1-1-2021

Medication Beliefs and Behaviors of Hypertensive Caribbean Immigrants Living in New York City

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Walden University
2021

Abstract

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MS, Purdue University Global, 2013

BS, State University of New York at Old Westbury, 2008

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

November 2021

Abstract

Hypertension remains a worldwide health phenomenon with serious health consequences including heart attack, stroke, aneurysm, and heart failure. Beliefs about medicines have been shown to influence hypertension outcomes. Medication adherence has emerged as a vital component of hypertension control and management. However, there has been limited research which addresses beliefs about medicines and medication adherence in Blacks of Caribbean origin. The purpose of this quantitative cross-sectional study was to identify the beliefs about medications held among hypertensive Caribbean immigrants living in New York City using the Beliefs about Medicines Questionnaire to identify what factors/barriers were related to these specific medication beliefs and to determine whether these medication beliefs influence adherence. The health belief model served as the theoretical construct for the study. The study included a sample of 100 hypertensive Caribbean immigrants living in New York City who attended an adult primary care clinic. Data were analyzed using the Pearson Chi-square, Mann-Whitney U-test, and regression analysis. The findings of this study showed that among the participants, gender, age, and employment were associated with specific medication taking behaviors ($p < .05$). The findings of this study could promote positive social change by identifying potential factors/barriers that influence blood pressure control among the Caribbean immigrant population. This may not only help improve individual health in Blacks of Caribbean origin but may also be beneficial in reducing the overall burden of hypertension within some New York City neighborhoods.

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Dedication

This doctoral study is dedicated to my loving family, who have always supported and encouraged me to best that I can be. I am grateful for God's guidance and direction in my life, who is the source of my all knowledge and strength.

Acknowledgments

I would like to say thank you to my amazing dissertation committee who have supported me throughout this entire dissertation process. Thank you to my dissertation chair, Dr. Diana Naser, you have been an invaluable resource and have guided me throughout this entire journey. Special thank you to my committee member, Dr. Howell Sasser, for your impactful contributions to my research. To my University Reviewer, Dr. W. Sumner Davis, and the entire Walden University dissertation community, I thank you for the incredible way you have all supported me in completing this journey. I would also like acknowledge and thank NYC Health + Hospitals for allowing me to conduct this study and the NYC Health + Hospital/Kings County Primary Care team for their remarkable support throughout this process.

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Chapter 1: Introduction to the Study

Introduction

High blood pressure, also known as hypertension, is the most important risk factor for cardiovascular disease and stroke - the two leading causes of morbidity and mortality within the United States (Center for Disease Control and Prevention [CDC], 2018). More than 75 million people within the United States have high blood pressure; this roughly suggests that every one in three adults have high blood pressure (CDC, 2018). Additionally, only 54% of adults with high blood pressure are within control (CDC, 2018). Every year, high blood pressure contributes to more than 1,100 deaths each day. In 2014, 410, 000 people died from high blood pressure (CDC, 2016). Uncontrolled blood pressure not only has a negative cost to the individual but has economic implications as well. Roughly, $48.6 million dollars is spent in debt of healthcare services, medication, treatment, and missed days of work related to high blood pressure (CDC, 2016). Hypertension is also a global burden. Bloch (2016) noted that the prevalence of hypertension now exceeds 1.3 billion globally. Thirty-one percent of all adults worldwide have high blood pressure (Bloch, 2016). This is an estimated 5.2% increase in the global prevalence of hypertension between 2000 and 2010 (Bloch, 2016). While all ethnicities are affected by high blood pressure, the Black population is disproportionately affected by hypertension (Gillespie & Hurvitz, 2013). Roughly 40.3% of the Black population has high blood pressure (Fryar et al., 2018). Additionally, not only does the Black population have the highest prevalence of hypertension when compared with other ethnicities, they have lower rates on blood pressure control (Gillespie & Hurvitz, 2013). As such, Blacks

have a higher incidence of hypertension related cardiovascular disease (Muntner et al., 2017).

New York City is an ethnically diverse diaspora. There are approximately 3.21 million immigrants living within the city: roughly 38% of the city's population (NYC Planning, 2017). The non-Hispanic Caribbean immigrants make up approximately 18% of the New York City population, many from countries such as Jamaica, Guyana, Haiti, and Trinidad and Tobago (NYC Planning, 2017). While there have been numerous studies focused on improving blood pressure control among minority groups, there has been limited evidence and research dedicated to improving hypertension outcomes in the Black Caribbean immigrant population (Bidulescu et al., 2015). Further, most often Blacks from the Caribbean are often studied with African Americans as one group, not making consideration for ethnic differences (Commodore-Mensah et al., 2016).

Numerous articles have shown that hypertension management is dependent on factors such as diet, lifestyle, health behaviors, and social and environmental factors. Additionally, factors such as a person's health beliefs, spiritual beliefs, and medication beliefs play a pivotal role in hypertension management (Kamran et al., 2014; Marshall & Archibald; 2015; Onoruoiza et al., 2015; Sanon et al., 2014). These factors can influence the uptake of medicines necessary for effective hypertension management. As such, there is a need to assess medication beliefs and health behaviors that may in inform medication adherence among this population. By so doing, there is an opportunity to understand the factors and barriers that contribute to poor hypertension management in the Black Caribbean immigrant populations, as well as gives opportunities to create avenues for

positive social change. The long-term impact of improved health can lead to sustained community wellness and growth.

This chapter will provide a background of works which highlight the intertwined relationships between medication beliefs, health behaviors and medication adherence among various populations. The problem statement and purpose for this study will then be provided; followed by the research questions and hypotheses. The theoretical framework for this study will be described as well as how it will be applied to this study. The nature of the study will provide the study design, its key study variables, and methodology. I also present the assumptions, scope and delimitations, limitations, and significance of the study. The chapter will conclude with a summary of the key arguments presented in this chapter.

Background

Previous studies have shown that uncontrolled blood pressure is linked to various factors (Chomistek et al., 2015; Greer & Ostwald, 2015; Migliozzi et al., 2015; Saneei et al., 2014). Factors such as diet, lifestyle, health behavior, social and environmental triggers play a significant role in blood pressure outcomes (Chomistek et al., 2015; Greer & Ostwald, 2015; Migliozzi et al., 2015; Saneei et al., 2014). Additionally, the lack of knowledge about blood pressure and how to manage the disease, contributes to poor adherence and management (Migliozzi et al., 2015). These factors may contribute to uncontrolled blood pressure individually or in a multifactorial way. As posited by Rodriguez and Ferdinand (2015), Black populations have a higher prevalence of hypertension, develop symptoms of hypertension earlier, and have a higher occurrence of

more severe and divergent organ damage related disease when compared with other races and ethnicities. In general, Black men account for roughly 30% hypertension and Black women account for 20% of all deaths attributable to high blood pressure (Williams et al., 2016).

Immigrants make up roughly 14% of the United States population (Zong & Batalova, 2017). In 2015, there were more than 43 million immigrants in the United States (Zong & Batalova, 2017). As a result of a growing immigrant population, there is also the need to pay closer attention to immigrant health (Commodore-Mensah et al., 2018). Hypertension continues to be public health issue in black immigrant Caribbean population (Bidulescu et al., 2015). Many from this population have migrated to the United States from various Caribbean countries (Allen et al., 2013). Commodore-Mensah et al. (2018) noted many of these ethnic minorities are disproportionately affected by cardiovascular disease and its risk associates. Not only are ethnic minority populations disproportionately affected by hypertension but by diabetes, overweight/obesity, as well as other chronic health conditions (Mozaffarian et al., 2016). Additionally, Caribbean Blacks and African Americans are often grouped together in research as one group, not allowing considerations for ethnic and cultural differences (Commodore-Mensah et al., 2018). The research of Allen et al. (2013) and Sanon et al. (2014) showed that there are gaps in care and treatment in hypertension management among Caribbean immigrants living within the United States related to their health beliefs. As such, there a need to independently study the Black Caribbean immigrant population to assess differences in health outcomes related to other ethnic/racial groups.

Several studies have shown that effective blood pressure control is dependent on medication adherence (Lam & Fresco, 2015; Neiman et al., 2017; Vries et al., 2014). Al Hewiti (2014) investigated the relationship between long-term medicine therapies and beliefs had on adherence and found that low adherence was most often associated with negative beliefs about medication and insufficient patient information regarding medications. Horne et al. (2013) stated roughly half of medicines prescribed are not taken as instructed. Chummun and Bolan (2013) performed a systematic review of literature which explored patients' beliefs about their medication and how these beliefs influence adherence. The key findings of their literature review suggest that adherence to medication is influenced by patients' beliefs regarding (a) the necessity of the medication, (b) the misconceptions about the medication, and(c) the benefits and side effects of the medication (Chummun & Bolan, 2013). Other investigators have found similar findings and have provide supporting evidence as the associations between medicine beliefs and adherence in the overall scheme of hypertension management (e.g., Atinga et al., 2018; Buckley et al., 2016). Studies have also shown that medication taking behaviors can also be seen as a predictor of medication adherence and hypertension control (Solomon et al., 2015). These studies will be further explored in Chapter 2 and will provide support of how medication beliefs and medication taking behaviors are an imperative part of blood pressure control.

While medication beliefs, medication taking behaviors, and medication adherence in the compass of hypertension management have been explored in various populations, there is limited studies available that focused on these factors which contribute to poor

hypertension management on Black Caribbean immigrant population. As such, the intent of this study is to help fill a gap in research regarding this population. The findings from this study may help provide a better understanding the medication beliefs and behaviors of Caribbean immigrants as well as create avenues for better hypertension management and prevention in this population.

Problem Statement

Cardiovascular disease remains the leading cause of death worldwide, and uncontrolled blood pressure is a major contributing factor of cardiovascular disease (CDC, 2018). One in three adults in the United States has high blood pressure, roughly 32%, and only about 54% are controlled (CDC, 2016). Therefore, it is imperative that blood pressure control be attained to reduce the risk for cardiovascular disease (Havranek et al., 2015). Medication adherence to antihypertensive medications has emerged as a vital component of hypertension management and cardiovascular disease risk outcomes (Solomon et al., 2015). Low-income minority populations face several challenges that may hinder medication adherence. These challenges include health literacy, self-efficacy, illness beliefs, and socioeconomic factors (Havranek et al., 2015; Schoenthaler et al., 2015). While there have been interventions designed for priority at risk populations such as African Americans and Hispanics, there has been limited research regarding improving blood pressure control in a minority immigrant population, such as Black Caribbean immigrants. As posited by Bidulescu et al. (2015), not only are there limited data regarding disparities in hypertension among the Caribbean origin population, but there are also limited interventions designed to address the problem. Although various care

models have been designed to improve chronic disease outcomes, further research is still needed to address health outcomes in this population. Information from this research could fill a gap related to the beliefs about medication held among Caribbean immigrants and how these beliefs influence medication adherence and blood pressure control in the Caribbean immigrant population.

Purpose of the Study

The purpose of this quantitative cross-sectional study was to identify the beliefs about medications held among hypertensive Caribbean immigrants living in New York City using the Beliefs about Medicines Questionnaire, to identify what factors/barriers were related to these specific medication beliefs and to determine whether these medication beliefs influence adherence among hypertensive Caribbean immigrant in New York City. In addition, using the 14-Hill-Bone Compliance Scale, I assessed the medication-taking behaviors among hypertensive Caribbean immigrant living in New York City.

Research Questions and Hypotheses

RQ1: Is there a significant difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the Beliefs about Medicine Questionnaire.

$H_0$1: There are no significant difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the Beliefs about Medicine Questionnaire.

$H_1$1: There is a significant difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the Beliefs about Medicine Questionnaire.

RQ2: Is there a significant difference in adherence to hypertensive medications between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the on 14-Item Hill Bone Compliance Scale.

$H_0$2: There is no significant difference in adherence to hypertensive medications between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the on 14-Item Hill Bone Compliance Scale.

$H_1$2: There is a significant difference in adherence to hypertensive medications between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the on 14-Item Hill Bone Compliance Scale.

RQ3: Is there a significant difference in adherence to hypertensive medications based on beliefs about medicines among hypertensive Caribbean immigrants.

$H_0$3: There is no significant difference in adherence to hypertensive medications based on beliefs about medicines among hypertensive Caribbean immigrants.

$H_1$3: There is a significant difference in adherence to hypertensive medications based on beliefs about medicines among hypertensive Caribbean immigrants.

The covariates for each research question were age, gender, educational level, and employment status.

Theoretical Framework

In the 1950s the health belief model was created by psychologists working for the health service who were interested in understanding why individuals were reluctant to engage preventative health screenings (Hochbaum et al., 1952; Salazar et al., 2015). Since its beginnings, the health belief model has been effectively applied to health promotion and research (Salazar et al., 2015). The health belief model has several constructs which are aimed at improving an individual's actions or lack of action to change his/her behavior. This includes (a) An individual will make decisions based on their perceived susceptibility to disease or condition; and as such a person will be willing to change behavior, if he or she believes that they are vulnerable to disease (Fertman & Allensworth, 2010); (b) An individual will weigh the benefits of performing a particular action - the perceived benefits and thus, will also look at hinderances/ barriers in taking part in the action – perceived barriers; (c) A person's belief that pursuing a specific set of recommendations is paramount; and (d) Self-efficacy plays a pivotal role in performing a new action (Fertman & Allensworth, 2010; McKenzie et al., 2009).

The HBM provides a framework that is applicable to a study designed to look at the beliefs about medication held by hypertensive patients of Caribbean origin, which factors influence medication beliefs, and whether the beliefs regarding medications has influence in adherence needed to improve blood pressure control. Adherence to antihypertensive medications begins when a person acknowledges that they are at risk for a disease/health outcome – in this scenario, the health outcome is hypertension. Thus, a person's perceived susceptibility of the risks for hypertension could promote and

motivate a change in current behavior and as such, initiate a new behavior to reduce the risks of hypertension. This new behavior is adherence to hypertension medications. Additionally, the perceived benefits of adherence are a reduction in blood pressure. The HBM also acknowledges that barriers in a person's life will need to be addressed to sustain this new behavior. However, self-efficacy, a person's belief that they can perform this new behavior, will play a critical role to medication adherence (Fertman & Allensworth, 2010; Onoruoiza et al., 2015).

Nature of the Study

This research study was a quantitative cross-sectional design. The study included a group of hypertensive Caribbean immigrant who attend an adult primary care clinic in New York City. The participants were asked to fill out a self-reported questionnaire at their physician visit regarding their beliefs about medication using the Beliefs about Medicines Questionnaire (BMQ) and current medication adherence using the 14 item Hill-Bone Compliance Scale. A quantitative research design was used to identify the associations related to beliefs about medications among hypertensive Caribbean immigrants and which factors were associated with medication beliefs among hypertensive Caribbean immigrant living in New York City. I also identified if there were any significant difference in how medication beliefs influence adherence to medication among hypertensive Caribbean immigrant living in New York City and whether the beliefs regarding medications influenced adherence needed to improve blood pressure outcomes among a chronically hypertensive Caribbean population in New York City based on age, gender, education level, and employment status. The independent variable

was hypertension control; the dependent variables were the beliefs about medicines and adherence to medications. The covariates in the study were age, gender, education level, and employment status.

Definitions

Health Behaviors: An action taken by a person to maintain, attain, or regain good health and to prevent illness. Health behavior reflects a person's health beliefs. Some common health behaviors are exercising regularly, eating a balanced diet, and obtaining necessary inoculations (Farlex Partner Medical Dictionary, 2012).

Health Beliefs: A personal conviction that influence health behaviors (Farlex Partner Medical Dictionary, 2012).

High blood pressure (also known as Hypertension): A common disease in which blood flows through blood vessels, or arteries at higher-than-normal pressures. Blood pressure is the force of blood pushing against the walls of your arteries as the heart pumps blood. High blood pressure, sometimes called hypertension, is when this force against the artery walls is too high. (National Institutes of Health, 2018).

Medication Adherence: Medication adherence is defined by the World Health Organization (WHO, 2003) as "the extent to which a person's behavior – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider" (para. 1).

Assumptions

I assumed that the participants of the study were truthful when responding the questions of the BMQ and Hill-Bone Compliance surveys and that the data was accurate

and reliable, I also assumed that the participants responding to the survey were of Caribbean origin and were patients with a diagnosis of hypertension. While it may be impossible to completely remove bias, these assumptions were necessary to protect the internal and external validity of the study. As such, internal validity indicated the reliability or accuracy of the study results; and external validity showed to what extent the findings could be generalized to other groups (Pannucci & Wilkins, 2010). However, since the study was limited to participants of Caribbean origin, there may be limited generalization to other populations.

Scope and Delimitations

The scope of the study focused on the medication beliefs and behaviors among hypertensive Caribbean immigrants living in New York City. For this purpose, the participants were limited to Caribbean immigrants with a primary diagnosis of hypertension. Through primary data collection, the plan of the study was to identify what factors/barriers were related to these specific medication beliefs and draw conclusions about whether these medication beliefs influence adherence among hypertensive patients of Caribbean origin in New York City. Further, it was also my intent to focus on the medication-taking behaviors such as routine, compliance to regimen, and lifestyle factors to draw conclusions about better blood pressure control among this priority population. The medication beliefs and behaviors of hypertensive Caribbean immigrants is of importance because disparities in hypertension among Black Caribbean immigrants remains a significant issue (Bidulescu et al., 2015). In 2014, there were more than 4 million immigrants from the Caribbean living within the United States (Zong & Batalova,

2016). Half of these Caribbean immigrants identified as Black. New York is home to many of these immigrants, roughly 28% of Caribbean immigrants reside in New York City (Zong & Batalova, 2016). According to the Pew Research Center analysis of Census Bureau, roughly 20% of Black immigrants within the United States live below the poverty line (Anderson, 2015). Additionally, data from 2014 showed that Caribbean immigrants were less likely to be uninsured than the overall foreign-born population, 21% to 27% respectively (Zong & Batalova, 2016). This has implications for poor health outcomes.

The Theory of Planned Behavior (TPB) was also identified as a suitable theoretical framework for this study and is often used in public health due to its ability to predict a person's intention in performing a particular behavior. The model focuses on the attitudes, behaviors intentions, subjective norms, social norms, perceived power, and perceived behavioral control (Boston University school of Public Health, n.d.; Glanz, 2015). However, the TPB model was excluded because I primarily focused on how the perceptions/beliefs regarding medicines may hinder/be a barrier in the uptake of medications and thus proliferate poor blood pressure control. The HBM ultimately looks at a person's course of action often dependent on their perceptions of the benefits and barriers related to health behavior (see Boston University school of Public Health, n.d).

Limitations

Due to the selection of a specific sample population, there may be limited generalization to other populations. I specifically focused on Caribbean immigrants living in New York City. I did not consider other migrant populations living within the United

States. While there is a plethora of research regarding hypertension outcomes in other minority populations such as African Americans and Hispanics, there is limited research dedicated to hypertension outcome in Caribbean immigrant populations (Bidulescu et al., 2015). As such, there was limited prior research available for review regarding the Caribbean immigrant populations regarding blood pressure outcomes.

An additional limitation of this study was self-reported bias. Potential limitations may include selective memory, exaggeration in which there is embellishment of outcomes/events, telescoping in which there is poor recall of events, and attribution which is the act of attributing positive outcomes/events to one own self but attributing negative outcomes to external forces (Brutus et al., 2013). There was also the possibility of people wanting to be more socially desirable in self-reported surveys by presenting themselves in a more favorable light by not admitting to undesirable behaviors or attitudes (see Stat Trek, n.d.).

Significance

The intent of this study was to examine the beliefs about medication held by hypertensive patients of Caribbean origin, explore what factors influenced medication beliefs, and whether the beliefs regarding medications were determinants in adherence needed to improve blood pressure outcomes among a chronically hypertensive Caribbean population in New York City. New York City and its boroughs are the home to many Caribbean immigrants (NYC Planning, 2017). Statistics show that heart disease remains a leading cause of death and disability not only within the United States, but worldwide and high blood pressure is the main contributing factor related to heart disease (CDC,

2016). Minority groups are disproportionately affected by high blood pressure (Balfour et al., 2015). While interventions have been successfully designed to address blood pressure control among minority groups, there is limited research related to blood pressure control among individuals of Caribbean origin (Bidulescu et al., 2015). Therefore, I endeavored to bring an original perspective and light to the beliefs about medications that may hinder blood pressure control among individuals of Caribbean origin. Additionally, poor adherence has been identified as a contributing factor in the treatment of hypertension (Al-Ruthia et al., 2017). The findings of this study could promote positive social change by exploring and identifying potential factors/barriers linked to beliefs about medications that influence blood pressure control among this population, and that may prove beneficial not only to the individual but also aid in reducing the overall burden of hypertension within New York City neighborhoods. As such, there is a greater need for research geared towards better blood pressure control in Blacks of Caribbean origin. As a result, interventions should be designed to aid priority groups with blood pressure control.

Summary

Uncontrolled blood pressure remains the leading risk associate for cardiovascular disease. In 2015, it was projected that more than 100 million people, 41.5% of the United States population, would have some form of cardiovascular disease (Khavjou et al., 2016). It now projected by 2035 that this percentage will increase to 45.1%, roughly 130 million people. As such, this is an estimated increase of roughly 30% (Khavjou et al., 2016). Minorities remain disproportionately affected by high blood pressure (American

Heart Disease Association, 2018). Particularly, hypertension management among Caribbean immigrant remains a topic not well studied (Bidulescu et al., 2015). This research assessed the medication beliefs and behaviors held among hypertensive Caribbean immigrants living with New York City. My research findings could aid future research in examining degree to which these factors that may hinder or improve blood pressure control among this population and other priority populations. Chapter 2 will provide a comprehensive review of literature on medication beliefs, and behaviors related to medication adherence and hypertension management among various populations.

Chapter 2: Literature Review

Introduction

Hypertension remains the leading modifiable risk factor for cardiovascular disease (CDC, 2017). There is a large body of research which shows that a person's diet, lifestyle, health behavior, as well as social and environmental factors, play a crucial role in hypertension. There are also numerous factors that a contributory to uncontrolled blood pressure. These factors include medication beliefs, health beliefs, spiritual beliefs, and medication-taking behaviors, to name a few (Kamran et al., 2014; Marshall & Archibald; 2015; Onoruoiza et al., 2015; Sanon et al., 2014). Research has also shown that effective blood pressure control is dependent on medication adherence. Ramli et al. (2012) noted that poor adherence has rippling effects which reverberate throughout the public health arena contributing to poor health outcomes and high medical costs. As such, there is also a need for medication adherence among hypertensive patients. In particular, there has been limited data regarding blood pressure control among people of Caribbean origin (Bidulescu et al., 2015). The purpose of this study was to assess the beliefs about medications held among hypertensive Caribbean immigrants living in New York City; identify what factors/barriers are related to these specific medication beliefs and determine whether these beliefs influence adherence among hypertensive Caribbean immigrants in New York City.

Literature Search Strategy

A systematic literature review was conducted to identify previous studies related to the proposed research study questions. Using the Walden Library, I performed a search

for articles within the following databases: The MEDLINE with Full Text database, CINAHL & MEDLINE Simultaneous, PubMed and Google Scholar. The review contained key search terms for full-text, peer-reviewed articles from 2013 through 2018 which were tailored towards: *hypertension, blood pressure control, high blood pressure, health beliefs, hypertension in Caribbean people, barriers to blood pressure control, medication adherence and hypertension, barriers to medication adherence, medication adherence and hypertension, Hill-Bone Compliance Adherence Scale, Health Belief Model, beliefs about medicines, Beliefs about Medications,* and *Beliefs and Medicines Questionnaire*. The results of the literature search yielded more than 1,000 articles. The search was narrowed to articles that directly used the HBM as a theoretical construct for hypertension across various populations; and articles which used the Hill-Bone Compliance Scale, and the beliefs about medication questionnaire as measurement tools for hypertension across various populations as these tools are related to my study.

Theoretical Framework

The theoretical framework chosen for this study is the HBM. The HBM was first introduced in 1952 by a group of psychologists whose objectives were to understand why individuals failed to participate in preventative health screenings (Salazar et al., 2015). Over the years, the health belief model has evolved and has been effectively employed in various health promotion programs including blood pressure screenings, flu vaccinations, nutrition and lifestyle screenings, and mammogram screenings (Salazar et al., 2015). The HBM emphasizes several key constructs. The first being perceived susceptibility which posits that a person will be more likely to engage in an action or behaviors if they

perceive that they are at risk for disease or condition (Fertman & Allensworth, 2010). The more vulnerable a person feels regarding a health threat, the more inclined they will be to change or engage in a new behavior. The second construct is perceived severity – the seriousness or acuteness of disease (Fertman & Allensworth, 2010). Thus, if a person perceives that the condition is serious, they will be more likely to engage in a new behavior (Fertman & Allensworth, 2010). The third construct is the perceived benefit – in which a person will weigh the benefits of performing a new behavior. The fourth construct is perceived barriers which are the perceived barriers/factors that inhibit the new behavior. As such, individuals must rely on cues to actions to activate readiness to perform new behaviors/actions. Examples include medication instructions and reminder calls which promote awareness (Fertman & Allensworth, 2010). Newer applications of the health belief model emphasize the importance of self-efficacy, which is the belief in oneself in performing a behavior. Lack of self-efficacy can hinder or be barrier to change (Fertman & Allensworth, 2010; McKenzie et al., 2009).

Application the Health Belief Model

The HBM provided an applicable framework to the beliefs about medication held by hypertensive Caribbean immigrants, which factors influence medication beliefs, and whether the belief regarding medications has an influence in adherence needed to improve blood pressure control. Blood pressure control and adherence to antihypertensive medications begins when a person acknowledges that they are at risk for a disease/health (Onoruoiza et al., 2015). Perceived susceptibility is critical to blood pressure control and adherence. A person must accept their diagnosis of hypertension and

the recommendations for treatment provider by healthcare providers (Onoruoiza et al., 2015). An important aspect of hypertension management is a person acknowledging that they have the condition, while there may be no symptoms. Thus, the perceived severity of hypertension involves knowing the given serious and consequences of hypertension if not treated (Onoruoiza et al., 2015). Thus, a person's perceived susceptibility and perceived severity of the risks for hypertension could promote and motivate a change in current behavior and as such, initiate a new behavior to reduce the risks of hypertension. As posited by Onoruoiza et al. (2015), the perceived benefits of high blood pressure control and medication adherence, emphasizes the benefit of performing the action. As such, the perceived benefit of adherence is better blood pressure control. The HBM also acknowledges that barriers in a person's life will need to be addressed to sustain this new behavior. However, self-efficacy, a person's belief that they can perform this new behavior, plays a critical role in blood pressure control and adherence (Fertman & Allensworth, 2010; Onoruoiza et al., 2015).

Many researchers have effectively applied the HBM as framework for explaining the persistence of various health condition. Kamran et al. (2014), Yue et al. (2015), and Venkatachalam et al. (2015) have effectively employed the HBM in studies to show that person's beliefs play a critical role in health behavior and adherence to medicines. Kamran et al. (2014) sought to investigate what factors affected medication adherence to antihypertensive medicine utilizing the health belief model. The study included 671 hypertensive patients attending rural health care centers in Ardabil city, Iran. The authors employed a cross-sectional study design utilizing a structured questionnaire. Participants

were interviewed over a period of 2 months, May through June in 2013. The questionnaire comprised of six categories which included demographic characteristics, lifestyle, HBM constructs and behaviors (perceived susceptibility, severity, benefit, barriers, and self-efficacy), and adherence to hypertension medication using the Morisky 4-Item Self-Report MEASURE of Medication-taking Behavior. The results of the study showed that only 24% of the study population was adherent to medications. Adherences rates were found to be higher among patients who were only taking only one medication and decreased the more frequent medications had to be taken. Adherence rates results based on the HBM constructs were as follows: good adherence was found among those who perceived high susceptibility (100/180, 55.6%); among those with moderate susceptibility (54/190, 28.4%) and among those with low susceptibility (7/301, 2.3%). These authors also found that the participants who had higher perceived severity (88/157, 56%) showed better adherence when compared to those with moderate or low perceived severity. Participants of the study with low perceived benefit were almost 20 times more likely to be non-adherent than those with perceived high benefits. Likewise, the authors found significantly higher adherence among patients with high self-efficacy (88/262, 33.6%); and lower adherence among those with those higher perceived barriers (22/184, 12%)) compared with moderate and low perceived barriers (24/190, 12.6%) and (115/297, 38.7%) respectively. Kamran et al. (2014) found that adherence to hypertension medications is significantly linked to the health belief constructs.

Like Kamran et al. (2014), Venkatachalam et al. (2015), who performed a cross-sectional study to identify the factors that influence adherence to hypertension

medications in a cohort of South Indian patients, found that constructs within the health belief model explained low adherence to antihypertensive medicines. Respondents with higher perceived susceptibility, severity, benefit were significantly more adherent with medicines when compared with respondents who had moderate and low susceptibility, severity, benefit. As such, interventions should be designed to improve adherence among populations with negative health beliefs.

These studies show that a person's health beliefs which includes their self-efficacy, perceived susceptibility, perceived severity, perceived benefit about medicines are linked to medication adherence. As such, greater beliefs in these HBM constructs can greatly improve adherence to medicines.

Yue et al. (2015) also sought to develop a greater understanding of antihypertensive medication adherence using the HBM. The authors used the HBM as a theoretical framework in a pharmacist-led cross-sectional intervention in order to understand antihypertensive medication adherence among Chinese patients. The authors noted that the HBM included numerous cognitive constructs which were advantageous in predicting why people take actions to control their maladies. Yue et al. found that the HBM was effective in explaining 48.8% of the variance in antihypertensive medication adherence and had an overall prediction accuracy of 82.8%.

These studies are applicable to my study, as they show that the HBM can be successfully applied to explain factors related to medication beliefs, and how these beliefs about medicines influence medication adherence. The HBM constructs can help to

predict a person behavior and thus can show how this behavior can affect health outcomes.

Overview of Hypertension

Hypertension is a medical condition in which a person's blood pressure is high. A blood pressure reading of 120/80 mmHg or less is said to be in normal range (CDC, 2016). High blood pressure is a blood pressure reading of 140/90 mmHg or more. More than 75 million Americans are affected by hypertension each year (CDC, 2016). As a result, every one in three adults within the United States has high blood pressure and another one third have prehypertension. Of those with high blood pressure, only 54% of people have their blood pressure under control. In 2014, high blood pressure was the primary and contributing cause of death for roughly 410,000 people living within the United States. Every year, the nation incurs approximately $48.6 billion in high blood pressure related costs (CDC, 2016). Unhealthy behaviors increase a person's risk for high blood pressure. These behaviors include smoking tobacco, eating foods high in sodium and low in potassium, lack of physical activity, being obese and overuse of alcohol (AHA, 2018). While high blood pressure affects all ethnicities, African Americans/Blacks have a higher prevalence of hypertension than other ethnicities (AHA, 2018).

Recent statistics from the National Center for Health Statistics (2018) showed that the overall prevalence of hypertension among adults within the United States for 2015-2016 period was 29.0%: 30.2% among men and 27.7% among women. The prevalence of hypertension for both men and women increases with age (Fryar et al., 2018). There was

no significant movement in hypertension control from 1999 to 2016. Only 48.3% of adults with hypertension were controlled; more women than men had their blood pressure within control. National trends show that non-Hispanic blacks remain disproportionately affected by hypertension when compared with other ethnicities; 40.3% Blacks, 27.8% Hispanics, 27.8% Whites, and 25% Asians have hypertension (Fryar et al., 2018).

New York City has an ethnically diverse population. Fei et al. (2017) examined the racial/ethnic minority disparities in hypertension prevalence among adults living in New York City. The authors used the 2013–2014 New York City Health and Nutrition Examination Survey to assess the hypertension prevalence among adults ages 20 and older. The survey included a total of 1,476 participants. Hypertension was measured as a systolic blood pressure greater than 140 mm Hg or diastolic blood pressure greater than 90 mm Hg or self-reported hypertension; and/or use of blood pressure medication. The authors also reported race/ethnicity and country of origin, as well as sociodemographic and health characteristics. The result of their analyses showed that among adults living in New York City, the overall prevalence of hypertension was 33.9% and increased with age: 43.5% among non-Hispanic Blacks, 38% among Asians, 33% among Hispanics, and 27.5% among non-Hispanic Whites (p=.01). Blacks and Hispanics had a higher prevalence of obesity than other racial/ethnicities (Black 36.9% and Hispanic, 36.8% vs White, 27.6% and Asian, 14.9%; $p < .001$). In general, ethnic minorities, particularly, non-Hispanic Blacks and Hispanics had higher odds of having hypertension after adjusting for age, sex, education, and body mass index when compared with non-Hispanic Whites. As such, the authors noted that culturally appropriated strategies should

be designed to meet the needs of various racial/ethnic subgroups, particularly considering the role of cultural practices (Fei et al., 2017). Giambrone et al. (2016) also found similar trends in hypertension among New York City adults. Using the 2004 New York City Health and Nutrition Examination Survey, the authors found the overall prevalence of hypertension among New York City adults was 25.5% (95% CI: 23.4-27.8); 32.8% among Blacks (95% CI: 28.7-37.2), 26.4% among Hispanics (95% CI: 22.3-31.0), 24.7% among Asians (95% CI: 19.9-30.3), and 21.1% among Whites (95% CI: 18.2-24.3). When compared with Giambrone et al. findings, the results of the Fei et al. study are similar in that they show that Blacks and Hispanics remain disproportionately affected by hypertension. Within the last 10 years, there has been an overall 8% increase in hypertension prevalence from among New York City adults and similar increases among each among each group respectively (Fei et al., 2017; Giambrone et al., 2016). Add summary and a conclusion to connect back to your study and to fully conclude the section.

Hypertension in the Caribbean Immigrant Population

As noted by Bidulescu et al. (2015), while there is a plethora of studies regarding hypertension in various populations, there is limited evidence and research dedicated to hypertension outcomes in the Caribbean population. Disparities in the Black Caribbean population remain a public health burden. The Caribbean is geographically diverse and is made up of a mixed ethnic population including but not limited to Blacks of African descent, and South Asians living within and outside of the region (Bidulescu et al., 2015).

Many have migrated to the United States from countries such as Jamaica, Barbados, Trinidad and Tobago, Guyana, and Haiti (Allen et al., 2013, Bidulescu et al., 2015)

As posited by Commodore-Mensah et al. (2018), within the United States, ethnic minority populations are disproportionately affected by cardiovascular disease and its risk factors such hypertension, overweight/obesity, and diabetes. Over the last 3 decades, there has been a dramatic increase in ethnic minority immigrant populations within the United States including, but not limited to ethnicities, from Asia, Caribbean Islands, Mexico/Central America/Caribbean, South America, Europe, Russia, Africa, the Middle East, and the Indian subcontinent (Commodore-Mensah et al., 2018). As previous authors (Bidulescu et al., 2015; Commodore-Mensah et al., 2018) noted, while there has been substantial increase in these ethnicities, many studies have been limited to Asian and Hispanic populations. As such, the Commodore-Mensah et al. sought to examine the prevalence of diagnosed hypertension, overweight/obesity, and diagnosed diabetes among a socioeconomic diverse sample of immigrants. The study included 41,717 immigrants. The sample included immigrants from Europe (12.5%), South America (6.6%), Mexico/Central America/Caribbean (47%), Russia (2.7%), Africa (5%), Middle East (3%), Indian subcontinent (6.5%), Asia (7.5%), and Southeast Asia (9%). Across the nine immigrant groups there were significant differences in sociodemographic characteristics. Immigrants from Mexico/Central America/Caribbean population has the third highest age and sex adjusted prevalence of hypertension (27%), the second highest age and sex adjusted prevalence of overweight/obesity (70.7%) and the second highest age and sex adjusted prevalence of diabetes (11.6%) when compared with the other

immigrant groups. Commodore-Mensah et al.) noted that African Americans, African immigrants, and Afro-Caribbeans are historically studied as “Blacks” with no consideration for ethnic differences. However, Blacks are heterogeneous in terms social determinants of hypertension and diabetes. Previous works such as Carlisle (2012) suggests by doing so, there is a missed opportunity to identify distinct health disparities between Afro-Caribbeans and African Americans. For instance, foundational work done by Read and Emerson (2005) identified differences between Caribbean, African, and European Black immigrants who lived within the United States in which African Blacks, followed by Caribbean Blacks, had better health and health outcomes when compared with European Blacks. Commodore-Mensah et al. suggested that future research should focus on culturally tailored prevention and management strategies in regarding to health outcomes, as well as address ethnic subgroups disparities.

Nunura et al. (2017) posited that the Caribbean region has experienced epidemiological transition within the last 50 years. Recent statistics from Pan American Health Organization (PAHO, year) indicate that the chronic noncommunicable diseases epidemic in Caribbean is the worst in the region of the Americas. Noncommunicable diseases such as cardiovascular diseases (CVDs), cancer, diabetes, and chronic respiratory diseases-constitute are the leading cause of death in the region (PAHO, 2013). Francis et al. (2015), through systematic review, sought to identify health disparities in the prevalence, incidence, and mortality rates of CVD among Afro-Caribbean populations and Caribbean immigrants compared to other ethnic groups between and within countries. Francis et al. (2015) posited that there are few studies that have been

dedicated to examining the influences of social factors, socioeconomic status and geographic origin or place of residences plays in the disease progression of CVD, particularly among people of African origin. Further research is needed in this particular area due to high levels of cultural heterogeneity that contribute to cause specific mortality within the Caribbean or the diaspora.

Sanon et al. (2014) sought to investigate hypertension management among Haitian immigrants living within the United States. As posited by Allen et al. (2013), Haitian immigrants were among the largest and fastest growing immigrant populations living with the US; with roughly 830, 000 immigrants living in large cities such as Miami, New York, and Boston. However, as Sanon et al. (2014) stated there is limited information regarding hypertension management in this population. These authors conducted a qualitative study, utilizing face-to-face semi-structured interviews with 31 Haitian immigrants in Miami Dade County, Florida, to explore their personal view and beliefs regarding hypertension management. The results of their study showed that Haitian immigrants had unique beliefs regarding hypertension and its management. Some participants felt that hypertension was not an illness but a normal body occurrence. Sanon et al. findings mirror those of Allen et al. (2013) who found that the health beliefs, attitudes, and service utilization among Haitian immigrants were not representative of traditional biomedical ideals. As such, treatment and management of hypertension can become challenging. Like other ethnic minorities immigrants, Haitians are more likely to use herbal remedies to treat their symptoms of hypertension instead of using medications. Both authors conclude that there is a lack of trust towards biomedical remedies.

These findings throughout the various studies suggest that Caribbean immigrants face several challenges in terms of the treatment and management of hypertension. Some of these challenges are related to their health beliefs and health behaviors. As such, there is a greater need to further study the factors and barriers to hypertension management, as well as create culturally appropriate strategies to address cultural traditions and health belief practices.

Beliefs about Medicines

Identifying factors that are contributory to uncontrolled/ blood pressure is necessary for improving blood pressure outcomes. A person's belief about medicines thus plays a key role in the uptake and adherence to hypertensive medication. Horne et al. (2013) cited previous works which noted that the medical management of most long-term conditions requires prescribing medicines. The authors however noted that roughly half of medications prescribed are not taken as instructed. Thus, demonstrating missed opportunities for effective treatment and optimal patient outcomes. As such, non-adherence to medications can be detrimental to the individual by increasing the risk for morbidity and mortality; as well as have serious negative effects on healthcare systems, contributing to wasted resources and increased admissions and utilization of hospitals. Non-adherence to medications cannot possibly be explained by one definitive factor. Non-adherence can be unintentional as well as intentional, relating to several factors. One such factor is beliefs about medicines. Beliefs about medicines are a contributing factor of intentional non-adherence which occurs when an individual intentionally or deliberately decides not to follow the recommendations for use of prescribed medications

(Horne et al., 2013). Previous studies which focused on a range of long-term conditions suggested that beliefs play a crucial role in influencing a person's perception regarding prescribed medicine (Horne et al., 2013). These beliefs fall under two categories, a) perception regarding personal need for treatments – Necessity Beliefs, and b) concerns regarding a range of potential adverse outcomes (Horne et al., 2013).

In a systematic review of the beliefs about hypertension and its treatment among African Americans performed by Buckley et al. (2016), the authors' noted that many patients believe in the efficacy of medications, however, only used them sporadically or only when there is a perceived threat of intermittent hypertensive episodes as to avoid addiction and dependence. Their review revealed the African Americans were more like to use home remedies in place of medications as to avoid adverse side effects of medicines. Thus, like other authors have posited, Buckley et al. (2016) suggested the beliefs about medicines are key to the uptake of antihypertensive regiments.

The aim of Sweileh et al. (2014) study was to assess the beliefs about medicines and self-reported adherence held among primary care patients with chronic illness in Nablus, Palestine. The authors' employed a cross-sectional study design using the Beliefs about Medicines Questionnaire (BMQ) to assess the beliefs about medicines and the Morisky Medication Adherence Scale (MMAS-8) to assess adherence to medications. Both surveys were translated into Arabic language obtained by the developers of the surveys. A total of 187 patients with chronic illnesses were interviewed. The results of the study showed that 79.6% of the participants believed that medications were necessary to treat their current health condition. Fifty eight percent of the patients had concern

regarding taking their medications on a regular basis and 57.8% had apprehensions about becoming dependent on their medications. However, in this study none of the demographic characteristics and clinical variables was significantly associated with medication adherence. The results of the multivariate analysis indicated that participants had higher odds of being adherent to the medications, if they had higher beliefs about medication necessity. Likewise, those who had greater concern related to their beliefs had lower odds of being adherent. As such, beliefs about medicines play an important role in medication adherence.

The research of Atinga et al. (2018) explored the factors that influenced long-term medication non-adherence among patients with diabetes and hypertension patients in Ghana. The authors noted that beliefs about medicine played a critical role in blood pressure control and adherence to medicines. Through qualitative interviews, several themes emerged from their study. The first theme pertains to perceptions regarding medicines efficacy. Patients had low trust in the medications efficacy; and as a result, there was low uptake of diabetes and hypertensive medications. As such, patients did not trust that the medication was effective. A second theme that emerged from their study relates to knowledge and experience regarding medications. Atinga et al. suggested knowledge of medications among individuals with high literacy can lead to nonadherence. They found that patients who had knowledge regarding the side effects of prescribed medication were fearful of taking the drug.

Likewise, the research of the Rajpura and Nayak (2014) assessed the shared effect that illness perceptions, medications beliefs, and illness burden has on medication

adherence among a cohort of elderly people with hypertension. The authors employed a cross-sectional questionnaire survey research design which utilized validated instruments such as the Brief Illness Perception Questionnaire, Pictorial Representation of Illness and Self Measure Revised II, Beliefs about Medicines Questionnaire, and Morisky Medication Adherence Scale the associations of beliefs and adherence. The results of multiple linear regression analysis showed that beliefs about medicine such as perceptions about illness, perceived illness burden played a significant role in predicting medication adherence (R-squared = 0.328). Bivariate correlations revealed that higher perceptions regarding illness were correlated with higher levels of adherence to antihypertensive medications (R=0.332, p <0.001), which in turn was linked to lower perceived illness burden (R = 0.423, -0.444, p< 0.001). These authors found that perceived concerns about the benefits played a significant role in predicting adherence than the risk associated to the use of medications. The results of Rajpura and Nayak (2014) conclude that beliefs about medicines play a critical role in medication adherence in elderly people. Positive perceptions can promote adherence, while negative perceptions regarding medicine can be a barrier to medication adherence. Both Rajpura and Nayak (2014) and Atinga et al. (2018) highlight that health beliefs play an important role in predicting adherence.

The research of Unni et al. (2016) sought to assess changes in medication adherence and beliefs in medicine among adults 65 years and older, to determine whether their beliefs regarding medicines changed over times. The authors note that a person's beliefs regarding medicines includes but is not limited to beliefs about necessity and

concerns regarding the negative sides. They note that the rate of adherence to medicines varies from 23% to 86% among older adults; as such, understanding how beliefs impact adherence is an important issue. Unni et al. employed a 2-year longitudinal internet-based survey which utilized the Beliefs about Medicines Questionnaire to measure beliefs regarding medicines and the Morisky 4-item scale to measure medication adherence. The study included 436 respondents at baseline and follow up. The authors found that there was no significant change in adherence, necessity beliefs or concern beliefs from baseline to follow up. However, there was as a statistically significant improvement in adherence among older adults with lower adherence at baseline, but not significant change in beliefs about medicines over time. The results of multiple linear regression showed that predictors of change in adherence over time included baseline adherence and baseline concerns due to beliefs about medicines. The authors concluded that a crucial factor in improving adherence was dependent on alleviating medication concerns at the beginning of therapy.

The research presented in this section informs my current study regarding the medication beliefs and behaviors among hypertensive Caribbean Immigrants, in that the researchers highlight some of the possible factors regarding beliefs of about medicine that play a critical role in blood pressure control and medication adherence. Across various populations, researchers have shown that beliefs about medicines are associated with medication adherence. Higher concerns or negative beliefs regarding medicines are associated with poor blood pressure control and poor adherence, whereas, positive beliefs

and higher medication necessity beliefs are associated with better blood pressure outcomes and medication adherence.

Medication Adherence

The World Health Organization (WHO) reports that on average only 50% of chronic disease patients are adherent with their medicines (WHO, 2003). The WHO acknowledges this issue is a crucial public health problem. Medication adherence is associated with improved clinical outcomes and improved overall health for chronic conditions. However, non-adherence has serious consequences that can lead to poor health outcomes, increased hospital admissions, increased morbidity and mortality, and rising healthcare costs (Lam & Fresco, 2015; Neiman et al., 2017). Despite increased awareness among chronic disease patients and gradual trends to improve hypertension, adherence remains low (Vrijens et al., 2017). As Vrijens et al. (2017) note medication adherence consists of three areas: initiation, implementation, and persistence. Non-adherence occurs when a person fails to 1) start a new prescription, 2) take prescription as prescribed or 3) continue with treatment. Every year, approximately 3.8 billon prescriptions are written within the United States; and 1/5 of the prescriptions written are not filled (Vrijens et al., 2017). Additionally, among those that are filled, roughly 50% are taken incorrectly (Neiman et al., 2017). Non-adherence to medications also has staggering economic costs. In a systematic review of the economic impact of non-adherence, Culter et al. (2018) found that in 2015, the annual adjusted disease-specific economic cost of non-adherence per person, ranged from $949 to $44,190.

Thus, understanding the factors or barriers to medication adherence is vital for improving overall adherence. As noted by de Vries et al. (2014) adherence to drug therapy has been a well-known documented clinical issue. The authors note that patients who are non-adherent to medicines can have intentional and unintentional motives. Patient-related factors can be unintentional factors and intentional factors. Unintentional factors are unintentional passive behaviors such as not remembering to take medications, picking up refills, or insufficient knowledge of dosage or keeping a medication schedule. Unintentional passive behaviors are more strongly linked to demographics. Conversely, intentional factors are conscious decisions related to patients' beliefs and attitudes towards medications, their beliefs about disease and medication side effects, and their assumptions regarding improvement (de Vries et al., 2014; Neiman et al., 2017). As such, non-adherence is linked to many factors which include but are not limited to patient and treatment characteristics, beliefs about medicines and treatment convenience (de Vries et al., 2014).

Further, medication adherence has emerged as a crucial factor in blood pressure control. As posited by Nwankwo et al. (2013), approximately 76% of adult Americans are takings some form of antihypertensive medication to control their blood pressure. However, only 51.8% on an antihypertensive drug therapy have achieved blood pressure control. According to the National Center for Health Statistics (NCHS, 2013), roughly 81% of women and 71% of men are reported taking antihypertensive medication. As noted by Wu et al. (2018), low adherence to antihypertensive medication contributes to worse health outcomes, since uncontrolled blood pressure can lead to a host of

complications and disease progression including cardiovascular disease, stroke, aneurysm, and heart failure. An earlier study done by Alhalaiqa et al. (2013) explored the experiences of hypertensive patients who enrolled in a hypertensive medication adherence therapy trial. The study took place in an adult primary care clinic setting in Jordan. The authors employed a qualitative study design which focused on the role that individual behavior has on medication adherence. Alhalaiqa et al. (2013) utilized convenience sampling, in which the first 10 hypertensive patients who were enrolled in the adherence therapy trial, were interviewed regarding their experiences, views and barriers related to medication adherence. Their results of the study showed that adherence therapy had a positive influence on improving participants' self-efficacy, health beliefs and attitudes toward hypertensive medication. As a result, greater effort should be focused on changing adverse individual behaviors (Alhalaiqa et al., 2013). Likewise, Natarajan et al. (2013) investigated adherence to antihypertensive medication among family practice patients with diabetes and hypertension in 27 clinics in three provinces in Canada. The main goal of the study was to identify factors associated with adherence to antihypertensive medication. Natarajan et al. employed a cross-sectional study design which included a self-reported survey utilizing the Morisky scale, and 22 questions related to patient factors such as demographic characteristics, clinical outcomes, individual behaviors, health beliefs and provider-patient relationships and healthcare system influences. The results of the survey showed that 77% of the patients were adherent with their medication. The results of the logistic regression showed higher adherence among those 55 years and older, those taking multiple medications, and among

those with an active lifestyle and health diet. The authors conclude that high adherence is related age, number of medications and lifestyle choice (Natarajan et al., 2013).

Medication Taking Behaviors

Medication taking behaviors can be seen as a predictor of medication adherence. As posited by Saito et al. (2016), it is crucial for patients to take their medication properly, routinely and on a long-term basis to effectively prevent and treat hypertension. A person's medication taking behavior and routine are previews to their medication adherence. In a commentary written by Kountz and Kofman (2015), the authors' note that Solomon et al.'s research adds to the growing body of work regarding medication routines as it relates to adherence, in that, the authors found strong associations between medication-taking consistency, medication adherence and blood pressure control. Solomon et al. (2015) examined the medication routines and adherence to hypertensive medications among a population of African Americans living in New York City. Their study was unique in the sense, that while other studies have detailed differences in medication schedule such as time of day, weekday or weekend, this study examined how medication-taking routine contributed to increased adherence. The authors' examined the sociodemographic factors related to a consistent medication routine and examined the associations between medication-taking routine consistency and medication adherence over a period of 9 months and explored the relationship between medication-taking consistency and blood pressure control. The research designed employed for this study was clinical trial, in which participants were randomized into a usual care control group that received standard general medical care or the motivational interviewing group

receiving standard general care as well four sessions behavioral counseling regarding medication adherence at 3-month intervals. The results of their study showed that the African American participants with a consistent medication-taking routine were more like to be adherent to their hypertensive medicines, and as a result, had better systolic blood pressure control. As such, the authors note greater focus should be placed on not medication schedule than medication-routine consistency (Solomon et al., 2015).

Medication taking behavior can also associated to cultural medicinal beliefs. The research of Sanon et al. (2014) focused on hypertension management among Haitian immigrants. The qualitative study included face-to-face semi-structured interviews with 31 Haitian immigrants in Miami Dade County, FL. Participants were questioned regarding their beliefs about hypertension and behaviors in managing their hypertension. The authors findings mirror previous studies which emphasize the significant role that personal beliefs contribute to hypertension management. The Haitian Caribbean participants were more inclined to use herbal remedies to manage their hypertension. Additionally, there was a lack of trust towards traditional biomedical products and healthcare professionals (Allen et al., 2013). This research contributes to work of hypertension management in that is highlights that personal health beliefs can be barriers to hypertension management. It also brings much needed insight into medication taking behaviors in a Caribbean immigrant population.

Research has also shown that medication taking behaviors can be explain by religious beliefs. Many authors have highlighted the complex role that religion and spirituality play in the health beliefs of people (Patterson, 2013; Marshall & Archibald;

2015; De Jesus, 2016; VanderWeele et al., 2017). Marshall and Archibald (2015) noted that spirituality is an important aspect of the Afro-Caribbean experience. There are varying diverse views on health among people of Afro-Caribbean descent. These views have implications regarding health outcomes in the United States due the high volume of people of Caribbean origin living within the United States. McCabe (2011) stated there was more than a 17 percent increase within the last 50 years of people of Caribbean origin residing in the U.S. Further, Christianity has emerged as a foundation in the Black experience. As such, there is complex relationship between spiritually and health behavior.

Bishop et al. (2015) sought to investigate what were the determinants of adequate blood pressure control among stroke patients post-discharge. The authors note that hypertension is an important risk for stroke and transient ischemic attach (TIA). Blood pressure becomes even more crucial after a stroke or transient ischemic attach; as such, optimal blood pressure control is needed to prevent a second stroke or TIA attach. Therefore, one of the authors' goals was to assess how once-daily dosing blood pressure medication can improve blood pressure control post discharge in 172 adult stroke and TIA patients with known hypertension. The researchers found that a once daily BP medications was not associated with blood pressure control. Elevated systolic blood pressure at discharge was linked to poor blood pressure control. Patients who had support systems such as outpatient home health and therapy had better blood pressure control. The authors thus note that further research is needed to decipher whether poor control is linked to the range of medications or patient medication-taking behavior.

Likewise, the aim of Jamison et al. (2016) study was to identify barriers to medication adherence for secondary stroke prevention among a group of general practice surgery patients in the United Kingdom, who were survivors of stroke and transient ischemic attack. The authors employed a qualitative study conducting interview with 28 stoke survivors to explore their perspective views and perceived barriers to medication adherence. The results of their study identified two major themes. The first theme relates to patient level barriers such as self-care, lack of knowledge regarding stoke and medication use, and survivors' perceptions regarding the seriousness of stroke. The second theme relates to medication level barriers which include personal health beliefs regarding how medications work, the medication routines such as attitude towards missing doses and difficulties taking medications, changing medications and the complexity of medication regimen contributed to the burden of treatment. As such, the authors highlighted the importance of creating joint efforts between caregivers, survivors, and health care professionals to mitigate challenges related to medication-taking behaviors (Bishop et al., 2015).

These studies inform my research regarding the factors and barriers that influence medication-taking behaviors. As previous works have shown, medication behaviors can be influenced by but is not limited to individual behaviors, health beliefs, cultural beliefs, spiritual beliefs, and complexity of regimen. Finding avenues to address these behaviors remains essential for improving health outcomes.

Beliefs about Medicines Questionnaire

For this study, one of the measurement tools being utilized is the beliefs about medicines questionnaire (BMQ). The beliefs about medicines questionnaire (BMQ) was created by Horne et al. (2009) to understand the beliefs regarding medicines held by individuals. The BMQ aims to assess the beliefs of patients regarding their concerns for taking medications. The BMQ is an 18-item self-administered questionnaire. The questionnaire is divided into two sections: the BMQ-Specific (10 items) which measures a person's specific –necessity for medication prescribed for personal use, and the BMQ-General (8 items) which measures a person's beliefs about medicines in general. The BMQ-Specific and BMQ-General can be used synchronously or separately. Both sections are measured on a five-point Likert sale ranging from strongly agree to strongly disagree. Higher scores signify stronger beliefs about regarding the topic, thus indicating negative beliefs about medicines (Horne et al., 2009; Verhaegen, n.d.). Several researchers have utilized this instrument to understand the complex associations between beliefs regarding medicines and health outcomes. As noted by Verhaegen, the BMQ has been translated into many languages and has been validated in various populations. The beliefs about medicines questionnaire have a high internal consistency and Cronbach's α subdomains range from 0.59 to 0.8, and total range from 0.66 to 0.7. Thus, the beliefs about medicines questionnaire when compared with other medication adherence questionnaires is reliable and valid.

Many studies have focused on the associations between beliefs about medicines and medication adherence (Horne et al., 2013: Sjölander et al., 2013; Alhewiti, 2014;

Swelish et al., 2014). Horne et al. (2013) performed a systematic review and meta-analysis of literature to understand how patients' beliefs about medication influence treatment engagement and adherences. The authors utilized the Necessity-Concerns Framework which describes how adherence is shaped by embedded personal beliefs regarding treatment concerns based on the potential adverse outcomes of taking medications. The authors found across studies that higher adherences to medication was stronger based on the beliefs regarding the necessity of treatment OR = 1.742, 95% CI [1.569, 1.934 (Horne et al., 2013).

Likewise, the Beliefs about Medicines Questionnaire (BMQ) was utilized by Sweileh et al. (2014) to assess medication adherence and its likely relationships with beliefs about diabetes among patients with Type 2 diabetes in Palestine. The authors note that nonadherence to diabetes medications was significantly associated with knowledge regarding the disease, personal beliefs regarding the necessity of anti-diabetic medications, concerns regarding the adverse side effects of anti-diabetic medications and the beliefs that medications are intrinsically harmful. The results of the study showed that diabetic patients who had higher knowledge scores and strong beliefs regarding the necessity of their medications were less likely to be non-adherent ([O.R = 0.87, 95% CI of 0.78 – 0.97] and [O.R = 0.93, 95% of 0.88 – 0.99] respectively). While diabetic patients who had higher concerns regarding the adverse side effects of their diabetic medications and those with high beliefs regards the harmfulness of diabetic medications were more likely to be non-adherent with their medications. ([O.R = 1.09; 95% C.I of 1.04 – 1.16] and [O.R = 1.09, 95% C.I of 1.02 – 1.16] respectively). As such, the authors

note that beliefs regarding medicines and knowledge play a crucial role in the uptake and adherence to medications. Thus, having negative beliefs regarding medicine can be seen as a barrier to medication adherence (Sweileh et al., 2014).

The research of Sjölander et al. (2013) also utilized the BMQ to evaluate patients' beliefs regarding medicines. These authors posited that adherence to drug treatment among stroke patients was a clinical problem. The objective of their study was to explore the relationship between beliefs of patients with stroke regarding their stroke and drug treatment and adherence to drug treatment. The authors employed a cross-sectional design which included patient 989 patients from 25 Swedish hospitals. The authors utilized the Brief Illness Perception Questionnaire, Brief IPQ to assess the patients' perceptions regarding stroke, the BMQ to assess the patients' beliefs about medicines, and Medication Adherence Report Scale, MARS to assess the patients' adherence to treatment, three months after the onset of a stroke. The authors utilized both the BMQ-Specific subscale which assesses the necessity and concern regarding prescribed medicines; and the BMQ-General subscales which assess the harm, overuse, and benefits regarding prescribed medicines. In total, the survey included 22 questions scored on a 5-point Likert scale - 1) strongly disagree, 2) disagree, 3) uncertain, 4) agree, and 5) strongly agree). Individuals who missed questions were not totaled in the overall BMQ subscales (Sjölander et al., 2013).

Sjölander et al. (2013) utilized Mann-Whitney U statistical tests to analyze the differences between adherent and non-adherent patients for both the Brief Illness Perception Questionnaire, Brief IPQ subscales and the Beliefs about Medicines

Questionnaires, BMQ subscales. The results of the study included 811 completed questionnaires. A subset of 587 patients completed the MARS questionnaire. Of those who completed the MARS survey, 12.5 % of the patients were non-adherent to their medicines. Among non-adherent patients, the results showed lower positive beliefs regarding the "BMQ-necessity (OR = 0.90, 95% CI 0.83 to 0.98) and BMQ-benefit (OR=0.77, 95% CI 0.68 to 0.87).; and higher negative beliefs were measured on BMQ-concern (OR=1.12, 95% CI 1.05 to 1.21), BMQ-overuse (OR=1.29, 95% CI 1.14 to 1.45), and BMQ-harm (OR=1.12, 95% CI 1.01 to 1.24)" (Sjölander et al., 2013). As such, non-adherence to medicines was associated to negative patient beliefs regarding the usefulness of medicines (p=0.001). These authors concluded that there was a link between patients' beliefs about regarding medicines and adherence to medicines (Sjölander et al., 2013). This study is relevant to my current study because it shows that BMQ instrument is a beneficial tool for assess individuals' beliefs regarding medicines. The study is also applicable because it shows that a person's beliefs about medicine have an intrinsic impact on medication adherence. Positive beliefs regarding medicines are associated with adherence, whereas negative beliefs about medicine are associated with non-adherence.

The research of Alhewiti (2014) aimed to investigate how long-term medications use affects adherence among patients attending family medicine clinics. The author also sought to assess the relationships between adherence, beliefs about medicines, and patients' perception about medication information adequacy. Alhewiti (2014) notes that nonadherence is known either as intentional or unintentional. Intentional nonadherences

can be seen as product of a person beliefs and individual's behaviors. Whereas nonintentional adherence can be due to forgetfulness or lack of understanding regarding medicine. The author employed a cross-sectional research design, in which a survey was distributed to patients with chronic diseases in family medical clinics in Riyadh, Saudi Arabia. The study was conducted between the months of November 2012 to May 2013. All patients 18 yrs. and older were asked to fill out the survey documenting the self-reported adherence. The Morisky Medication Adherence Scale (MMAS-8) was utilized to examine adherence to medicines, and the Beliefs about medicines questionnaire was utilized to examine beliefs about medicines. Both surveys were translated into Arabic. A total of 408 participants completed the survey. The results of the analysis showed that 56.9% of the participants reported low adherence. The result of the Pearson's bivariate correlation showed a positive association between MMAS-8 scores and the BMQ-specific necessity ($R = 0.526$, $p < 0.001$); and the perceived information adequacy ($R = 0.568$, $p < 0.001$); There was also a negative association between adherence score and BMQ specific concerns, general overuse, and harm ($R = -0.647$, -0.466, and -0.663) ($p < 0.001$). The results of the multivariate analysis showed that a person's age, their belief concerns regarding safety and harm, and their perceived medication competence was explained by 32.3% of the variance in adherence. Like the previous studies mentioned, Alhewiti (2014) concludes that there were higher rates of low adherence among chronic disease patients with long-term medication use which were negatively associated with poor belief regarding medications and missed opportunities for adequate information regarding medications.

The studies presented have effectively applied the BMQ to assess the relationships between beliefs, adherence to medications and health outcomes. Beliefs about medicines play a crucial role in the uptake of medicines. Poor perceptions and greater concerns for medicines translate to poor adherence. As such, the Beliefs about medicines questionnaire can also be applied to this study as tool to measure the medication beliefs of hypertensive Caribbean immigrants living in New York City.

Hill-Bone Compliance Scale

The second instrument that will be utilized for this study is the Hill-Bone Compliance Scale. The Hill-Bone Compliance scale was designed as tool to examine patients' medication-taking behaviors and barriers to medication adherence (Lam & Fresco, 2015). The Hill-bone is particularly designed to focus on patients who are taking antihypertensive medications (Lam & Fresco, 2015). The scale is a 14-item questionnaire with 3 subscales that assesses behaviors regarding sodium intake, ability to keep medical appointments, and medication-taking behaviors. The scale is measured on a four-point Likert scale (Lam & Fresco, 2015; Culig & Leppée, 2014). The Hill-Bone Compliance scale has a high internal consistency. When first tested the internal consistency reliability and predictive validity of the scale were 0.74 and 0.84, respectively (Kim et al., 2000).

Lambert et al. (2007) first validated the Hill-Bone Compliance to High Blood Pressure Therapy Scale (HB Comp Scale) in a South African primary healthcare setting. The Hill-Bone scale was developed to some extent, in response to an earlier implementation of an instrument that measured patients' self-reported adherence. The objective of the Hill-Bone Compliance scale was to create a culturally appropriate valid

and reliable scale appropriate for people with limited literacy and that could be self-reported in a short period in three subdomains - medications-compliance, appointment making, and salt intake (Lambert et al., 2007). The scale was translated in the language of the patients and then back into English. There were total of 598 patients who were recruited for the study from primary healthcare clinics in Cape Town, South Africa. Lambert et al. (2007) utilized Omron electronic blood pressure manometers to collect blood pressure reading. The authors utilized Spearman rank order correlations to assess the relationship between compliance and blood pressure (Lambert et al., 2007).

The results of the study showed that the modified scale which included only 10 items had sufficient internal consistency – an item-total correlation of .31 and a standardized Cronbach of 0.79). The results also showed an average interitem correlation of .26. The results showed that medication taking, appointment keeping, and salt intake were crucial behavioral aspects that influenced blood pressure control (Lambert el al., 2007).

Following the validity of the instrument, the Hill-Bone compliance scale has been utilized by various investigators to assess people medication taking behaviors and blood pressure compliance. The Hill-Bone compliance scale was used in the research of Abel and Efird (2013), whose intent was to investigate the associations between trust in healthcare providers and medication compliance among Black women with high blood pressure. The authors noted that disparities in hypertension outcomes show that Black women have the highest prevalence of hypertension. Some historical reasons within the United States include mistrust for health professionals, denial of treatment and poor

medication adherence (Abel & Efird, 2013). Eighty women on an antihypertensive regimen were recruited from urban communities to participate in this study. The participants were asked to complete the Trust in Physician and Hill-Bone Compliance to High Blood Pressure Therapy questionnaires. The authors utilized an exact discrete-event model (proportional odds) to test the relationship between trust and medication adherence. The results of the study showed that higher levels of trust in health care was independently associated with higher medication adherence ($P_{\text{Trend}} = 0.015$). As such, greater focused should be placed on provider-patient relationships to increase medication adherence (Abel & Efird, 2013).

Roghayeh et al. (2013) also utilized the Hill-Bone Compliance scale. The aim of the study was to determine the rate of adherence to therapeutic regimens, as well as the related factors of hypertension admitted to a hospital. The setting for this study is an affiliated teaching hospital of the Urmia University of Medical Sciences in Iran. The authors employed a descriptive study in which 120 patients with hypertension admitted to four outpatient clinics were selected to be participants. The level of adherence to antihypertensive therapeutic regimens was assessed utilizing the Hill-Bone Compliance scale which was filled out through interviews (Roghayeh et al., 2013). The results of the study showed there were significant associations between patient medication adherence and levels of income, the number of pills taken daily, and blood pressure control frequency (Roghayeh et al., 2013). As such, this research important to my current research, in that it shows that adherence to antihypertensive regimens is a key in controlling blood pressure.

Likewise, the research of Al-daken and Eshah (2017), focused on the adherence rate to hypertension therapeutic regimen among Jordanian hypertensive patients. The authors note that adherence remains essential for blood pressure control and numerous factors including perceptions of the disease, patient-physician factors, belief about treatment factors and other factors in the personal dimension, play an important role in adherence (Al-daken & Eshah, 2017). The purpose of the study was to identify the strongest predictors of adherence rate among Jordanian hypertensive patients. A total of 192 participants were selected based on their appointment keeping. The authors utilized the Hill-Bone Compliance to High Blood Pressure Therapy Scale to assess adherence and the Hypertension Knowledge-Level Scale was used to assess knowledge of hypertension (Al-daken & Eshah, 2017). The results of the study showed good adherence 82.8% among the participants. Higher adherence scores were found among several dependent variables including women, those with limited education, unemployed, those with comorbidities, those with a negative history of hypertension and participants who visited regular physician visits. Good adherence to hypertension therapeutic regimen was predicted by greater knowledge regarding hypertension and regular physician visits (Al-daken & Eshah, 2017). As such the authors conclude that adherence to antihypertensive regimens is based on knowledge about hypertension. Regular visits with a physician were also importance for medication adherence (Al-daken & Eshah, 2017). Further research should look at ways to encourage lifestyle modifications (Al-daken & Eshah, 2017). This study brings value to my current research because it shows that knowledge and personal behaviors influence medication adherence.

The research of Sarfo et al. (2018) examined the factors associated with uncontrolled blood pressure among Ghanaians. The authors employed a cross-sectional study which included 2,870 participants with hypertension and with or without diabetes from across 5 hospitals in Ghana. The Hill-Bone compliance 14-item scale was utilized to assess adherence among the participants. The authors used multivariate logistic regression to assess the factors associated with uncontrolled blood pressure. Uncontrolled blood pressure wad defined as 140/90mmHg (Sarfo et al., 2018). The results of the study showed that factors related to blood pressure control among the Ghanaian participants receiving therapy at a tertiary level of care with adjusted OR (95% CI) included: 2.47 (1.57–3.87), longer duration of hypertension diagnosis: 1.01 (1.00– 1.03), poor adherence to therapy: 1.21 (1.09–1.35) for each 5 points higher score on the Hill-Bone scale, reported difficulties in obtaining antihypertensive medications: 1.24 (1.02– 1.49) and number of antihypertensive medications prescribed: 1.32 (1.21–1.44) (Sarfo et al., 2018). The authors concluded that concluded that higher levels uncontrolled blood pressure among Ghanaian patients were associated with accessing healthcare in public institutions (Sarfo et al., 2018).

The research of Abel and Efird (2013), Al-daken and Eshah (2017), Roghayeh et al. (2013), and Sarfo et al. (2018) provides support that the Hill-Bone Compliance Scale can be effectively applied to research to investigate a range of topics related regarding medication adherence in various populations. As such, the Hill-Bone Compliance Scale tool can be utilized to assess the medication adherence among a group of uncontrolled

hypertensive Caribbean patients to investigate the factors and barriers that influence adherence.

Cross-Sectional Studies

My current study will utilize a cross-sectional study design to examine what are the medication beliefs and behaviors among uncontrolled hypertensive Caribbean immigrants living in New York City. A cross-sectional study falls under the umbrella of observational study designs (Setia, 2016). Cross-sectional study designs are used to measure the prevalence of health outcomes or health determinants, separately or currently, at a point in time, or over a short period of time. As such, this information can be utilized to investigate etiology (BMJ, n.d.). Participants in a cross-sectional study are based selected based on an inclusion and exclusion criteria. Cross-sectional studies are most often employed in population-based surveys and to assess the prevalence of diseases in clinical-based populations. There are several advantages and strengths of using a cross-sectional study design. They can be helpful in designing a cohort study once the prevalence is identified; and aid in effectively planning, monitoring, and evaluating public health strategies (Setia, 2016). Unlike experimental designs, when using a cross-sectional design casual inference cannot be made and studies are sometimes prone to bias (Setia, 2016). Numerous researchers have effectively employed a cross-sectional study design to research a variety of health topics, including examining the associations, factors and barriers contributory to hypertension outcomes in various populations. Many of the articles mentioned for this research utilized a cross-sectional study design (Alhewiti,

2014; Fei et al., 2017; Kamran et al., 2014; Lee at al., 2013; Sjölander et al., 2013; Sweileh et al., 2014; Venkatachalam et al., 2015;).

Other examples of cross-sectional studies include the research of Gao et al. (2013), who utilized the cross-sectional questionnaire to assess the prevalence of hypertension among Chinese adults. The authors obtained blood pressure reading and administered a questionnaire to 46929 Chinese adult participants who were enrolled in the China National Diabetes and Metabolic Disorders Study. Using this methodology, the authors were able to estimate the prevalence of hypertension in the Chinese population. The authors found that the prevalence of hypertension was increasing among the young and rural populations. Similarly, a cross-sectional study design was utilized by Nwabuo et al. (2014) who sought to assess what were the factors related to missed appointments among African American with poorly controlled hypertension. Nwabuo and colleagues used a cross-sectional survey which was distributed to 185 African American patients admitted to an urban medical center between 1999 and 2004. The survey included questions regarding non-appointment adherence, medication adherence and substance abuse. The results of their study showed that appointment non-adherence was associated with lack of access to healthcare, knowledge (lack of education and literacy), attitudes and beliefs (perceived side effects).

Summary and Conclusion

The studies presented in this literature review aid in identifying factors that are contributory to poor blood pressure control. These factors range from individual behaviors, health beliefs, cultural beliefs, spiritual beliefs, and complexity of regimen to

name a few. As the literature shows, a person's beliefs about medicines play a key role in blood pressure control, the uptake of medications and adherence to hypertensive medication. Higher concerns or negative beliefs regarding medicines are associated with poor blood pressure control and poor adherence, whereas, positive beliefs and higher medication necessity beliefs are associated with better blood pressure outcomes and medication adherence. The literature review presents previous research that have effectively applied the Beliefs about Medicines Questionnaire and the Hill-Bone Compliance Scale. The Beliefs about Medicine Questionnaire is reliable and valid tool that can be used to assess the complex relationship between medicine beliefs and health outcomes throughout various populations. Likewise, the Hill-Bone Compliance scale has also been utilized to assess medication adherence to medications for numerous chronic conditions around the world. The literature review also informs my current study by revealing the challenges that Caribbean immigrants face in terms of treatment and management of blood pressure. Some of these challenges are related to their health beliefs, cultural beliefs, and health behaviors. Thus, there is a greater need for research that focuses on factors and barriers to hypertension management in this population, as well as encourages further developments in creating culturally appropriate interventions to address these concerns. Chapter 3 will provide an in-depth description of the research design, methodology, instrumentation and operationalization constructs, threats to validity and ethical procedures.

Chapter 3: Research Method

Introduction

There is limited research regarding hypertension in the Black Caribbean immigrant populations living within the United States (Bidulescu et al., 2015). The purpose of study was to examine the associations related to beliefs about medications held among hypertensive patients of Caribbean origin living in New York City as well as examine the associative factors around of medication-taking behaviors that influence medication adherence among hypertensive patients of Caribbean origin living in New York City. This chapter contains a detailed description of the target population, the sampling strategy for recruitment and data collection. This chapter also provides an in-depth look at the instrumentation and operationalization of constructs, threats to validity and ethical procedures related to this study.

Research Design and Rationale

The research design chosen for this study was a quantitative, cross-sectional study design. Cross-sectional designs fall under the aegis of observational study designs (Stat Trek, n.d.) The design focuses on making inferences about the general population based on gender, age, socioeconomic level, and other factors mentioned (Salazar et al., 2015). As such, a survey can be designed to answer demographic and other characteristics associated with your chosen variables (Salazar et al., 2015). Cross-sectional study designs are advantageous for several reasons. One, there are relatively inexpensive and easy to implement; two, they are effective; three, participants are more willing to engage in the process; and four, they have the ability to devise hypotheses concerning causal and

prevention factors (Salazar et al., 2015). Two cross-sectional questionnaires were used for this study and the questionnaires were self-reported. The first was the Beliefs about Medicine questionnaire. This survey was used to examine the associations of belief about medication held among hypertensive patient of Caribbean origin living in New York City. The second survey used was the 14-item Hill- that influences medication taking and adherence.

The quantitative research design was appropriate for testing the associations between an independent and dependent variable. The independent variable for the study was hypertension – controlled versus uncontrolled. The dependent variables for this study were the patient beliefs and medication adherence to hypertension therapy based on two survey instruments. Covariates in this study included age, gender, educational level, and employment status.

Methodology

The setting for this study was an adult primary care clinic located in Brooklyn, New York, in the East Flatbush community which includes a large population of Caribbean immigrants.

Population

The target population chosen for this research were Caribbean immigrants living within New York City who were 18 years and older. In 2015, there were more than 4.5 million immigrants living with New York City (American Immigration Council, 2015). Statistics from 2013 to2017 show that 26% of Caribbean immigrants live in New York. The largest group of 291,000 live in Kings County where this study was based.

Sampling and Sampling Procedures

The study used convenience sampling. Convenience sampling is one the most used nonprobability sampling mechanisms and is advantageous because it includes participants that are easily accessible (Stat Trek, n.d.). The target population must meet the inclusive criteria based on easy accessibility, geographic proximity, availability and willing to participate in the study. Additionally, convenience sampling is relatively affordable (Etikan et al., 2016). This sampling strategy was chosen due to the likelihood and easy of sampling hypertension patients in a clinical setting.

The sample included patients who were of Caribbean origin. Only patients with a primary diagnosis of hypertension were included in the study. Hypertension is defined by the AHA (2019) as having a systolic blood pressure reading of 140mmHg and diastolic blood pressure reading of 90mmhg. Only patients 18 years and older in the adult primary care setting were included in the sample. The sample contained patients who were engaged in primary care; where engaged is defined as having a recent visit within the last 12 months. Participants who met these criteria upon arrival for their routine medical exam or blood pressure check visit were given the Beliefs about Medicine Questionnaire and the 14-item Hill-Bone Compliance Scale to complete in the suite or waiting area.

All pregnant patients were excluded from this study. All newly diagnosed patients were excluded from the sample. While other minorities groups could fill out the questionnaires at their leisure, only patients of Caribbean origin were included in the sample. Also excluded from the sample were patients who are mentally ill or cognitively impaired and any patients with literacy challenges.

To determine the appropriate sample size, a power analysis was performed. I calculated the sample size using the G*Power calculator, version 3.1.9.2: The sample sized needed for this study is a minimum of 84 participants. The following criteria were defined: Test – Correlation: Bivariate normal model, two tails, a power of .80 with an α of 0.05.

Procedures for Recruitment, Participation, and Data Collection

A New York City hospital was the site for recruitment of patients of Caribbean origin with hypertension. All patients of the Adult Primary Care Practice who meet the inclusion criteria could volunteer to take the survey. Participants were asked by a member of the care team (clerk, patient care associate, registered nurse, or provider) to voluntarily fill out the two self-reported survey instruments along with a simple demographic cover in the waiting area before or after their medical visit depending on circumstance of visit. The care team members established whether the participants based on review of their medical record met the inclusion or exclusion criteria. Participants who agree to complete the survey were asked to sign a consent form at that time. After completing the forms, participants returned the surveys to the care team member from whom I collected the surveys for analysis.

Instrumentation and Operationalization of Constructs

The simple demographic questionnaire included four covariate variables: age, gender, education level, employment status and race. Age is a categorical variable was categorized as categorical/ordinal; gender was categorized as male or female; education level was categorized as elementary, less than high school, high school, some college,

AS, BS, Grad; employment status was categorized as employed or unemployed; race was categorized as Afro-Caribbean, Indo-Caribbean, Hispanic, or Other. The simple demographic questionnaire also asked participants to indicate country of origin. Additionally, the hypertension (independent variable) is categorized as controlled or uncontrolled.

Table 1

Operationalization of Variables

Variable	Description	Data Category	Measure
Hypertension	Diagnosis	Binary	0 = Uncontrolled 1 = Controlled
Covariates	Age	Ordinal	1 = 18-24 2 = 25-34 3 = 35-44 4 = 45-54 5 = 55-64 6 = 65 or older
	Gender	Categorical/Nominal	0 = Male 1 = Female
	Education	Ordinal	1 = Less than HS 2 = High School 3 = Some College 4 = AS 5 = BS 6 = Grad
	Employment Status	Categorical/Nominal	0 = Unemployed 1 = Employed
	Race	Categorical/Nominal	1 = Afro-Caribbean 2 = Indo-Caribbean 3 = Hispanic 4 = Other Caribbean
Belief about Medicines	BMQ	Likert Scale	1 = strongly disagree

			2 = Disagree 3 = Uncertain 4 = Agree 5 = Strongly agree
Adherence to Hypertension Therapy	Hill-Bone Compliance Scale	Likert Scale	1 = None of the Time 2 = Some of the Time 3 = Most of the Time 4 = All of the Time

Beliefs about Medicine Questionnaire (BMQ) – (Dependent Variable)

The Beliefs about Medicine Questionnaire (BMQ) was used to measure the patients' beliefs regarding medicines. Permission to use the BMQ was provided by its author (see Appendix A). The BMQ scales consist of two subscales, the specific necessity and specific-concern scale and the general-overuse scale. The specific-necessity and specific-concern scales addresses persons' personal beliefs regarding the need for medications prescribed for their illness and their concerns regarding potential adverse events from taking the medications. Both specific-necessity and specific-concern are five questions each measured on a five-point Likert scale. Scoring ranges from five to 25. Higher scores specific-necessity scores indicate stronger perceptions regarding the need for medications for good health, while higher specific-concern scores indicate poor

perceptions regarding adverse effects medications (Horn et al., 2009; Sweileh et al., 2014).

The general section scale is broken into two subscales which addresses the general beliefs held by a person regarding their medications. The general-overuse scale focuses on a personal belief regarding the way medications are used by doctors and the general-harm scales address the beliefs held by a person regarding the perceived harm of medications. Both subscales are measured on a five-point Likert scale with response statements include strongly disagree, disagree, uncertain, agree and strongly agree. Scoring ranges from one to five: strongly disagree – 1 to strongly agree-5. Scores are summed to give belief score. Higher score represents stronger negative personal views regarding the general over-use and perceive harm of medicines. The BMQ has been tested in various patient populations and has its validity and reliability measure of medication beliefs (Horne et al., 1999, 2013).

Hill-Bone Compliance Scale (Dependent Variable)

The Hill-Bone Compliance Scale was developed as an instrument to assess high blood pressure therapy by Kim et al. (2000). Permission to use the Hill-Bone Compliance Scale was provided by the authors (see Appendix B). The scale is a 14-item questionnaire with three subscales which assesses patient behaviors in three areas of high blood pressure treatment. This includes reduced sodium intake, appointment keeping, and medication taking. Each item is measures on a four-point Likert type scale (Kim et al., 2000). The Hill-Bone Compliance Scales has been found to be a valid and reliable scale for evaluating hypertension in adults. The scale was evaluated in two community-based

samples of adult patients with hypertension. The scale has a standardized alpha 0.74 and 0.84 (Kim et al., 2000).

Data Analysis Plan

RQ1: Is there a significant difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the Beliefs about Medicine Questionnaire.

$H_0$1: There are no significant difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the Beliefs about Medicine Questionnaire.

$H_1$1: There is a significant difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the Beliefs about Medicine Questionnaire.

RQ2: Is there a significant difference in adherence to hypertensive medications between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the on 14-Item Hill Bone Compliance Scale.

$H_0$2: There is no significant difference in adherence to hypertensive medications between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the on 14-Item Hill Bone Compliance Scale.

$H_1$2: There is a significant difference in adherence to hypertensive medications between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the on 14-Item Hill Bone Compliance Scale.

RQ3: Is there a significant difference in adherence to hypertensive medications based on beliefs about medicines among hypertensive Caribbean immigrants.

$H_0$3: There is no significant difference in adherence to hypertensive medications based on beliefs about medicines among hypertensive Caribbean immigrants.

$H_1$3: There is a significant difference in adherence to hypertensive medications based on beliefs about medicines among hypertensive Caribbean immigrants.

The covariates for each research question were age, gender, educational level, and employment status.

All statistical analyses were performed using SPSS version 24 and performed two tails, at a power of .80 with α of 0.05. Descriptive statistics were provided for the demographic variables and summarized using numbers, frequencies, and percentages for the categorical variables. The associations between the demographic variables and the BMQ were examined using Pearson Chi-square test. The associations between the demographic variables and the Hill-Bone Scale were examined using Pearson Chi-square test. The associations between the BMQ subscale items and Hill-bone adherence were examined utilizing Mann-Whitney U-test. A p value of $\leq .05$ was used to determine significance. If the value is less than .05, then the null hypothesis can be rejected. Regression analysis was performed to measure the association between beliefs about medicine and medication adherence. Results analyzed ass 95% confidence with a significance level <0.05.

Threats to Validity

An important part of being a researcher is to be able to perform high quality research. Researchers assess quality of a research by meticulousness examining the validity in the findings. Researchers must consider the problem being studied, and not be influenced by coincidental relationships, researcher bias or limitations within the study design (Burkholder et al., 2016). In quantitative research, it is important to reflect on the threats to internal and external validity. As posited by Burkholder et al. (2016), any proposal or suggestions regarding causal inference, there could be competing explanations that be threats to validity. Internal validity is important because helps to determine cause and effect relationships. Threats to internal validity convey our confidence in saying that a relationship exists between the independent and dependent variables. In contrast, external validity is important because it helps generalize to and across individuals, settings, and times (Michael, n.d.). In social science research, researchers must be aware of what is proper and improper when conducting scientific research (Babbie, 2017).

Ethical Procedures

Ethical issues can arise when performing social research. Participants must be informed of their rights in a potential study. They must also know that their information will be kept safe and confidential. As such, researchers must take the necessary precautions to protect the rights and privacy of participants' data. This includes confidentially storing or disposing data sheets or records, limiting access data to confidential data, and locking up participants' data in a cabinet/storing in a database.

Additionally, it is sometimes appropriate to remove any identifying features from the data. This is done through coding and anonymizing (National Institutes of Health, n.d). Additionally, a potential ethical issue in quantitative research relates to analysis and reporting. Researchers have an ethical obligation to report the truthful findings and the analytic ways these results were obtained. Negative findings if related to the analysis, the study's limitations and failures should be reported. Many findings are unexpectedly discovered; therefore, researchers must be honest when describing their findings, and avoid the desire to state the findings as a "preplanned analytic strategy" (Babbie, 2017, p. 72).

Summary

This chapter provides an in-depth discussion of the methodology and the rationale for a quantitative design. The research design chosen for this study was a cross-sectional study design which is advantageous for exploring the associations between patient beliefs about medicine, their medication taking behaviors as it related to hypertension control among Caribbean immigrants living in New York City. The study took place in an adult primary care practice in New York City Kings County. Participants voluntarily completed the BMQ and Hill-Bone Compliance surveys. Inferential statistics was performed to analyze the data collected. Chapter 4 provides the results of the analysis.

Chapter 4: Results

In this chapter, I present the results of the cross-sectional study design. The purpose of this quantitative cross-sectional study was to identify the beliefs about medications held among hypertensive Caribbean immigrants living in New York City using the BMQ to identify what factors/barriers were related to these specific medication beliefs and to determine whether these medication beliefs influence adherence. In addition, using the 14-Hill-Bone Compliance Scale, the medication-taking behaviors among hypertensive Caribbean immigrant living in New York City was measured. I will describe the process for recruitment, data collection, data analysis, and results of this study.

Data Collection

A total of 100 participants for the adult primary care practice in New York City were recruited to take a part in a self-reported survey regarding their medication beliefs and medication behaviors. Consent was received and participants were given an information sheet regarding the purpose of the study. Due to Covid-19 restrictions, recruitment was delayed in light of patient care being performed via telehealth. As restrictions loosened, surveys were collected over a period of 2 months. Surveys were administered to participants who met the inclusion criteria in the waiting room for the practice. Data collection was approved by the Walden IRB and other external entities (see Appendices). The IRB approval number for this study is 03-06-20-0276572.

Two surveys (BMQ-General/BMQ-Specific, 14 Item Hill-Bone Compliance Scale) were administered to the participants over a period of 2 month. All participants

had a diagnosis of hypertension of which 62 (62%) were controlled and 38 (38%) were uncontrolled. A sample included 69 females and 31 males. The largest observed age group was participants over the age of 65 (43%). Frequencies for educational level showed that most of the participants had a high school/GED equivalent, 46 (46%) or less than high school 30 (30%) and employment status frequencies showed that 52% of the participants were currently unemployed. The frequencies of the demographic variables are reported in Table 2.

Table 2

Table Nominal and Ordinal Variables

Variable	*N*	%
Age		
18-24	1	1%
25-34	2	2%
35-44	2	2%
45-54	15	15%
55-64	37	37%
>65	43	43%
Gender		
Male	31	31%
Female	69	69%
Education Level		
Less than HS	30	30%
HS/GED	46	46%
Some College	9	9%
Associate	7	7%
Bachelors	5	5%
Graduate	2	2%
Missing	1	1%
Employment Status		
Unemployed	52	52%
Employed	47	47%
Missing	1	1%

Results

The following research questions and hypotheses guided the study:

RQ1: Is there a significant difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the Beliefs about Medicine Questionnaire.

$H_0$1: There is no significant difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the Beliefs about Medicine Questionnaire.

$H_1$1: There is a significant difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the Beliefs about Medicine Questionnaire.

RQ2: Is there a significant difference in adherence to hypertensive medications between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the on 14-Item Hill Bone Compliance Scale.

$H_0$2: There is no significant difference in adherence to hypertensive medications between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the on 14-Item Hill Bone Compliance Scale.

$H_1$2: There is a significant difference in adherence to hypertensive medications between controlled and uncontrolled hypertensive Caribbean immigrants as measured by the on 14-Item Hill Bone Compliance Scale.

RQ3: Is there a significant difference in adherence to hypertensive medications based on beliefs about medicines among hypertensive Caribbean immigrants.

$H_0$3: There is no significant difference in adherence to hypertensive medications based on beliefs about medicines among hypertensive Caribbean immigrants.

$H_1$3: There is a significant difference in adherence to hypertensive medications based on beliefs about medicines among hypertensive Caribbean immigrants.

The covariates for each research question are age, gender, educational level, and employment status.

Testing the Statistical Assumptions

I used the Pearson's chi-square test to test the associations/relationships between two categorical variables. The first assumption of the test states that the two variables must be ordinal or nominal, and the second assumptions states that the two variables must consist of two or more categories (Laerd Statistics, 2020). All variables (dependent, independent, and covariates) used in the analysis met these assumptions.

The Mann-U Whitney test was used to compare differences between two independent groups when the independent variable is either ordinal or continuous and the dependent variables consist of two categorical independent groups. For this study, the independent variables were ordinal (BMQ-General and BMQ-Specific five-point Likert scale "strongly agree" through to "strongly disagree"; Hill-Bone four-point Likert scale “1=None of Time, 2=Some of Time, 3=Most of the Time, 4=All of the Time). The dependent variable for the study was categorical: controlled and uncontrolled. The covariates employment gender and employment status were also categorical. The variables did not fail the assumptions of the test and therefore the Wilcoxon signed-rank

test did not need to be used. I used logistic regression to test the assumptions between the dependent variable and the mean scores of the BMQ subscales.

To test the assumptions of normality, the Shapiro-Wilk test and normal P-P Plots were performed for the Beliefs about Medicines subscales and are listed in Figures 1 through 4. Looking at Table 3., the necessity, harm, and overuse subscales are not normally distributed. The concern subscale is the normally distributed (Table 3).

Table 3

Tests for Normality for the Beliefs about Medicines Subscales

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	Sig.	Statistic	*df*	Sig.
Nec_p	0.109	96	0.007	0.972	96	0.037
Con_p	0.081	96	0.133	0.990	96	0.653
Harm_p	0.120	96	0.002	0.967	96	0.016
Over_p	0.112	96	0.005	0.964	96	0.010

Note. Lilliefors Significance Correction

Figure 1

Normal P-P Plot of BMQ Subscale - Necessity

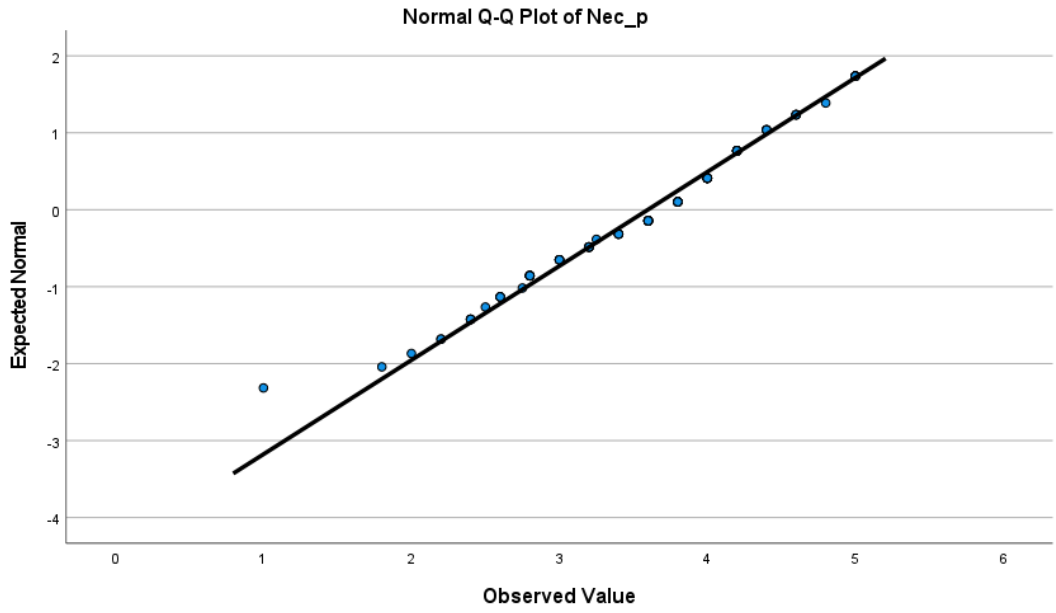


Figure 2

Normal P-P Plot of BMQ Subscale - Concern

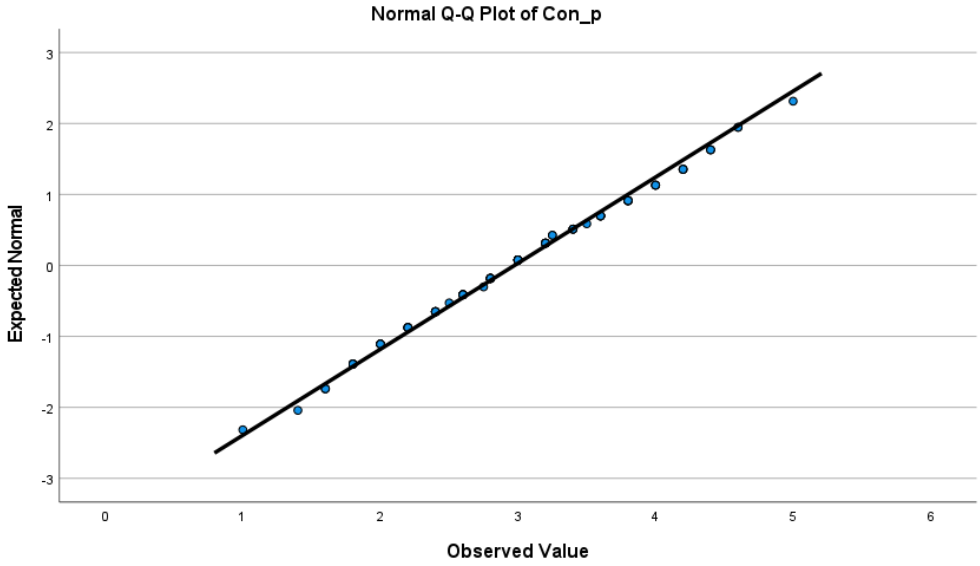


Figure 3

Normal P-P Plot of BMQ Subscale - Harm

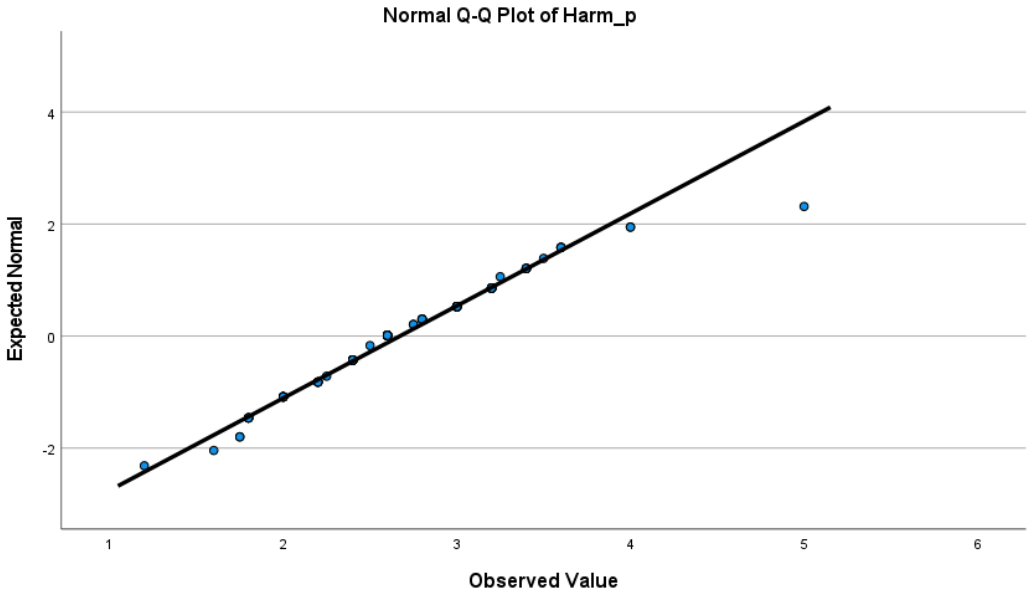
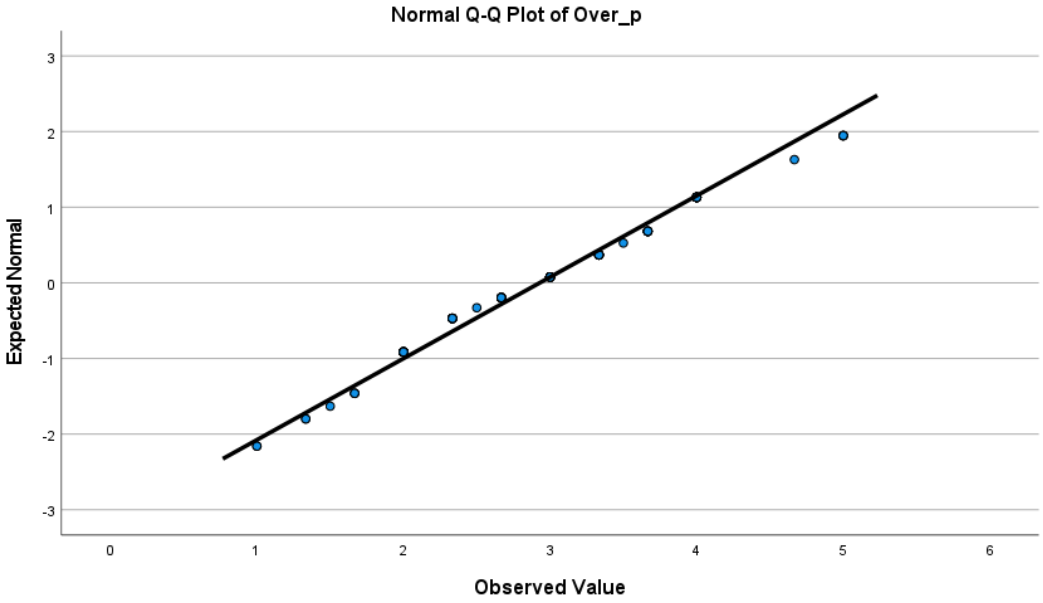


Figure 4

Normal P-P Plot of BMQ Subscale - Harm



Using the BMQ prorating definition in which at least 60% of participants responded to the questionnaire, the mean values were computed for the BMQ subscales, higher scores indicating stronger beliefs regarding medicines. The mean score of the necessity scales was 3.62 ± 0.815 which was greater than the mean score of the concern scale 2.97 ± 0.827. Sixty-one percent of participants responded that beliefs about the necessity of the medications were greater than their concern regarding their medication. Additionally, respondents have lesser concerns about the harm and overuse of medications; the means scores were 2.67 ± 0.607 and 2.91 ± 0.948 respectively (Table 4). The frequency distribution of the BMQ subscale scores of respondents with hypertension are displayed in Table 4.

The results of the Pearson Chi-Square did not find a significant relationship between the BMQ subscales and hypertension control. The covariates age and education level were transformed into dichotomous variables to avoid small cell frequency. The Pearson Chi-square did not find any significant relationships between blood pressure control and the covariates (age, gender, and employment status). Based on the finding, the null hypothesis was retained for these covariates. There was, however, a statistically significant relationship between educational level and blood pressure control. The crosstabulations and Chi-square results are displayed in Tables 5- 8.

Logistic regression was performed to ascertain whether predictions regarding Beliefs based on hypertension control could be made. The results of logistic regression did not find any significant outcomes. As such, the null hypothesis cannot be rejected

stating that there is no difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean immigrants (Table 12).

Table 4

Frequency Distribution for Beliefs about Medicines Questionnaire Scores

BMQ Subscales	*N*	*M*	*SD*	*% Agree/Strongly Agree*
Necessity Scale	95	3.62	0.815	61
Concern Scale	92	2.97	0.827	28
Harm Scale	88	2.67	0.607	8
Overuse Scale	95	2.91	0.948	30

Note. N values indicate the number of respondents answering each question.

Table 5

Crosstabulation of Blood Pressure Control by Age

		Age_Group					
		18-54		>55		Total	
		n	%	*n*	%	Total	%
Blood Pressure Control	Uncontrolled	8	40.0%	29	36.3%	37	37.0%
	Controlled	12	60.0%	51	63.8%	63	63.0%
Total		20	100.0%	80	100.0%	100	100.0%

Note. Fisher Exact Test, p =0.799

Table 6

Crosstabulation of Blood Pressure Control by Gender

		Gender					
		Male		Female		Total	
		N	%	*N*	%	*N*	%
Blood Pressure Control	Uncontrolled	12	38.7%	25	36.2%	37	37.0%
	Controlled	19	61.3%	44	63.8%	63	63.0%
Total		31	100.0%	69	100.0%	100	100.0%

Note. Fisher Exact Test $p = 0.826$

Table 7

Crosstabulation of Blood Pressure Control by Education

		Education Category					
		Less than HS		HS and Above		Total	
		N	%	N	%	N	%
Blood Pressure Control	Uncontrolled	16	53.3%	21	30.4%	37	37.4%
	Controlled	14	46.7%	48	69.6%	62	62.6%
Total		30	100.0%	69	100.0%	99	100.0%

Note. Fisher Exact Test $p = 0.042$

Table 8

Crosstabulation of Blood Pressure Control by Employment Status

			Employment Status		
			Unemployed	Employed	Total
Blood	Uncontrolled	n	24	13	37
Pressure		%	46.2%	27.7%	37.4%
Control	Controlled	n	28	34	62
		%	53.8%	72.3%	62.6%
Total		n	52	47	99
		%	100.0%	100.0%	100.0%

Note. Fisher Exact Test $p = 0.065$

Table 9

Logistic Regression of Blood Pressure Control and Beliefs about Medicine Subscales

Variables in the Equation								
							95% C.I.for EXP(B)	
	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
Nec_p	-0.193	0.319	0.366	1	0.545	0.825	0.441	1.540
Con_p	-0.396	0.313	1.599	1	0.206	0.673	0.364	1.243
Harm_p	-0.515	0.487	1.121	1	0.290	0.597	0.230	1.551
Over_p	0.107	0.333	0.104	1	0.747	1.113	0.580	2.138

Constant	3.470	1.784	3.781	1	0.052	32.127

Note. Variable(s) entered on step 1: Nec_p, Con_p, Harm_p, Over_p.

The mean scores of the Hill-Bone Compliance scale are found in Table 10 and the frequency distribution of participant scores is found in Table 11. The total mean score for HBC scale was 1.50 ± 0.259. Patient responses to the sodium intake subscale (range 3 - 12) which contained 3 questions had an average score of 1.62 ± 0.383. The appointment keeping subscale (ranged 3- 12) included 3 questions, had an average patient score response of 1.84 ± 0.477. The medication taking subscale included 8 questions with a possible range of scores from 8 to 64. The mean patient score response for this subscale was 1.34 ± 0.326 (Table 10).

Table 10

Mean Scores of Hill-Bone Compliance Subscales

Variable	*N*	*M*	*SD*
Total HBC-14 Items	86	1.50	0.259
Sodium Intake	95	1.62	0.383
Appointment Keeping	91	1.84	0.477
Medication Taking	97	1.34	0.326

Note. N - mean score calculated if respondent answered all questions in subscale

Pearson Chi-Square was utilized to test associations between covariates and 14-Item Hill Bone Compliance Scale (Table 11). Thus, the null hypothesis cannot be rejected. For the associations of the covariates with the 14-Item Hill Bone Compliance Scale, gender was associated with 3 items from the scale Item 11 - "How often do you miss taking your high blood pressure pills when you feel better?" Item12 "How often do you miss taking your high blood pressure pills when you feel sick?"; Item 14 "How often do you miss taking your high blood pressure pills when you are careless?", p <.05. Age was also associated with 3 items from the 14-Item Hill Bone Compliance Scale, Item 1 "How often do you forget to take your high blood pressure medicine?" Item 3 "How often do you eat salty food?" and Item 5 "How often do you eat fast food?", p <.05. Education was also associated with 2 items from the 14-Item Hill Bone Compliance Scale, Item 5 "How often do you eat fast food?" and Item 9 "How often do you run out of high blood pressure pills?", p <.05. Based on the results, the null is rejected for these specific items. There was not a statistically significant association between employment status and 14-Item Hill Bone Compliance Scale. Results of the Pearson's Chi-Square are presented in Table 11.

Table 11

Bivariate analysis of characteristics of respondents and adherence with 14-Item Hill-Bone Compliance Scale

	None of the time (%)	Sometimes, Most of the time, All the time (%)	Gender	Age	Education	Employment
			n=100	n=100	n=99	n=99
1. How often do you forget to take your high blood pressure medicine?	43	57	0.259	0.042*	0.125	0.268
2. How often do you decide NOT to take your high blood pressure medicine?	69	31	0.120	0.558	0.307	0.352
3. How often do you eat salty food?	23	77	0.691	0.041*	0.612	0.163
4. How often do you shake salt on your food before you eat it?	80	20	0.360	0.847	0.623	0.180
5. How often do you eat fast food?	29	71	0.992	0.000*	0.003*	0.181
6. How often do you make the next appointment before	13	87	0.371	0.675	0.467	0.703

you leave the doctor's office?						
7. How often do you miss scheduled appointments?	56	44	0.723	0.717	0.968	0.802
8. How often do you forget to get prescriptions filled?	78	22	0.331	0.562	0.885	0.371
9. How often do you run out of high blood pressure pills?	66	34	0.723	0.682	0.015*	0.105
10. How often do you skip your high blood pressure medicine before you go to the doctor?	62	38	0.314	0.66	0.919	0.901
11. How often do you miss taking your high blood pressure pills when you feel better?	63	37	0.005*	0.849	0.989	0.293
12. How often do you miss taking your high blood pressure pills when you feel sick?	73	27	0.039*	0.804	0.924	0.291
13. How often do you take someone else's high blood pressure pills?	98	2	0.338	0.991	0.056	0.133

14. How often do you miss taking your high blood pressure pills when you are careless?	70	30	0.027*	0.572	0.661	0.915

Note. *Significant $p < 0.05$. Pearson chi-squared test

The Mann-U Whitney test was utilized to compare differences between blood pressure control based on the 14-Item Hill Bone Compliance Scale. The results of the analysis were not significant, U=77335, p= .627. As such, the null hypothesis is not rejected. There is no difference in medications adherences as measured by the 14-Item Hill Bone Compliance Scale between controlled and uncontrolled hypertension Caribbean patients.

A multinominal logistic regression was utilized to test to whether there was a relationship between medication adherence – medicating taking subscale of Hill-Bone Compliance Scale with the Beliefs about Medicines Subscales. The model fitting was assessed and showed that the chi-square statistic was 61.416, p<.05; indicating that there was a relationship between the independent and dependent variables in the final model. The Pseudo R square measures were Cox and Snell (.483), Nagelkerke (.492) and McFadden (.162). The model accounts for 16% to 49% of the variance. The Likelihood Ratio test showed that the predictor variables of Beliefs about Medicines Subscales - concern and overuse were found to be significant contributors to the model, p<.05). Lower mean scores of the subscale medication taking behaviors indicate higher medication adherence – in which participants agreed to missing blood pressure

medications none of the time. For the medication taking score of 1.25 when compared to the medication taking score of 1, only overuse was a significant predictor (B =. -2.054, S.E = 0.128, p <.05). The estimated odds ratio favors a decrease of nearly 87%, [Exp (B) = [.128], 95% CI (0.024, 0.681) for every one unit increase in overuse. For the medication taking score of 1.38 when compared to the medication taking score of 1, beliefs of necessity and concern were significant predictors (necessity B=. 1.184, S.E = 0.599, p <.05; concern B= -1.504, S.E = 0.620, p <.05). The estimated odds ratio favored an increase of nearly 3%, [Exp (B) = 3.269], 95% CI (1.011, 10.567) for every one unit increase in necessity; whereas, the estimated odds ratio favored a decrease of nearly 77%, [Exp (B) = .222], 95% CI (.066, .749) for every one unit increase in concern. The multinomial logistic Regression Analysis is displayed in Table 12. Based on the results, the null hypothesis is not retained.

Table 12

Multinomial Logistic Regression of Medication Adherence Subscale and Beliefs about Medicines Subscales

Parameter Estimates

								95% Confidence Interval for Exp(B)	
MedTaking_m[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
1.13	Intercept	-0.228	2.765	0.007	1	0.934			

	Nec_p	-0.212	0.523	0.164	1	0.685	0.809	0.290	2.255
	Con_p	-0.024	0.562	0.002	1	0.965	0.976	0.324	2.938
	Harm_p	0.287	0.833	0.119	1	0.730	1.333	0.260	6.819
	Over_p	-0.098	0.545	0.033	1	0.857	0.906	0.312	2.636
1.25	Intercept	-4.138	3.786	1.194	1	0.274			
	Nec_p	0.161	0.699	0.053	1	0.818	1.174	0.298	4.622
	Con_p	1.313	0.700	3.524	1	0.060	3.718	0.944	14.649
	Harm_p	1.402	1.072	1.710	1	0.191	4.062	0.497	33.196
	Over_p	-2.054	0.852	5.812	1	0.016*	0.128	0.024	0.681
1.38	Intercept	-4.284	3.243	1.745	1	0.186			
	Nec_p	1.184	0.599	3.914	1	0.048*	3.269	1.011	10.567
	Con_p	-1.504	0.620	5.892	1	0.015*	0.222	0.066	0.749
	Harm_p	0.097	0.877	0.012	1	0.912	1.102	0.197	6.153
	Over_p	1.142	0.615	3.452	1	0.063	3.132	0.939	10.446
1.50	Intercept	-6.508	3.491	3.475	1	0.062			
	Nec_p	-0.057	0.608	0.009	1	0.925	0.945	0.287	3.113
	Con_p	0.908	0.677	1.800	1	0.180	2.479	0.658	9.334
	Harm_p	1.423	0.986	2.081	1	0.149	4.148	0.600	28.664
	Over_p	-0.363	0.676	0.289	1	0.591	0.695	0.185	2.618
1.63	Intercept	-5.690	5.845	0.948	1	0.330			
	Nec_p	-0.365	0.957	0.145	1	0.703	0.694	0.106	4.528
	Con_p	0.807	1.016	0.630	1	0.427	2.241	0.306	16.427
	Harm_p	0.242	1.487	0.026	1	0.871	1.274	0.069	23.472
	Over_p	0.503	0.979	0.264	1	0.607	1.654	0.243	11.266
1.75	Intercept	-3.504	3.456	1.028	1	0.311			
	Nec_p	-0.366	0.631	0.337	1	0.562	0.693	0.201	2.389
	Con_p	0.268	0.659	0.165	1	0.684	1.307	0.359	4.755
	Harm_p	1.105	1.017	1.181	1	0.277	3.019	0.412	22.154
	Over_p	-0.059	0.657	0.008	1	0.929	0.943	0.260	3.419

1.88	Intercept	-13.628	4.780	8.129	1	0.004			
	Nec_p	1.770	0.926	3.658	1	0.056	5.874	0.957	36.048
	Con_p	-1.261	0.877	2.066	1	0.151	0.283	0.051	1.582
	Harm_p	2.383	1.236	3.719	1	0.054	10.837	0.962	122.104
	Over_p	0.834	0.966	0.746	1	0.388	2.303	0.347	15.280
2.00	Intercept	-3.155	9.288	0.115	1	0.734			
	Nec_p	0.326	1.720	0.036	1	0.850	1.385	0.048	40.336
	Con_p	0.861	1.530	0.317	1	0.574	2.366	0.118	47.465
	Harm_p	0.824	2.439	0.114	1	0.736	2.279	0.019	271.773
	Over_p	-2.484	2.408	1.064	1	0.302	0.083	0.001	9.350
2.25	Intercept	-0.025	6.447	0.000	1	0.997			
	Nec_p	1.717	1.271	1.826	1	0.177	5.570	0.461	67.267
	Con_p	-2.941	1.497	3.859	1	0.049*	0.053	0.003	0.993
	Harm_p	-3.369	2.114	2.541	1	0.111	0.034	0.001	2.168
	Over_p	2.367	1.488	2.531	1	0.112	10.668	0.578	197.036

Note. The reference category is: 1.00. * Significant p values

Summary

This study aimed to investigate the beliefs about medicines and medication adherence among hypertensive Caribbean immigrants. The results of analysis showed that while mean scores for BMQ subscales were higher among the controlled respondents, these differences were not great enough to be significantly different from the uncontrolled respondents. As such, there was no difference in beliefs about medicines between controlled and uncontrolled hypertensive Caribbean patients. There were differences found in HBC adherence scale based on the demographic variables. These differences could be defined by age, gender, and education, $p < .05$. Overall evaluation for

differences in adherence to hypertensive medications between controlled and uncontrolled hypertensive patients did not yielded significant results. However, the results of the analysis revealed significant associations of adherence to hypertensive medications based on beliefs about medicines among hypertensive Caribbean immigrants. As such for this study, we can make predictions regarding medication adherence based on beliefs about medicines.

Chapter 5 will discuss the key findings of the study, as well as look at the limitations within the scope of the study. I will also discuss the implications for social change as it relates to hypertension management in a Caribbean Immigrant population. Finally, I will provide implications and recommendations for further study in a hypertensive immigrant population.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

Nearly half of all Americans have hypertension (CDC, 2019). In particular, Blacks/African Americans have higher disproportionate rates of hypertension when compared to other ethnicities (CDC, 2019). Additionally, there have been limited studies to assess the burden of hypertension in Caribbean immigrant population, as well as to the address the barriers to medication adherence and blood pressure control (Bishop et al., 2015). Research has shown that beliefs about medicine and specific medication taking behaviors can influence hypertension control. Thus, identifying how these beliefs and behaviors may be contributory to uncontrolled/ blood pressure is necessary for improving blood pressure outcomes. As such, the purpose of this quantitative cross-sectional study was to identify the beliefs about medications held among hypertensive Caribbean immigrants living in New York City and which factors/barriers were related to these specific medication beliefs and determine whether these medication beliefs influenced adherence.

I used two widely used surveys, BMQ and the Hill-Bone Compliance Scale in this study. While the study results did not confirm associations between beliefs and blood pressure control, relationships between medication taking behaviors and medication adherence were affirmed.

Interpretation of the Findings

There are previous studies which described how belief and medicines and medication taking behaviors can influence hypertension control (e.g., Atinga et al., 2018;

Solomon et al., 2015). Across various populations, previous studies have indicated there is a relationship between hypertension control and beliefs about medicines. The higher concern or negative beliefs about medicines were associated with poor blood pressure control; and positive beliefs about medicines were associated with optimal blood pressure control (Sjölander et al., 2013, Sweileh et al., 2014). My study showed that participants higher mean scores on the necessity scale, indicating positive beliefs regarding the need for their medications. Respondents had lesser concerns regarding the harm and overuse of medication thus showing positive beliefs in general regarding their medications. However, there were no statistically significant associations between high blood pressure control and patients' beliefs. As such, the results of this study did not confirm that beliefs played a significant role in blood pressure control among this sample of Caribbean immigrants.

I also explored the beliefs about medicine among hypertensive Caribbean immigrants, particularly to identify whether beliefs about medicine played a role in hypertension control. Although, previous research of Rajpura and Nayak (2014) concluded that beliefs about medicines play a critical role in medication adherence, key findings from my study did not find any relationships between patients' medicine beliefs and medication adherence for this sample of Caribbean immigrants.

Medication taking behaviors have been shown to be predictors of medication adherence (Solomon et al., 2015). The Hill-Bone compliance scale has been used by various investigators to assess people medication taking behaviors and blood pressure compliance. Previous works from authors such as Kim et al. (2000) and Lambert et al.

(2007) have found that medication taking, appointment keeping, and salt intake were crucial behavioral aspects to blood pressure control. This study also found associations regarding medication taking behaviors and salt intake as it relates to blood pressure control. Associations were found on forgetting to take medications and salt intake based on age. Like the research of Al-daken and Eshah (2017), which found associations in adherence rates based on factors such as gender and employment, my study affirmed associations on items of medication taking behaviors and salt intake with blood pressure based not only by gender, but also by age and education status. The findings from this study also affirmed the HBM in that current health behaviors can influence a person's health outcomes.

Limitations of the Study

The study was specifically limited to Caribbean immigrants living in New York City. It does not make any considerations for other migrant populations living within the city or within the United States and cannot be generalized to other populations. Due to the Covid pandemic, there was a missed opportunity to sample a large selection of Caribbean immigrants since there were limited in person interactions in the primary care practice. Another limitation of the study was the truthfulness and remembrance of the participants to the self-reported surveys to ascertain their beliefs about medications and their medication taking behaviors. Social desirability bias may have played in role in the participants responses regarding their concerns about medication and to their beliefs regarding the harm of medications. Additionally, participants recall regarding medication taking behavior may have been skewed.

Recommendations

While there is a plethora of research devoted to hypertension control in various populations, there is still limited work which focuses in Caribbean immigrant populations (Bidulescu et al., 2015). Particularly, beliefs about medicines and medication taking behaviors among Caribbean immigrants living within the United States have been under studied. Studies such as Rajpura and Nayak (2014) and Atinga et al. (2018) have shown that beliefs about medication play a pivotal role in hypertension control and medication adherence. Despite the work of authors such as Al-daken and Eshah, 2017, who have shown that medication taking behaviors are pertinent to medication adherence, healthcare systems are still troubled by low adherence rates which in turn leads to poor blood pressure control. As such, I would recommend that this research be replicated among of Caribbean Immigrant living not only with New York City but throughout the United States. Additionally, there is also the need to understand how the impact of social and economic factors such as lack of insurance and non-legal immigrant status can affect hypertension control. I would also recommend that these factors be explored among other Caribbean immigrants living within the United States.

Implications for Social Change

Although this current study did not affirm associations within the Caribbean immigrants' population based on their beliefs about medicine, associations can be made regarding their medication taking behaviors. As such, there is opportunity to promote social change via exploring the factors and barriers which influence poor medication adherence. Designing tailored interventions may prove to be beneficial in reducing the

barriers that influence medication taking behaviors. On a large scale, inequities in healthcare delivery must be addressed. Social determinants of health such as access to healthcare services, access to resources to support proper nutrition and socioeconomic conditions to due immigrant status must also addressed. These services tailored within this population can help to reduce the overall burden of hypertension with the Caribbean immigrant population.

Conclusion

The purpose of the quantitative cross-sectional study was to measure the beliefs about medicine and medication taking behaviors held among Caribbean Immigrants living in New York City. The Afro-Caribbean immigrants living with in the United States have been under studied and underrepresented in studies. While the findings of the study did not support differences in beliefs among controlled and uncontrolled hypertensive participants, associations in medication taking behaviors were found among the demographic variables based on age, gender, education, and employment status. As such, there are implications for further research in the Caribbean immigrant population which focus on socioeconomic factors and their influences in hypertension outcomes. Additionally, because most often Caribbean immigrants are often grouped into research based on race/ethnicity, it is also important that researchers look at this population separately to find differences in health status. This study brings awareness and helps to bridge the gap of knowledge in research regarding hypertension control in the Caribbean immigrant population. Future research should continue to explore avenues that can assess

the factors/barriers that can hinder this priority population from reaching optimal health statuses.

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Appendix A: Permission for Beliefs about Medicines Questionnaire

From: Sowemimo, Tami <t.sowemimo@ucl.ac.uk>
Sent: Friday, December 18, 2020 12:57 PM
To: Nadia Williams <nadia.williams2@waldenu.edu>; Diana D. Naser <diana.naser@mail.waldenu.edu>
Cc: Horne, Robert <r.horne@ucl.ac.uk>; Clarke, Amy Louise <amy.clarke@ucl.ac.uk>
Subject: RE: BMQ Conditions for Usage

Dear Nadia,

Thank you for returning the completed form.

Please find a copy of the BMQ attached, together with the scoring guide.

Best wishes,
Tami

Tami Sowemimo
Research Assistant
UCL School of Pharmacy
Department of Practice and Policy | Centre for Behavioural Medicine
BMA House, Tavistock Square
London, WC1H 9JP
Email: t.sowemimo@ucl.ac.uk

Please note that my usual working hours are between 09:30 and 17:30 on Tuesday and Friday.

Appendix B: Permission for Hill-Bone Scale

Re: Permission to use the Hill-Bone Scale

From: SON-HillBone <SON-HillBone@jhu.edu>
Sent: Tuesday, February 5, 2019 3:02 PM
To: Nadia Williams
Cc: SON-HillBone
Subject: Permission to use the Hill-Bone Scale

Dear Nadia,

Thank you for your interest in using the Hill-Bone Scale.

Please consider this email as permission to use the Hill-Bone Scale.

We have attached the Hill-Bone Compliance Scale along with several relevant articles reporting on the validation and use of the scale. Please cite the scale using the references provided. We would appreciate you sharing the findings of your research with us.

We wish you the very best in your project and please don't hesitate to reach out to us if you have any follow-up questions.

Best,
The Hill-Bone Scales Team

* Note: Please do not share these documents with anyone else outside your project. We ask that anyone who wishes to use the scale should submit a formal request using the link provided for proper authorization