is pivotal to bring a social change in the entire healthcare of people, especially in the management of chronic illnesses, knowledge and self-efficacy are to be infused when conducting health promotion with a hope of bringing a change in health beliefs that will result in social change in individuals, groups, and communities.

In addition, the same type of educational program must be extended to other different ethnic minorities whose spoken language would be other than English because they too can be benefitted from similar educational programs when it is offered in their spoken languages. Unfortunately, medication non-adherence is a pervasive societal problem in which public health has much responsibility to bring this situation under control through educational programs. According to the customs and beliefs, these communities cluster together for any common good among themselves and health promotion can be introduced into these communities and when it is conducted with cultural sensitivity, the educational program itself becomes more vibrant and lively and brings a social change in these communities. It is necessary that policies and health educational programs, pertaining to various communities, understand and incorporate the issues related to their culture and customs. In this way, the health educational programs become successful among the communities with a great expectation of social change in medication adherence.

Final Message

A nation's health and wellness greatly depends on community health and it can be achieved through education. Social change takes place when individuals and communities act responsibly. Education is the powerful tool for transformation of individuals, communities, and the nation.

References

Sample Size Calculator. (2012). Retrieved from http://www.uss.gov.au/nss/home.NSF/pages/Sample+Size+Calculator+Description?OpenDocument

The Chicago fact book consortium. (1995). *Local Community fact book Chicago metropolitan area 1990*. Chicago, IL: Academy Chicago publishers (pp.199-203)

Chronic Illness. Mosby's medical dictionary. (8th ed). (2009). Elsevier.

Institute of Medicine. (2002). *Unequal treatment: Confronting racial, and ethnic disparities in health care.* Washington, DC: National academy press

Adams, A. S., Trinacty, C. M., Zhang, F., Kleinman, K., Grant, R. W., Meigs, J. B., Soumerai, S. B., … Ross-Degnan, D. (2008). Medication adherence, and racial difference in AIC control. *Diabetes Care, 31,* 916-921. doi: 10.2337/dc07-1924

Aikens, J. E., & Piette, J. D. (2009). Diabetic patients' medication underuse, illness outcomes, and beliefs about antihyperglycemic and antihypertensive treatments. *Diabetes Care, 32*(1), 19-24

Al-Qazaz, H. K., Hassali, M. A., Shafie, A. A., Sulaiman, S. A., Sundaram, S., & Morisky, D. E. (2010). The eight-item Morisky medication adherence scale MMAS: Translation, and validation of the Malaysian version. *Diabetes Research and Clinical Practice,* 1-6. doi: 10.1016/j.diabres.2010.08.012

Apter, A. J., Reisine, S. T., Affleck, G., Barrows, E., & zuWallack, R. L. (1998). Adherence with twice-daily dosing of inhaled steroids. Socio-economic and health-belief Differences. *American Journal of Respiratory Critical Care Med, 157,* 1810-1817

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education Behavior, 31(2),* 143-164

Bandura, A. (1994). Self-efficacy In V. S. Ramachandran (Ed). New York, NY: Academic press. *Encyclopedia of Human Behavior, 4,* 71-81

Bandura, A. (1977). *Social learning theory.* Upper saddle river, NJ: Prentice hall

Benkert, R., Hollie, B., Nordstrom, C. K., Wickson, B., & Bins-Emerick, L. (2009). Trust, mistrust, racial identity, and patient satisfaction in urban African American primary care patients of nurse practitioners. *Journal of Nursing Scholarship, 41(2),* 211-219. doi: 10.1111/j.1547-5069.2009.01273.x

Benkert, R., Peters, R., Tate, N., & Dinardo, E. (2008). Trust of nurse practitioners and physicians among African Americans with hypertension. *Journal of American Academy of Nurse Practitioners, 20,* 273-280. doi: 10.1111/j.1745-7599.2008.00317.x

Bogner, H. R., & de Vries, H. F. (2010). Integrating Type 2 diabetes mellitus, and depression treatment among African Americans: A randomized controlled pilot trial. *The Diabetes Educator, 36(2),* 284-292. doi: 10.1177/0145721709356115

Bolman, C., Arwert, T. G., & Völlink, T. (2010). Adherence to prophylactic asthma medication: Habit strength, and cognitions. *Heart & Lung, 40(1),* 63-75. doi: 10.1016/j.hrtlng.2010.02.003

Braunstein, J. B., Sherber, N. S., Schulman, S. P., Ding, E. L. & Powe, N. R. (2008). Race, medical researcher distrust perceived harm, and willingness to participate in cardiovascular prevention trials. *Medicine, 87(1),* 1-9. doi: 10.1097/MD.0bo13e3181625d78

Brunton, S. A. (2011). Improving medication adherence in chronic disease management. *The Journal of Family Practice, 60(04 Suppl),* S1-S8

Charles, P., Giraudeau, B., Dechartres, A., Baron, G., & Ravaud, P. (2009). Reporting of sample size calculation in randomized controlled trials: review. *British Medical Journal, 338 (b1732),* 1-6. doi: 10.1136/bmj.b1732

Chen, S. Y., Shen, S., Chang, C. S., Wang, T. H., & Huang, M. S. (2010). The Effects of the self-efficacy method on adult asthmatic patient self-care behavior. *Journal of Nursing Research, 18(4),* 266-274. doi: 10.1097/NRJ.ob013e3181fbe33f

Chlebowy, D. O., & Garvin, B. J. (2006). Social support, self-efficacy, and outcome expectations: Impact of self-care behaviors, and glycemic control in Caucasian, and African American adults with type 2 diabetes. *The Diabetes Educator, 32(5),* 777-786. doi: 10.1177/0145721706291760

Chobanian, A. V., Bakris, G. L., Black, H. R., Cushman, W. C., Green, L. A., Izzo, J. L. Jr., … The national high blood pressure education program coordinating committee. (2003). Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. *Hypertension, 4296,* 1206-1252

Chodosh, J., Morton, S. C., Mojica, W., Maglione, M., Suttorp, M. J., Hilton, L., … Shekelle, P. (2005). Meta-analysis: Chronic disease self-management programs for older adults. *Annals of Internal Medicine, 143(6),* 427-438

Cohen, J. (1992). A Power primer. *Psychological Bulletin, 112(1),* 155-159. doi: 10.1037/10033-2909.112.1.155

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed*

Methods Approaches (3rd ed). Thousand Oaks, CA: SAGE Publications, Inc.

Cutler, D. M. & Everett, W. (2010). Thinking outside the pillbox-medication adherence as a priority for health care reform. *New England Journal of Medicine*, 7, 3280-3286. doi: 10.1056/NEJMp10023052.

de Groot, V., Beckerman, H., Lankhorst, G. J., & Bouter, L. M. et al., 2003. How to measure co-morbidity: a critical review of available methods. *Journal of Clinical Epidemiology, 56(3),* 221-229

de Young, S. (2009). *Teaching Strategies for Nurse Educators* (2nd ed). Upper Saddle River, NJ: Pearson Prentice Hall

DiMatteo, M. R., Haskard, K. B., & Williams, S. I. (2007). Health beliefs, disease severity, and patient adherence: a meta analysis. *MedCare, 45,* 521-528

Dimitrov, D. M. & Rumrill, P. D., Jr. (2003). Pretest-posttest designs, and measurement of change. *Work, 20,* 159-165

Downie, D. L., Schmid, D., Plescia, M. G., Huston, S. L., Bostrom, S., Yow, A., … DuBard, C. A. (2011). Racial disparities in blood pressure control, and treatment differences in a Medicaid population, North Carolina 2005-2006. *Public Health Research, Practice, and Policy, 8(3),* 1-13

Elliott, R. A., Ross-Degnan, D., Adams, A. S., Safran, D. G. & Soumerai, S. B. (2007). Strategies for coping in a complex world: Adherence behavior among older adults with chronic illness. *Society of General Internal Medicine, 22,* 805-810. doi: 10.1007/s11606-007-0193-5

Erdfielder, E., Faul, F., & Buchner, A. (1996). G-Power: A general power analysis program. *Behavior Research Methods, Instruments, & Computers, 28,* 1-11

Farmer, A. (2008). Taking tablets for chronic illness: where next? *Chronic Illness, 4(4),* 235-238. doi: 10.1177/1742395308100649

Fitzgerald, M. A. (2011). Hypertension treatment update: Focus on direct renin inhibition. *Journal of the American Academy of Nurse Practitioners, 23(5),* 239-248. doi: 10.1111/j.1745-7599.2010.00589.x

Frankfort-Nachmias, C. & Nachmias, D. (2008). *Research Methods in the Social Sciences* (7th ed). New York, NY: Worth Publishers

Friedman, D. B., & Hoffman-Goetz, L. (2008). Literacy, and health literacy as defined in cancer education research: A systematic review. *Health Education Journal, 67(4),* 285-304. doi: 10.1177/0017896908097071

Gamble, V. N. (1997). Under the shadow of Tuskegee: African Americans, and health care. *American Journal of Public Health, 87(11),* 1773-1778

Gatti, M. E., Jacobson, K. L., Gazmararian, J. A., Schmotzer, B., & Kripalani, S. (2009). Relationships between beliefs about medications, and adherence. *Am J Health-Syst Pharm, 66,* 657-664. doi: 10.2146/ajhp080064

Gazmararian, J. A., Kripalani, S., Miller, M. J., Echt, K. V., Reu, J., & Rask, K. (2006). Factors associated with medication refill adherence in cardiovascular-related diseases. A focus on health literacy. *Journal General Internal Medicine, 21,* 1215-1221. doi: 10.1111/j.1525-1497.2006.00591.x

Gerber, B. S., Cho, Y. I., Arozullah, A. M., & Lee, S. D. (2010). Racial differences in medication adherence: A cross-sectional study on Medicare enrollees. *The American Journal of Geriatric Pharmacotherapy, 8(7),* 136-145. doi: 10.1016/j.amjopharm.2010.03.002

Gerin, W., Tobin, J. N., Schwartz, J. E., Chaplin, W., Rieckmann, N., Davidson, K. W., … Ogedegbe, O. (2007). The medication adherence, and blood pressure control (ABC) Trial: A multi-site randomized controlled trial in a hypertensive, multi-cultural, economically disadvantaged population. *J. Contemporary Clinical Trials, 28,* 459-471. doi: 10.1016/j.cct.2007.01.003

Gheiman, A., Schnur, J., Montgomery, G., Sassu, R., Veres, U. I., & David, D. (2011). How are adherent people more likely to think? A meta-analysis of health beliefs, and diabetes self-care. *The Diabetes Educator, 37(3),* 392-408. doi: 10.1177/0145721711403012

Gonder-Frederick, L. A., Cox, D. J., & Ritterbaud, L. M. (2002). Diabetes and Behavioral Medicine: The Second Decade. *Journal of Consulting and Clinical Psychology, 70(3),* 611-625. doi: 10.1037//0022-006X.70.3.611

Granger, B. B., Swedberg, K., Ekman, I., Granger, C. B., Olofsson, B., McMurray, J. J. V., … Pfeffer, M. A. (2005). Adherence to candesartan, and placebo, and outcomes in chronic heart failure in the CHARM programme: double-blind, randomised, controlled clinical trial. *Lancet, 366,* 2005-2011. doi: 10.1016/50140-6736(05)67760-4

Halbert, C. H., Weathers, B., Delmoor, E., Mahlar, B., Coyne, J., Thompson, H. S., … Lee, D. (2009). Racial differences in medical mistrust among men diagnosed with prostate cancer. *Cancer, 115,* 2553-2561. doi: 10.1002/cncr.24249.www.interscience.wiley.com

Haynes, R. B., McDonald, H., Garg, A. X., & Montague, P. (2005). Interventions for helping patients to follow prescriptions for medications (Review). *The Cochrane Database of Systematic Reviews 2002, (2)* Art No.: CD000011. doi: 10.1002/14651858.CD000011

Heckman, B. D. Holroyd, K. A., Tietjen, G., O'Donnell, F. J., Himawan L., Utley, C., … Stillman, M. (2009). Whites, and African-Americans in headaches specialty clinics respond equally well to treatment. *Cephalalgia, 29(6),* 650-661. doi: 10.1111/j.1468-2982.2008.01785.x

Heisler, M., Vijan, S., Makki, F., & Piette, J. B. (2010). Diabetes control with reciprocal peer support versus nurse care management. *Annals of Internal Medicine, 153(8),* 507-515

Hill, M. N., Miller, N. H., DeGeest, S., & the American society of hypertension writing group. (2010). ASH position paper: Adherence, and persistence with taking medications to control high blood pressure. *The Journal of Clinical Hypertension, 12(10),* 757-764. doi: 10.1111/j.1751-7176.2010.00356.x

Hill-Briggs, F., Gary, T. L., Bone, L. R., Hill, M. N., Levine, D. M., & Braucati, F. L. (2005). Medication adherence, and diabetes control in urban African Americans with type 2 diabetes. *Health Psychology, 24(4),* 349-357. doi: 10.1037/0278-6133.244.349

Ho, P. M., Bryson, C. L., & Rumsfeld, J. S. (2009). Medication adherence. Its importance in cardiovascular outcomes. *Circulation, 119,* 3028-3035. doi: 10.1161/CIRCULATIONAHA.108.768986

Horne, R. (2000). Assessing perceptions of medications: Psychological perspectives. In handbook of drug research methodology. UK Drug Utilization Research Group.

Horne, R., & Weinman, J. (1998). Patients' beliefs about prescribed medicines, and their role in adherence To treatment In chronic physical illness. *Journal of Psychosomatic Research, 47(6),* 555-567

Horne, R., Weinman, J., & Hankins, M. (1999). The beliefs about medicines questionnaire: The development, and evaluation of a new method for assessing the cognitive representation of medication. *Psychology & Health, 14,* 1-24

Houston, T. K., Allison, J. J., Sussman, M., Horn, W., Holt, C. L., Trobaugh, J., … Hullett, S. (2011). Culturally appropriate storytelling to improve blood pressure. *Annals of Internal Medicine, 154,* 77-84

Janson, S. L., Earnest, G., Wong, K. P., & Blanc, P. D. (2008). Predictors of asthma medications non-adherence. *Heart & Lung, 37(3),* 211-218. doi: 10.1016/j.hrting.2007.05.014

Kalichman, S. C., Cain, D., Fuhrel, A., Eaton, L., DiFonzo, K., & Ertl, T. (2005). Assessing medication adherence self-efficacy among low-literacy patients: development of a pictographic visual analogue scale. *Health Education Research, 20 (1),* 24-35. doi: 10.1093/her/cyg106

Kalichman, S. C., Pope, H., White, D., Cherry, C., Amaral, C. M., Swetzes, C., … Kalichman, M. O. (2008). Association between health literacy, and HIV treatment adherence: Further evidence from objectively measured medication adherence. *Journal of the International Association of Physicians in AIDS Care (JIAPAC), 7(6),* 317-323. doi: 10.1177/1545109708328130

Kline, M. V. & Huff, R. M. (2007). *Health Promotion in Multicultural Populations. A Handbook for Practitioners, and Students* (2nd ed). Thousand Oaks, CA: Sage Publications, Inc.

Kocurek, B. (2009). Promoting medication adherence in older adults…, and the rest of us. *Diabetes Spectrum, 22(2),* 80-84

Kralik, D., Paterson, B., & Coates, V. (2010). *Translating Chronic Illness Research into Practice.* West Sussex, United Kingdom: John Wiley & Sons, Ltd.

Krieger, J., Collier, C., Song, L., & Martin, D. (1999). Linking community-based blood pressure measurement to clinical care: A randomized controlled trial of outreach, and tracking by community health workers. *American Journal of Public Health, 89(6),* 856-861

Kripalani, S., Henderson, L. E., Chiu, E. Y., Robertson, R., Kolm, P., & Jacobson, T. A. (2006). Predictors of medication self-management skill in a low-literacy population. *Journal of General Internal Medicine, 21,* 852-856. doi: 10.1111/j.1525-1497.2006.00536.x

Kripalani, S., Risser, J., Gatti, M. E., & Jacobson, T. A. (2009). Development, and Evaluation of the adherence to refills, and medications scale (ARMS) among low-literacy patients with chronic disease. *Value in Health, 12(1),* 118-123. doi: 10.1111/j.1524-4733.2008.00400.x

Kripalani, S., Robertson, R., Love-Ghaffari, M. H., Henderson, L. E., Praska, J., Strawder, A., … Jacobson, T. A. (2007). Development of an illustrated medication schedule as a low-literacy patient education tool. *Patient Education, and Counseling, 66,* 368-377. doi: 10.1016/j.pec.2007.01.020

Kripalani, S., Yao, X., & Haynes, B. (2007). Interventions to enhance medication adherence in chronic medical conditions. *Arch Intern Med, 167,* 540-550

Krishnan, J. A., Riekert, K. A., McCoy, J. V., Stewart, D. Y., Schmidt, S., Channugain, A., … Rand, C. S. (2004). Corticosteroid use after hospital discharge among high-rick adults with asthma. *Am J Respair Crit Care Med, 170(12),* 1281-1285. doi: 10.1164/rccom.200403-4090C

Krousel-Wood, M., Islam, T., Muntner, P., Holt, E., Joyce, C., Morisky, D. E., … Frohlich, E. D. (2010). Association of depression with antihypertensive medication adherence in older adults: Cross-sectional, and longitudinal findings from COSMO. *Annals of Behavioral Medicine, 40,* 248-257. doi: 10.1007/s12160-010-9217-1

Krousel-Wood, M. A., Muntner, P., Islam,T., Morisky, D. E., & Webber, L. S. (2009). Barriers to, and determinants of medication adherence in hypertension management: Perspective of the cohort study of medication adherence among older adults. *Medical Clinics of North America, 93,* 753-769. doi: 10.1016/j.mcna.2009.02.007

Larsen, P. D., & Lubkin, I. M. (2009). *Chronic illness: Impact, and intervention* (7th ed). Sudbury, MA: Jones, and Bartlett Publishers

LaVeist, T. A., Nickerson, K. J., & Bowie, J. V. (2000). Attitudes about racism, medical mistrust, and satisfaction with care among African American, and White cardiac patients. *Medical Care Research, and Review, 57(S1),* 146-161

Lehane, E., & McCarthy, G. (2007). Intentional, and unintentional medication non-adherence: A comprehensive framework for clinical research, and practice. A discussion paper. *International Journal of Nursing Studies, 44,* 1468-1477. doi: 10.1016/j.ijnurstu.2006.07.010

Levine, D. M., & Green, L. W. (1985). State of the Art in Research and Evaluation. *Bull N. Y. Acad. Med., 61(2),* 135-143

Levinthal, B. R., Morrow, D. G., Tu, W., Wu, J., & Murray, M. D. (2008). Cognition and literacy in patients with hypertension. *Journal of General Internal Medicine, 23(8),* 1172-1176. doi: 10.1007/S11606-008-0612.2

Lewis, L. M., Askie, P., Randleman, S., & Shelton-Dunston, B. (2010). Medication adherence beliefs of community-dwelling hypertensive African Americans. *Journal of Cardiovascular Nursing, 25(3),* 199-206

Marks, H. M. (2003). Rigorous uncertainty: Why R. A. Fisher is important. *International Journal of Epidemiology, 32(6),* 932-937. doi: 10.1093/ije/dyg.288

Marks, R. (2009). Ethics and patient education: Health literacy and cultural dilemmas. *Health Promotion Practice, 10(3),* 328-332. doi: 10.1177/1524839909335657

McDonald, H. P., Garg, A. X., & Haynes, R. B. (2002). Interventions to enhance patient adherence to medication prescriptions. *JAMA, 288(22),* 2868-2879

Meigs, J. B., Cagliero, E., Dubey, A., Murphy-Shelby, P., Gildesgame, C., Chueh, H., … Nathan, D. M. (2003). A Controlled trial of web based diabetes disease management. *Diabetic Care, 26,* 750-757

Morisky, D. E., Ang, A., Krousel-Wood, M., & Ward, H. J. (2008). Predictive validity of a medication adherence measure in an outpatient setting. *Journal of Hypertension, 10(5),* 348-354

Morisky, D. E., & DiMatteo, M. R. (2011). Improving the measurement of self-reported medication non-adherence. Final Response. *Journal of Clinical Epidemiology, 64,* 262-263. doi: 10.1016/j.jclinepi.2010.09.010

Morisky, D. E., Green, L. W., & Levine, D. M. (1986). Concurrent and predictive validity of a self-reported measure of medication adherence. *Medical Care, 24(1),* 67-74

Morisky, D. E., Kominski, G. F., Afifi, A. A., & Kotlerman, J. B. (2009). The effects of a disease management program on self-reported health behaviors, and health outcomes: Evidence from the "Floria: A Healthy State (FAHS)" Medicaid program. *Health Education & Behavior, 36(3),* 505-517. doi: 10.1177/1090198107311279

Morisky, D. E., Lees, N. B., Sharif, B. A., Liu, K. Y., & Ward, H. J. (2002). Reducing Disparities in hypertension control: A community-based hypertension control project (CHIP) for a ethnically diverse population. *Health Promotion Practice, 3(2),* 264-275. doi: 10.1177/152483399020030022l

Morrow, D. G., Weiner, M., Steinley, D., Young, J., & Murray, M. D. (2007). Patients' health literacy, and experience with instructions: Influence preferences for heart failure medication instructions. *Journal of Aging, and Health, 19(4),* 575-593. doi: 10.1177/0898264307304448

Mosen, D. M., Schatz, M., Gold, R., Mularski, R. A., Wong, W. F., & Bellows, J.

(2010). Medication use, emergency hospital care utilization, and quality-of-life outcome disparities by race/ethnicity among adults with asthma. *The American Journal of Managed Care, 16(11),* 821-828

Mosenifar, Z. (2007). Population issues in clinical trials. *Proceedings of the American Thoracic Society, 4,* 185-188. doi: 10.1513/pats.200701-009GC

Nichol, M. B., Knight, T. K., Wu, J., Tang, S. S. K., Cherry, S. B., Benner, J. S., & Hussein, M. (2009). Transition probabilities, and predictors of adherence in a California Medicaid population using antihypertensive, and lipid-lowering medications. *Value in Health, 12(4),* 544-550. doi: 10.1111/j.1524-4733.2008.00474.x

Ogedegbe, O., Schoenthaler, A., Richardson, T., Lewis, L., Belue, R., Espinosa, E., … Charlson, M. E. (2007). An RCT of the effect of motivational interviewing on medication adherence in hypertensive African Americans: Rationale, and design. *Contemporary Clinical Trials, 28,* 169-181. doi: 10.1016/j.cct.2006.04.002

Ogedegbe, G., Tobin, J. N., Fernandez, S., Gerin, W., Diaz-Gloster, M., Cassells, A., … Ravenell, J. (2009). Counseling African Americans to control hypertension (CAATCH) Trial: A multi-level intervention to improve blood pressure control in hypertensive Blacks. *Circulation: Cardiovascular Quality, and Outcomes, 2(3),* 249-256. doi: 10.1161/CIRCOUTCOMES.109.849976

Osborn, C. Y., Paasche-Orlow, M. K., Davis, T. C., & Wolf, M. S. (2007). An overlooked factor in understanding HIV health disparities. *American Journal of Preventive Medicine, 33(5),* 374-378. doi: 10.1016/j.amepre.2007.07.022

Osterberg, L., & Blaschke, T. (2005). Drug therapy: Adherence to medication. *The*

New England Journal of Medicine, 353(5), 487-497

Piette, J. D., Heisler, M., Harand, A., & Juip, M. (2010). Beliefs about prescription medications among patients with diabetes: Variation across racial groups, and influences on cost-related medication underuse. *Journal of Health Care for the Poor, and Underserved, 21(1),* 349-361

Ponnusankar, S., Surulivelrajan, M., Anandamoorthy, N., & Suresh, B. (2004). Assessment of impact of medication counseling on patients' medication knowledge, and compliance in an outpatient clinic in South India. *Patient Education, and Counseling, 54(1),* 55-60. doi: 10.1016/S0738-3991(03)00193-9

Powers, B. J., King, J. I., Ali, R., Alkon, A., Bowlby, L., Edelman, D. … Bosworth, H. B. (2009). The cholesterol, hypertension, and glucose Education (CHANGE) study for African Americans with diabetes: study design, and methodology. *American Heart Journal, 158(3),* 342-348. doi: 10.1016/j.ahj.2009.06.026

Prasauskas, R., & Spoo, L. (2006). Literally improving patient outcomes. *Home Health Care Management Practice, 18(4),* 270-271. doi: 10.1177/1084822305284747

Preacher, K. T., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers, 36(4),* 717-731

Ramadas, A., Quek, K. F., Chan, C. K. Y., & Oldenburg, B. (2011). Web-based Interventions for the management of type 2 diabetes mellitus: A systematic review of recent evidence. *International Journal of Medical Informatics, 80,* 389-405. doi: 10.1016/j.ijmedinf.2011.02.002

Rask, K. J., Ziemer, D. C., Kohler, S. A., Hawley, J. N., Arinde, F. J., & Barnes, C. S. (2009). Patient activation is associated with healthy behaviors, and ease in managing diabetes in an indigent population. *Diabetic Educator, 35(4),* 622-630. doi: 10.1177/0145721709335004

Risser, J., Jacobson, T. A., & Kripalani, S. (2007). Development and psychometric evaluation of the self-efficacy for appropriate medication use scale (SEAMS) in low-literacy patients with chronic disease. *Journal of Nursing Measurement, 15(3),* 203-219

Russell, C. L. (2006). Culturally responsive interventions to enhance Immune-suppressive medication adherence in older African American kidney transplant recipients. *Progress in Transplantation, 16(3),* 187-196

Schectman, J. M., Nadkarni, M. M., & Voss, J. D. (2002). The association between diabetes metabolic control, and drug adherence in an indigent population. *Diabetes Care, 25(6),* 1015-1021

Schoenthaler, A., Chaplin, W. F., Allegrante, J. P., Fernandez, S., Diaz-Gloster, M., Tobin, J. N., & Ogedegbe, G. (2009). Provider communication effects medication adherence in hypertensive African Americans. *Patient Education, and Counseling, 75,* 185-191. doi: 10.1016/j.pec.2008.09.018

Schoenthaler, A., Ogedegbe, G., & Allegrante, J. P. (2009). Self-efficacy mediates the relationship between depressive symptoms, and medication adherence among hypertensive African Americans. *Health Education & Behavior, 36(1),* 127-137. doi: 10.1177/1090198107309459

Shiel, W. C., Jr. & Stoppler, M. C. (2008). *Webster's New World Medical Dictionary,* *3rd ed*. Hoboken, NJ: Wiley Publishing, Inc.

Simpson, R. J. (2006). Challenges for improving medication adherence. *JAMA, 296(21),* 2614-2616

Thai, A. L., & George, M. (2010). The effects of health literacy on asthma self-management. *Journal of Asthma & Allergy Educators, 1(2),* 50-55. doi: 10.1177/2150129710368850

Tong, B., & Stevenson, C. (2007). Comorbidity of cardiovascular disease, diabetes and chronic kidney disease in Australia. *Cardiovascular disease series no. 28 Cat. No. CVD 37 Australian Institute of Health & Welfare: Canberra*

Van Dulmen, S., Sluijs, E., van Dijk, L., de Ridder, D., Heerdink, R., & Bensing, J. (2007). Patient adherence to medical treatment: a review of reviews. *BMC Health Services Research, 7(55),* 1-13. doi: 10.1186/1472-6963-7-55

Verbrugge et al., 1989. Comorbidity, and its impact on disability. *Milbank Quarterly, 67(3-4),* 450-484

Vervloet, M., van Dijk, L., Santen-Reestman, J., van Vlijmen, B., Bouvy, M. L., & de Bakker, D. H. (2011). Improving medication adherence in diabetes type 2 patients through real time medication monitoring: A randomized controlled trial to evaluate the effect of monitoring patients' medication use combined with short message service (SMS) reminders. *BMC Health Services Research, 11(5),* 1-8. doi: 10.1186/1472-6963-11-5

Voils, C. I., Hoyle, R. H., Thorpe, C. T., Maciejewski, M. L., & Yancy, W. S., Jr. (2011). VARIANCE and DISSENT: Improving the measurement of self-reported medication non-adherence. *Journal of Clinical Epidemiology, 64,* 250-254

Von Korff, M., Gruman, J., Schaefer, J., Curry, S. J., & Wagner, E. H. (1997). Collaborative management of chronic illness. *Annals of Internal Medicine*, 127(12), 1097-1102

Wagner, C. V., Steptoe, A., Wolf, M. S., & Wardle, J. (2009). Health literacy, and health actions: A review, and a framework from health psychology. *Health Education & Behavior, 36(5),* 860-877. doi: 10.1177/1090198108322819

Wagner, G. J., Riopelle, D., Steckart, J., Lorenz, K. A., & Rosenfeld, K. E. (2010). Provider communication and patient understanding of life-limiting illness, and their relationship to patient communication of treatment preferences. *Journal of Pain and Symptom Management, 39(3),* 527-534. doi: 10.1016/j.jpainsymman.1009.07.012

Wells, K., Pladevall, M., Peterson, E. L., Campbell, J., Wang, M., Lanfear, D. E., & Williams, L. K. (2008). Race-ethnic differences in factors associated with inhaled steroid adherence among adults with asthma. *American Journal Respiratory Critical Care Medicine, 178,* 1194-1201

Williams, A. (2004). Patients with comorbidities: perceptions of acute care services. *Journal of Advanced Nursing, 46(2),* 13-22

Williams, A., Manias, E., & Walker, R. (2008). Interventions to improve medication adherence in people with multiple chronic conditions: a systematic review. *Journal of Advanced Nursing, 63(2),* 132-143. doi: 10.1111/j.1365-2648.2008.04656.x

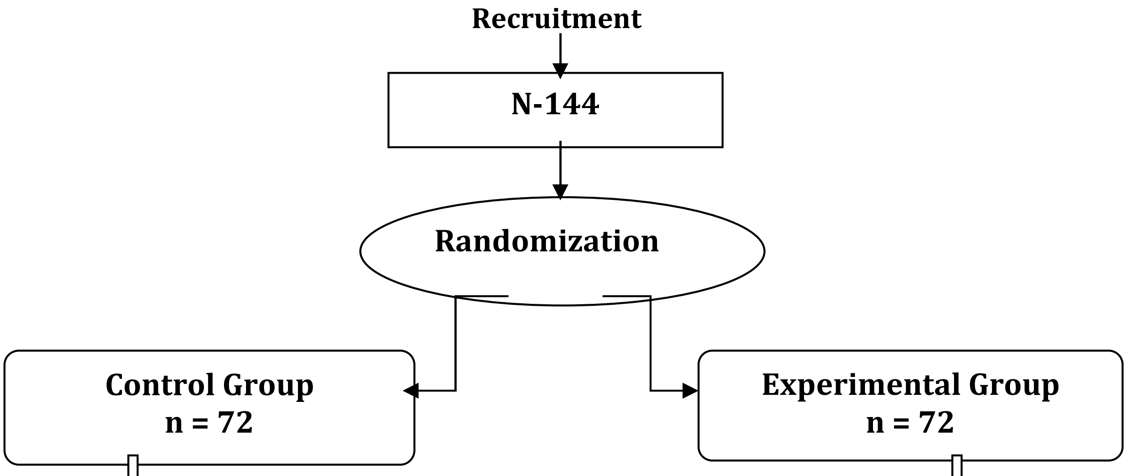
Wolff, J. L., Starfield, B., &, Anderson, G. (2002). Prevalence, expenditures, and complications of multiple chronic conditions in the elderly. *Arch Intern Med, 162(11),* 2269-2276

Zielenbach, S. (2005). Understanding community change: A look at low-income Chicago neighborhoods in the 1990s. *Neighborhood change in urban America, 4,* 1-11

Zolnierek, K. B. H., & DiMatteo, M. R. (2009). Physician communication and patient adherence to treatment: A meta-analysis. *Med Care, 47(8),* 826-834. doi: 10.1097/MLR.ob013e31819a5acc

Appendix A

Randomized Controlled Pre-test/Post-test Design



Health Promotion Schedule

Control Group	Week	Experimental Group
Pre-test/Post-test Pamphlets on Hypertension Medication	Week 1 Hypertension Medication	Pre-test/Post-test Lecture, and Video on Hypertension Medications
Pre-test/Post-test Cholesterol Pamphlets	Week 2 High Cholesterol Medication	Pre-test/Post-test Lecture, Video & Group Disc- Cholesterol Medican.
Pre-test/Post-test Diabetes Medications Pamphlets	Week 3 Diabetes Oral Medications	Pre-test/Post-test Lecture, Video, Gr. Disc Diabetic Medications
Pre-test/Post-test Insulin Medication Pamphlets	Week 4 Diabetes Insulin Medications	Pre-test/Post-test Lecture, Gr. Discussion Insulin Medications
Pre-test/Post-test review Of Pamphlets of weeks 1 to 4	Week 5 Medication Review Weeks 1 to 4	Pre-test/Post-test Lecture & Role Playing on Weeks 1 to 4
Pre-test/Post-test Asthma Medications Pamphlets	Week 6 Asthma Medications	Pre-test/Post-test Lecture & Video on Asthma Medications
Pre-test/Post-test COPD Medications Pamphlets	Week 7 COPD Medications	Pre-test/Post-test Lecture & Video on Diabetic Medications
Pre-test/Post-test Asthma, and COPD Pamphlets	Week 8 Review of COPD, and Asthma Medications	Pre-test/Post-test Lecture & Role playing on Weeks 6, and 7

The control group that received only pamphlets in this 8-week study will now receive a lecture, video presentation, group discussion, and a role play session on these subjects.

Appendix B

I, Dieltroe Ford, give my permission, and will cooperate with Prema David for the study of African Americans. Thank you.

From: prema david <pdavid1948a@yahoo.com>
To: "dieltroeford@yahoo.com" <dieltroeford@yahoo.com>
Sent: Friday, October 28, 2011 5:45 PM
Subject: letter

8/13/2011

From:

Prema David, MSN, NP-BC, AANP

Doctoral Student in Health Sciences, and Health Promotion

Walden University

To:

Mrs. Dieltroe Ford

Pastor/Evangelist of Step of Faith Ministries

Elim Christian Church

2735 W. 79th St.

Chicago, IL 60652

Dear Pastor,

I am a doctoral student at Walden University. My field of specialty is Health Sciences, and Health Promotion. My topic of interest is to educate African Americans on medication adherence with chronic illnesses that include hypertension, high cholesterol, diabetes, asthma, and COPD through educational methods of lectures, video presentations, role plays, and group discussions. The main purpose of this study is to assess the effectiveness of these educational methods in promoting medication adherence.

Participation in the study is voluntary. The study participants, who remain in this for eight-week educational program, will receive twenty-five dollars. I would truly appreciate it if you would allow me to conduct my study at your church facility, and I need your cooperation, and permission.

The study time will be planned, depending on permission from the school, as well as giving consideration to extreme winter weather.

Thanking you

Prema David

Email: pdavid1948a@yahoo.com

(H) Phone: (847) 676-1534

Thanks so much Prema for your kind words, and I wish you the very best of success on your dissertation...I received your fax, and thanks...

dmorisky

On Today 5:21 PM, pdavid1948a@yahoo.com wrote:

Dear Dr. Morisky,
Thank you for sending all those articles. I owe you a debt of gratitude, and it will be shown in my actions. I sent the agreement by fax yesterday 8/31/2011.

Thanking you
I'm so grateful
Prema

From: DONALD E MORISKY <dmorisky@ucla.edu>
To: "pdavid1948a@yahoo.com" <pdavid1948a@yahoo.com>
Sent: Wednesday, August 31, 2011 7:49 PM
Subject: Re: letter to Dr. Morisky

Here it is Ms. David, and sorry for not attaching it previously.

dmorisky

On Today 5:44 PM, pdavid1948a@yahoo.com wrote:

Dear Dr. Morisky,
I sincerely want to thank you for all the efforts that you have taken in sending the articles. I could not find the waiver of license, and copyright agreement form along with these articles. If you send me the form, I would definitely agree to adhere to the copyright laws, cite your research wherever needed, and to provide your with a brief summary of my findings upon completion of the study.

Thanking you very much,

Sincerely,

Prema David

From: Donald E. Morisky <dmorisky@uclaedu>
To: prema david <pdavid1948a@yahoo.com>
Sent: Tuesday, August 30, 2011 5:46 PM
Subject: Re: letter to Dr. Morisky

Thank you very much Prema for your interest in our adherence scales, and your request to use the copyrighted MMAS-8. I presume that you are referring to the most recent adherence measure, the MMAS-8.
The scale is a generic assessment of medication-taking behavior, and has been used in a number of health conditions, both chronic, and infectious diseases. It is a reliable, and valid indicator to assess self reported medication-taking behavior, including several levels of criterion related validity (blood pressure control, HgA1c) discriminant validity (social desirability), and persistence using pharmacy fills as a criterion. The scale is not in the public domain, and should not be on the internet without my permission, and can only be used through issuance of a license agreement through the owner/developer. This is the only way the integrity of the scale can be maintained, as you will note so many "modified" versions being published.

Since you are a student at Walton University, conducting adherence research, I have put together a waiver of license, and copyright agreement form for you to fill out, and sign, and return to me. My only request is that you adhere to the copyright laws, cite our research and provide me with a brief summary of your findings upon completion of your study. I trust that you will abide with these simple guidelines in using the scale, and thank you for your interest. I have also attached recent articles that you can use in your background citing additional levels of criterion-related validity of the MMAS-8. I wish you the best of success on your psychometric course and adherence research. I have attached several articles which provide a historical overview of the development of the MMAS from its original Morisky, Green, and Levine scale to the MMAS-4 to its current MMAS-8. I also attached an article that uses the MMAS-8 for IBD assessment. I hope you find these articles informative. I would appreciate your thoughts.....

Sincerely,

Dmorisky

Donald E. Morisky,

Sc.D., M.S.P.H., Sc.M.

Professor, and Program Director, Doctoral Training in the Social, and Behavioral Determinants of HIV/AIDS Prevention

Department of Community Health Sciences

UCLA School of Public Health

650 Charles E. Young Drive South

Box 951772

46-071 CHS

Los Angeles, CA 90095-1772

email: dmorisky@ucla.edu

Phone: (310) 825-8508

Fax: (310) 794-1805At 09:54 AM 8/13/2011,
prema david wrote:

Dear Dr. Morisky,

Here is the letter that you asked for.

Sincerely

Prema David

Dr. Risser conducted this work as one of my students. You have my permission to use the instrument.

Thanks,
Sunil

From: prema david [mailto:pdavid1948a@yahoo.com]
Sent: Thursday, August 11, 2011 6:05 PM
To: Kripalani, Sunil
Subject: request for permission

Dear Dr Kripalani,
My name is Prema David, and I am a current Doctoral student at Walden University. I am specializing in Health Sciences, and Health Promotion , and Public Health. My interest is to promote medication adherence with chronic illnessess with inner-city African American Poulation in Chicago. I need your permission to use SEAMS self efficacy scale for my study on medication adherence. I sent an e-mail to Dr Jessica Risser, MD, MPH 2 days ago, and I did not get any reply from her. My mentor advised me to contact you, and obtain permission so that I can prepare my teaching materials for my dissertation. My dissertation topic is assessing the efectiveness of using different educational methods to promote medication adherence with African Ametricans with chronic illnessess. I would appreciate your help regarding this matter. Also, I should keep a copy of your permission with my final copy of my dissertation. I can be reached at 847-676-1534. e-mail pdavid1948a@yahoo.com.

Thanking you,
Prema David MSN, NP-BC,AANP.

Yes, this is fine. Do you need something back from me in writing (besides this email)?

Thanks,
Sunil

From: prema david [mailto:pdavid1948a@yahoo.com]
Sent: Saturday, August 13, 2011 11:08 AM
To: Kripalani, Sunil
Subject: request

Dear Dr. Kripalani,
Here is the attachment for your permission.
Thank you
Prema David

August 15, 2011
RE: Use of SEAMS instrument
Dear Prema,
Thank you for your interest in using the instrument, Self-Efficacy for Appropriate Medication Use
(SEAMS). You may use the instrument in your dissertation work, at no cost. Please cite the article which
describes the scale's development, and psychometric testing.
Sincerely,
Sunil Kripalani, MD, MSc
Associate Professor

Chief, Section of Hospital Medicine
Vanderbilt University

Dear Prema

Thank you for your email which Prof. Horne has forwarded to me, and apologies for the delay in replying to you but we have had a few days holiday here this last week.

Thank for your interest in the BMQ in your research project. We ask all potential users to sign up to our standard conditions for use of the questionnaire.

These conditions are found on the attached form. They are not designed to restrict your research with the questionnaire or your rights to publish your findings. Rather, they are designed to:

- Preserve the integrity of the questionnaire
- Promote uniformity of analysis, and presentation (to facilitate comparison of findings across studies)
- Ensure that you are using a valid, and up-to date version of any disease specific BMQ

If you agree to these conditions then please arrange for the Principal Investigator on your study to sign the form, and return it by fax or email. Permission to use the questionnaire is automatic on receipt on the signed form.

With regard to the psychometric paper I have attached the BMQ (1999) paper but this is all Professor Horne has at the moment as he is currently compiling data from other studies but this data is not ready yet.

I have also attached some guides to using the BMQ but please let me know if you require further information.

Kind regards
Penny

Penny Reed
Research Administrator
Centre for Behavioural Medicine
School of Pharmacy
University of London
BMA/Tavistock House
Tavistock Square
London WC1H 9JP
Tel: +44 (0)20 7874 1281
Fax:+ 44 (0)20 7387 5693
Email: penny.reed@pharmacy.ac.uk
Find us at: http://www.pharmacy.ac.uk/fileadmin/documents/Practice_and_Policy/dppMap.pdf

From: prema david [mailto:pdavid1948a@yahoo.com]
Sent: 25 August 2011 03:01
To: Rob Horne
Subject: electronic request

From,
Prema David
8151 N Tripp, Skokie, Illinois. 60076-3249
USA

To,
Professor Rob Horne
Professor of Behavioural Medicine,
Director of Centre for Behavioural Medicine,
The School of Pharmacy, University of London

Sir,
My name is Prema David. I am a doctoral student at Walden University majoring Health Sciences, and Health Promotion. I am currently writing my dissertation on medication adherence with chronic illnessess in African American Population in Chicago, Il, USA. I would like to use the BMQ Scale-18 that you had developed, and validated. I need your permission to use this scale. Also, I would like to have the Psychometric property of this scale. I would be very grateful to you if you could kindly consider my request very urgent, and send me your permission, and the Psychometric property of the scale.
I can be reached by e-mail at pdavid1948a@yahoo.com. My home phone no 001-847-676-1534

Thanking you,
sincerely,
Prema David

Appendix C

Morisky Medication Adherence Scale (MMAS-8-Item). This is a generic adherence scale and the name of the health concern can be substituted in each question item. You indicated that you are taking medication(s) for your (identify health concern, such as “high blood pressure”). Individuals have identified several issues regarding their medication-taking behavior, and we are interested in your experiences. There is no right or wrong answer. Please answer each question based on your personal experience with your [health concern] medication.		
(Please circle the correct number)		
	Yes = 1	No = 0
1.) Do you sometimes forget to take your [health concern] medication(s)?		
2.) People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your [health concern] medication(s)?		
3.) Have you ever cut back or stopped taking your medication(s) without telling your doctor, because you felt worse when you took it?		
4.) When you travel or leave home, do you sometimes forget to bring along your [health concern] medication(s)?		
5.) Did you take your [health concern] medication(s) yesterday?		
6.) When you feel like your [health concern] is under control, do you sometimes stop taking your medication(s)?		
7.) Taking medication(s) every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your [health concern] treatment plan? 8.) How often do you have difficulty remembering to take all your medication(s)?		

(Please circle the correct number)
Never/Rarely…………………………………....4
Once in a while……………………………………3
Sometimes…………………………………………2
Usually……………………………………………..1
All the time………………………………………...0

Coding Instructions for the ©Morisky Medication Adherence Scale (8-Item)

You will need to reverse the code response in a positive direction for item number 5, and standardize the code for item 8 (0-4), resulting in a scale from low adherence to high adherence. Item 8 is divided by 4 when calculating a summated score. This procedure standardizes the 5-point Likert scale. The total scale has a range of 0 to 8.0. The eight-item compliance scale had an alpha reliability of 0.83 (n= 1367) among patients diagnosed with essential hypertension attending an outpatient clinic of a large teaching hospital. We have used a 75 percent completion criterion for establishing eligibility. The median value of all missing items would be substituted for the missing item for individuals meeting the eligibility criterion.

Re-codes:

If Item5 = 0 Item5r = 1 (high adherence)
If Item8=4 Item8r = 1 (highest adherence)
If Item8=3 Item8r = .75 (high adherence)
If Item8=2 Item8r = .50 (moderate adherence)
If Item8=1 Item8r = .25 (low adherence)
If Item8=0 Item8r = 0 (lowest adherence)

Adherence Level	**percent**
Low Adherence (< 6)	32.1
Medium Adherence (6 to <8)	52.0
High Adherence (= 8)	15.9

Chapter 1 Required citation, and footnote for the 8-item MMAS are as follows:

Morisky DE, Ang A, Krousel-Wood M, Ward H. Predictive Validity of a Medication Adherence Measure for Hypertension Control. *Journal of Clinical Hypertension* 2008; 10(5):348-354.

This footnote is required on all tables or figures which present the ©MMAS-8.

Use of the ©MMAS is protected by US copyright laws. Permission for use is required. A license agreement is available from: Donald E. Morisky, ScD, ScM, MSPH, Professor, Department of Community Health Sciences, UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, CA 90095-1772.

Additional citation you may use to document criterion-related validity with pharmacy fills

Krousel-Wood MA, Islam T, Webber LS, Morisky DE, Muntner P. Concordance of Self-Reported Medication Adherence by Pharmacy Fill in Patients with Hypertension. Am J Managed Care 2009; 15(1):59-66.

**Al-Qazaz HK, Hassali MA, Shafie AA, Sundram S, Morisky DE. The Eight-Item Morisky Medication Adherence Scale (MMAS-08):Translation, and Validation of the Malaysian version. Diabetes Research
and Clinical Practice 2010; 90:216-221.**

COPYRIGHT, and Licensure Fee Agreement for use of the Morisky Medication Adherence Scale, MMAS-4, and MMAS-8

All translations, adaptations, computer programs, and scoring algorithms, and any other related documents of the Morisky Medication Adherence Scale (MMAS 4-, and MMAS-8 item versions), or Morisky Adherence Questionnaire (MAQ 4-item version) are owned, and copyrighted by, and the intellectual property of, Donald E. Morisky, ScD, ScM, MSPH. Professor of Community Health Sciences, UCLA School of Public Health, Los Angeles, CA 90095-1772. Copyright protection is also extended to electronic versions of all Morisky Scale documents, and products. Permission will be granted to translate the MMAS scale, however all translations must be conducted by the Mapi Institute. Languages that have already been translated, and validated by the Mapi Institute can be requested through the Mapi Trust. The Mapi Institute employs the most rigorous standards in the translation process consisting of two native linguistic experts who independently conduct forward, and backwards translation. The developer of the instrument is integrally involved in the construct validation of each item in the scale, before final approval of the translated scale is provided.

Permission to use the scale is granted through a licensure agreement between the owner, and licensee.

1) **No changes to the wording or phrasing of any Morisky Scale document can occur without written permission. If any changes are made to the wording or phrasing of any MMAS item without permission, the document cannot be considered the MMAS, and subsequent analyses, and/or comparisons to other MMAS data will not be considered appropriate. 2) The specific coding, and scoring criteria of the MMAS-8 cannot be divulged in any publication or external report without prior permission from the owner; 3) Permission to use the name "MORISKY SCALE" or MMAS will not be granted for any unauthorized use or translations of the MORISKY SCALE or MORISKY SCALE items. Any analyses or publications of unauthorized changes or translated versions may not use the MORISKY SCALE name. Any unauthorized translation will be considered a violation of copyright protection. If you are interested in translating this scale, please notify me, and I will advise you regarding the requirements for translation 4) The MORISKY SCALE copyright information provided on these documents must be included on every page of a MORISKY SCALE questionnaire in study documents, and in any reproductions for manuscript or other publication purposes. 5) If there are issues of scientific or copyright misconduct in using the MORISKY SCALE system of questionnaires, Dr.**

Morisky reserves the right to withdraw permission for use, and seek damages to the full extent provided by international copyright law.

I understand that the licensure fee for use of the copyrighted MMAS-8 will be waived, as I am a student conducting adherence research. The license agreement is in effect for a two-year period or the duration of the study, whichever is shorter. I agree with the specification outlined above regarding the use of the Morisky Medication Adherence Scale, 8-Items, MMAS-8, and will abide with its requirements. I agree to provide results of my research to Professor Morisky upon completion of the study. Please fax or scan, and email to: Donald E. Morisky, ScD, ScM, MSPH, Professor, Department of Community Health Sciences, UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, CA 90095-1772, fax 310-794-1805.

Name, and contact information of Licensee: Prema David, Email: pdavid1948a@yahoo.com, (H) Phone: (847) 676-1534

Title of Research: **Date: 8/30/2011**

Signature of researcher

Appendix D

SEAMS Questionnaire

Number	Questions	Not Confident	Somewhat Confident	Very Confident
1	When you take several different medicines each day?			
2	When you take medicines more than once a day?			
3	When you are away from home?			
4	When you have a busy day planned?			
5	When they cause some side effects?			
6	When no one reminds you to take the medicine?			
7	When the schedule to take the medicine is not convenient?			
8	When your normal routine gets messed up?			
9	When you are not sure how to take the medicine?			
10	When you are not sure what time of the day to take your medicine?			
11	When you are feeling sick (like have a cold or the flu)?			
12	When you get a refill of your old medicines, and some of the pills look different than usual?			
13	When a doctor changes your medicines, how confident are you that you can carry out the following tasks?			

Grading Method:
Very Confident = 3 points
Somewhat Confident = 2 points
Not Confident = 1 point

Risser, J., Jacobson, T. A., & Kripalani, S. (2007). Development, and Psychometric Evaluation of the Self-Efficacy for Appropriate Medication Use Scale (SEAMS) in Low-Literacy Patients with Chronic Disease. *Journal of Nursing Measurement, 15(3),* 203-219

Appendix E

Table: 1 Themes underpinning common beliefs about as presented in the Beliefs about Medicines Questionnaire (BMQ)

Ref Horne, R (2000) Assessing perceptions of medication: psychological perspectives In Handbook of Drug

Research Methodology Publ UK Drug Utilization Research Group ISBN 0 9537011 07

BMQ-SPECIFIC NECESSITY (Assesses patients' beliefs about their prescribed medicines)					
Specific Necessity (Beliefs about necessity and efficacy of medicines prescribed for specific condition.)	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
My health in the future will depend on my medicines					
My health, at present, depends on my medicines					
My life would be impossible without my medicines					
Without my medicines I would be very ill					
My medicines protect me from becoming worse					

BMQ-SPECIFIC CONCERNS					
Specific-Concerns (Concerns about the harmful effects of medicines prescribed for specific conditions)	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Having to take my medicines worries me					
I sometimes worry about the long-term effects of my medicines					
I sometimes worry about becoming too dependent on my medications					
My medicines are a mystery to me					
My medicines disrupt my life					

BMQ-GENERAL OVERUSE (Assessed general beliefs about medicines as a whole)					
General-Overuse (Beliefs that medicines in general are overused by doctors)	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
If doctors had more time with patients they would prescribe fewer medicines					
Doctors use too many medicines					
Doctors place too much trust on medicines					
Natural remedies are safer than medicines					

BMQ-GENERAL HARM					
General-Harm (Beliefs that medicines in general are harmful addictive poisons)	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Most medicines are addictive					
Medicine do more harm than good					
People, who take medicines, should stop their treatment for a while, every now and then					
All medicines are like poisons					

Informed Consent Form

Consent for Participation in Research

Field: To evaluate educational methods on medications with chronic illnesses

This is a research study. Prema David, a nurse practitioner at John Stroger, Jr. Hospital of Cook County and a doctoral student at Walden University, developed this study. This research study only includes African Americans between the ages of 18 to 65 years old and the ones who are already taking medications for any one of the chronic illnesses such as high blood pressure, high cholesterol, diabetes, asthma, and COPD. Your participation is entirely voluntary and you may leave the study at any time without any penalty. Please take your time to make a decision.

Why only African Americans?

Many scholars have explained through their studies that chronic illnesses, such as high blood pressure, high cholesterol, diabetes, asthma, and COPD, are prevalent at an increased rate among African Americans when compared with other ethnic groups. Also, there is a racial disparity that there is an increased morbidity and mortality because of these chronic illnesses among African Americans, resulting in poor quality of life.

Why is this study being done?

The purpose of this research is to evaluate educational methods used to teach on medications with high blood pressure, high cholesterol, diabetes, asthma, and COPD in order to increase knowledge and self-confidence to take medications, resulting in an improved quality of life. Your evaluation on educational methods in this research study will help improve our teaching strategies on medications with chronic illnesses and also help research student Prema David to accomplish her dissertation requirement.

What are the study inclusion criteria?

1.) African Americans, both men and women
2.) Age: 18 to 65
3.) Taking medications for any one of these conditions: high blood pressure, high cholesterol, diabetes, asthma, and COPD
4.) Willing to provide a written consent
5.) Attend to Step of Faith Ministries
6.) Live in the Southwest Community

They need not to be a member of the church or Step of Faith Ministries

What is involved in the study?

The study involves testing the educational methods by using Pretest/Posttest with a set of questionnaires. A total number of 142 to 144 people, who are willing to participate in this research study, will be divided into two groups through a procedure called randomization. Randomization means that you are placed into a group by chance. It is like flipping a coin. One group is called Green color group and the other group is called Red color group. The group, which you are assigned to, will be decided by a computer. Neither researcher nor the study participants will choose what group you will be in. Every study participant will have an equal chance of being placed in either group and all of you will evaluate educational methods.

In both groups, you will be asked to mark a set of questionnaires as Pretest and Posttest. Pretest will be done before beginning of the class and you will return those answers to volunteers. At the end of the class, you will complete the posttest and return them to the volunteers. Both groups will do the same Pretest/Posttest questionnaires for each class for eight weeks.

How long does the study last?

This research study will take place for 1 hour, weekly once on Friday evenings from 6PM to 7PM for eight weeks. You are allowed to leave the study at any time without any penalty.

What are the risks of the study?

The risk is very low in that you may give 1 hour on Friday evenings for 8 weeks to come to Elim Christian Church, the place where the study will take place.

Are there benefits to taking part in the study?

You may learn something new about medications, their usefulness, and they can improve your health. In addition, the information that you gain through these classes can be shared with your family members. Furthermore, you will be able to increase your knowledge and confidence in taking medications, even in difficult situations. You may gain new friends by attending this study program. You will receive educational pamphlets to take home.

What Other Treatment Options are there?

This is a research study about measuring the usefulness of educational methods on medications with high blood pressure, high cholesterol, diabetes, asthma, and COPD and does not involve treatment or therapy. The alternative is not to participate.

What about confidentiality?

Every effort will be made to keep your information confidential. There will be symbols and characters on the Pretest/Posttest questionnaire face sheet. The symbols such as a blood pressure cuff indicates high blood pressure, a picture of a narrowed artery indicates high cholesterol, a picture of a sugar cane indicates diabetes, an inhaler picture indicates asthma, and a round disk indicates COPD; the mark gender “x” character indicates male gender and “y” character indicates female gender. The age group will be marked in range as 18-35, 36-45, 46-55, and 56-65. The pretest/posttest will have code numbers. You will not write your name, diagnosis, and your age. These symbols, characters, age ranges, and code numbers are necessary to protect your information and to keep it confidential. You will be asked to mark these symbols, characters, and age range on the face sheet of the questionnaire.

However, organizations, including Walden University Research Committee, the Institutional Review Board of John H. Stroger, Jr. Hospital of Cook County, the Bureau of Health Services, and the funding organization may inspect or gain a copy of these research records for quality assurance.

What are the costs?
To help pay your costs in taking part in this study, you will receive a small token of $25.00 in appreciation for your participation in this research study for eight weeks. Healthy refreshments will be served after each class. Educational pamphlets will be given to you to take home. A certificate will be given to you from Step of Faith Ministry indicating your participation in this research study.

What are my rights as a research participant?
Taking part in this study is voluntary. You may choose not to take part. You may leave the study at any time without any penalty.

What if I have questions or problems?
For questions about the study

Names	Contact Number
Prema David	(847) 542-8147
Pastor Dieltroe Ford	(312) 322-9881
Cathy Rowell	(773) 928-5762
Yvonne Hunt Sanders	(773) 776-1594

Participant Consent

Please circle one

1.) I have read the information provided in this consent sheet
Yes/No
2.) I have the opportunity to clarify my questions Yes/No
3.) I am willing to give my consent Yes/No
4.) I understand that I can withdraw my participation from this study at any time without penalty
Yes/No

Signature

I agree to take part in this research study
Participant: ____(Print Name)
____________________________(Signature) _______________________(Date)
Person Obtaining Consent: ____________________________________(Print Name)
____________________________(Signature) _______________________(Date)

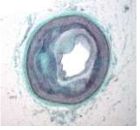
Instruction Sheet

1.) Please do not write your name, age, gender, and/or diagnosis on the questionnaires
2.) Follow the pictures and mark accordingly

High Blood Pressure

☐

High Cholesterol



☐

Diabetes

☐

Asthma

☐

COPD

☐

Gender

X = Male

Y = Female

Age Group

18-35 ☐

36-45 ☐

46-55 ☐

56-65 ☐

Flyer

An Invitation to African Americans for an Educational Program

k3612444 www.fotosearch.com

Purpose: This is a research study and its main purpose is to evaluate the educational methods that will be used to educate on medications pertaining to High Blood Pressure, High Cholesterol, Type 2 Diabetes, Asthma, and COPD
This educational program will last for a period of 8 weeks and it is only for African Americans, 18 to 65, who are already taking medications for the above mentioned conditions. The participation in this educational program is entirely voluntary and you're allowed to leave the program at any time with no cost.
Those, who remain in this program for 8 weeks, will receive 25 dollars as incentive and every week refreshments will be served. Also, educational pamphlets will be given for free. Participants are required to do a pretest and a posttest with simple questionnaires. Your information will be kept confidential and will not be shared with anyone else. This pretest and posttest will help us to evaluate as to how these educational methods improve knowledge and confidence in taking medications.
The education will take place in a southwest community church with Step of Faith Ministry once a week.

Address:
Elim Christian Church
2735 W. 79th St.
Chicago, IL 60652
Pastor Dieltroe Ford: (312)322-9881

Contact Numbers:
Pastor Dieltroe Ford: (312)322-9881
Qiana Allen: (773)580-1788
Jada Fox: (773)633-1226
Ruby Tolliver: (773)928-8938
Cathy Rowell: (773)928-5762
Yvonne Hunt Sanders: (773)776-1594
James Keith Moore: (708)623-9610

Curriculum Vitae

Prema David, MSN, APN, NP-BC, AANP-CV

Academics:
MS in Nursing, St. Xavier University, 1985, Chicago, IL
Adult Nurse Practitioner Certification, North Park University, 1998, Chicago, IL
Current Doctoral Student at Walden University, Minneapolis, MN

Professional Certification:
AANP Board Certification for Adult Nurse Practitioner since 1998

Professional Membership:
American Academy of Nurse Practitioners
American College of Nurse Practitioners

Licenses:
RN & APN by the State of Illinois

Clinical Experience in John H. Stroger, Jr. Hospital:
Pediatric Trauma, 1985-1986
Pediatric & Adult Burn Critical Care, 1986-1987

Nurse Practitioner:
Nurse Practitioner in Nephrology, 1987-Current
Primary Care in Nephrology/Consultation 1998-Current
Pulmonary Medicine, 2008-Current-AANP/Primary Care
General Medicine, 2009-Current-AANP/Primary Care

Clinical Responsibilities:
Complete Patient Care Management as a Primary Care Nurse Practitioner
Using Technology to complete Progress Sheets (Electronic Medical Records)
Prescribing Medications and Ordering Laboratory Work Using Electronic Devices
Ordering Necessary Diagnostic Tests according to Patient Needs
Educating the Patients on Medications, Diet, Exercise, and Self-Monitoring of Blood Glucose
Referring when Consultations are needed
Health Promotion in Diabetes, Hypertension, and Hyperlipidemia
Telephone Consultation
Quality Assurance on Laboratory Reports and Take Appropriate Actions
Retrieve Sleep Report from the CPAP Machine and Interpret the Findings
Customize Education for Patients diagnosed with OSA

Placing Orders to replace Defective CPAP Parts with consultation of Attending Physician in compliance with Medicare & Medicaid for Illinois

Professional:
Maintain my continuous education requirements
Attend professional conferences
Meet the educational requirements of John H. Stroger, Jr. Hospital of Cook County (e. g.: CPR, Fire)
Continue to maintain advanced education
Follow policies and procedures of Cook County Hospital

Research Activities:
Assisted in a study with Chief Nephrologist to study Membranous Renal Failure
Assisted in recruitment of African Americans for AASK studies
Currently assisting University of Illinois in recruiting African American patients with Sleep Apnea

Teaching Experience:
Involved with preceptorship of North Park University Nurse Practitioner students from 2000 to 2009
Developed an educational program to educate patients at the clinical site along with other supportive staff members and it is running well