HYPERTENSION SELF-MANAGEMENT INTERVENTION: TEXT MESSAGES TO IMPROVE BLOOD PRESSURE AND MEDICATION ADHERENCE AMONG AFRICAN AMERICAN OLDER ADULTS

by

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DISSERTATION

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Abstract

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The most widely used form of mobile health technology has been text messaging. Because of the wide use, acceptability, and cost effectiveness of text messaging it may be a useful tool to develop hypertension self-management interventions for African American older adults with hypertension. Despite the wide use of text messaging interventions, no studies were found that include a large sample of African American older adults, with hypertension and the use of text messaging to improve blood pressure control and medication adherence. Therefore, the purpose of this pilot feasibility study was to determine if a text message intervention has an effect on blood pressure and medication adherence among African American older adults 60 years of age and older with hypertension.

Using a pretest-posttest nonequivalent comparison group design 44 participants were recruited from two African American churches in north Texas (n = 21 control group; n = 23 treatment group). Blood pressure and medication adherence scores were collected at baseline and two months post intervention. Systolic and diastolic blood pressure improved from baseline to two months post intervention in both groups (systolic mean 137.09; SD=17.22 at baseline to

mean 132.77; SD= 14.31; diastolic mean 82.68; SD= 9.11 at baseline to 79.27; SD=9.45). Medication adherence also improved overtime for both groups and was found to be statistically significant from baseline to post intervention $F(1, 42) = 15.12$, $p < .001$, $\eta^2 = .265$. Participants indicated that text messages were useful in motivating them to adhere to medication protocols (87%) and that once a week was the preferred timeframe to receive text messages about medication adherence (91.3%). Findings from this study suggest that text messaging interventions may be useful in controlling blood pressure and improving medication adherence among African American older adults. However, more research is needed to fully realize the efficacy of this treatment.

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CHAPTER 1

Introduction

Hypertension (HTN), also referred to as high blood pressure, is a major health concern. It is the biggest risk factor for heart disease in the United States (Holmes, Hassain, Ward, & Opara, 2013). The U.S. prevalence is highest among African American adults compared to all other racial/ethnic groups (Mozzafarian, Benjamin, & Go, 2015). Adults 60 years of age and older account for 65% of individuals with this disease (Mozzafarian et al., 2015). In this population, nonadherence to prescribed antihypertension medications has been identified as one of the main reasons for poorly controlled blood pressure (BP; Solomon et al., 2015). Mobile health, the application of wireless technology to healthcare, is a rapidly growing field in disease prevention and chronic disease management (Davidson et al., 2015). Multiple researchers in this area have shown the promise of a positive impact of various forms of mobile health technology on medication adherence. However, no studies were found that included a large sample of African American older adults, 60 years of age and older with HTN, and the use of text messaging to improve BP control and medication adherence.

In this chapter, the background and significance of the problem of HTN is discussed. This chapter also highlights the need for HTN self-management interventions using text messaging to increase medication adherence and BP control among African American older adults (60 years of age and older) with this disease. Lastly, an overview of the theoretical framework, study purpose, research question, assumptions, and chapter summary are discussed.

Background and Significance of Hypertension

It is estimated that one in three U.S. adults (about 70 million people) has HTN (Nwankwo, Yoon, Burt, & Gu, 2013). The prevalence of HTN is highest among African

American adults (42.1%), compared to other racial groups; Whites (28.0%), Hispanics (26.0%), and Asians (24.7%), respectively (Mozzafarian et al., 2015). HTN is more common among individuals 65 years of age and older (Oliva & Bakris, 2012). For example, adults 60 years of age and older account for 65% of individuals with HTN in the United States (Mozzafarian et al., 2015). Overall, there are no significant differences in prevalence between U.S. men and women, however, there are differences in age groups by sex. Males have a higher prevalence of this disease until the age of 45 (Doumas, Papademetriou, Faselis, & Kokkinos, 2013). The prevalence is equal between the two sexes from 45 to 64 years of age, and then after that, HTN becomes more prevalent among women (Doumas et al., 2013).

The age adjusted, hypertension-related death rate was 255.1 per 100,000 population in 2000, versus 314.1 in 2013, illustrating its rapidly increasing prevalence (Kung & Xu, 2015). African Americans had the highest HTN-related mortality rate in 2013. Because this disease disproportionately affects African Americans at a higher rate, this population experiences a higher burden of HTN-related complications (Still et al., 2015). Left untreated, HTN can lead to heart attack, stroke, kidney disease, vision loss, and sexual dysfunction (American Heart Association [AHA], 2018a). HTN is commonly referred to as the silent killer because it has no early significant symptoms (National Heart, Lung & Blood Institute, 2015). Individuals may not be aware that they have HTN until someone takes their BP.

Socioeconomic status also plays a significant role in the development of HTN. Higher rates of HTN among African American adults have been linked to socioeconomic disadvantage (Go et. al., 2013). African Americans have lower household income and lower educational attainment compared to Whites. For example, the median household income for African Americans is $40,232, compared to Whites at $63,704, Asians at $83,456, and Hispanics at

$49,704 (U.S. Census, 2017a). The rate of bachelor's degrees among African Americans is 14.8%, compared to 21.1% in Whites (U.S. Census, 2017b). James et al. (2011) also suggested that discrimination, chronic stress, and living in disadvantaged neighborhoods all contribute to the early onset of HTN in African Americans.

HTN costs the United States $46 billion dollars a year in direct and indirect costs; health care service utilization, medication cost, and missed days of work (Mozzafarian et al., 2015). Medical costs associated with HTN are projected to increase to over $154 billion dollars by 2035 if measures are not taken to manage this disease (Khavjou, Phelphs, & Leib, 2016).

Medication Adherence

Medication adherence is defined as the extent to which an individual takes medication as prescribed by their healthcare provider (Stirratt et al., 2015). Emphasis is placed on ensuring the correct medication, the correct dose, and the correct time are followed as prescribed. Non-adherence to prescribed antihypertensive medication has been identified as one of the main reasons for poorly controlled BP among African American populations (Solomon et al., 2015). For example, nearly 25% of new prescriptions for HTN medicine are never filled (CDC, 2016b).

Self-Management

For nearly a decade, the term self-management has been defined as the ability of an individual, in conjunction with family, community, and healthcare professionals to manage symptoms, treatments, lifestyle changes, and psychosocial, cultural, and spiritual consequences of health conditions (Richard & Shea, 2011). The goal of self-management is to empower individuals diagnosed with various chronic illnesses to take an active role in treating and managing their health. HTN self-management is an essential requirement for long-term BP control (McNamara, Versace, Marriott, & Dunbar, 2014). It encompasses a wide range of interventions that focus on proper medication use, home-based monitoring, and lifestyle modifications.

Mobile Health Technology in HTN

Mobile health technology frequently used for HTN and BP control include interactive BP monitoring, electronic salt intact sensors, text message reminders, and mobile alerts (Marcolino, et al., 2018). Mixed results have been reported related to the use of these various forms of mobile health technology and their effect on BP. The most widely used mobile health technology intervention in HTN has been text messaging. Text messaging has been used for patient reminders, education, behavior change, motivation, and prevention (Anthony et al., 2015; Buis et al., 2017; Maslakpak & Safaie, 2016; Varleta et al., 2017). This method is considered more cost effective than other forms of mobile health technology (Anthony et al., 2015). Current research providing a thorough and comprehensive cost effectiveness analysis is not available. However, researchers found text messaging was as much as 45% less expensive than other mobile phone reminders and telecommunication costs (Beratarrechea et al., 2014; Peiris, Praveen, Johnson, & Mogullura, 2014). Because of the wide use, acceptability, and cost effectiveness of text messaging it may be a useful tool to develop HTN self-management interventions for African American older adults.

Theoretical Framework

The theory of planned behavior (TPB) has its origins in psychology. Icek Ajzen (1991) first proposed it in 1985 to improve upon the predictive power of the theory of reasoned actions. The theory of reasoned actions was created to explain the relationship between attitudes and behaviors as they relate to human action (Ajzen, 1991). This theory was used to predict how individuals would behave based on their pre-existing attitudes and behavioral intentions (Ajzen, 1991). Ajzen later revised this theory to include the addition of the concept of perceived control over behaviors (Peterson & Bredow, 2017). The TPB states that attitudes toward behavior, subjective norms, and perceived behavioral control together shape an individual's behavioral intentions and behaviors (See Appendix A; Ajzen, 1991).

Main Concepts

Beliefs. Behavioral beliefs are subjective thoughts the individual holds regarding the expected outcome of performing a behavior (Ajzen, 1991). Normative beliefs are the thoughts an individual holds regarding the likelihood others would approve or disapprove of the behavior, such as a spouse, family member, or friend, depending on the population under study and the behavioral situation (Ajzen, 1991; 2006). Control beliefs are what an individual holds regarding the presence or absence of barriers and facilitators to performing the desired behavior (Ajzen, 1991). For example, individuals may not refill their prescription because it costs too much money, even if they are aware of the health benefits associated with adhering to the prescribed medication. Together, behavioral beliefs, normative beliefs, and control beliefs determine attitudes, subjective norms, and perceived behavioral control.

Attitudes. Attitudes are the degree to which performance of the behavior is positively or negatively valued (Ajzen, 2006). An individual with strong beliefs that mostly positive outcomes will result from performing a behavior will have a positive attitude toward the behavior (Peterson & Bredow, 2017).

Subjective Norms. Subjective norms are the perceived social pressures to engage, or not, in a behavior (Ajzen, 2006). They are determined through the individual's perception of whether or not other individuals important to them approve or disapprove of the behavior (normative beliefs). This is weighted by the individual's motivation to comply with referent others (Peterson & Bredow, 2017).

*Perceived Behavioral Control***.** Perceived behavioral control refers to people's perceptions of their ability to perform a given behavior (Ajzen, 2006). This concept is derived from the self-efficacy theory created by Bandura (1977), and is the conviction that people can successfully execute the behavior required to produce a specific outcome. Bandura (1977) theorized that self-efficacy was the most important precondition for behavioral change. Based on the TPB, perceived behavioral control is influenced by control beliefs and perceived power (Ajzen, 2006).

Intention. Intention is an individual's readiness to perform a given behavior and is considered the immediate antecedent of behavior (Ajzen, 2006). Behavioral intention is the best predictor of the likelihood of undertaking the behavior (Ajzen, 1991). The intention is based on attitudes toward the behavior, subjective norms, and perceived behavioral control (Ajzen, 2006).

Behavior. Behavior is the manifestation of the observable response in a given situation based on a given target (Ajzen, 2006). Based on the TPB theory, behavior is a function of compatible intentions and perceptions of behavioral control (Ajzen, 2006). For example, a healthcare professional may introduce a specific health intervention to an individual with a chronic disease. The goal of this intervention is to change negative behavior to a more desirable or positive health behavior to improve the condition. In this case the behavior, whether positive or negative, is the action taken following the introduction of the intervention.

Theoretical Propositions

The TPB model illustrates the theoretical propositions that an individual's beliefs about a specific health care practice influences their attitude, there motivation to adhere (subjective norm), and their beliefs about what hinders or empowers (perceived behavioral control) them to engage in a specific health behavior (intention/behavior). In other words, if individuals have a positive attitude about their medication regime, and also have positive influences from nurses, family, and friends (subjective norms), they will feel empowered and able to control/manage their BP and adhere to a specific medication regime (perceived behavior control). In contrast, a negative attitude, negative influences, and a lack of control will lead to poor management of BP and decreased medication adherence.

Application of the theory

Non-adherence to prescribed antihypertensive medication is one of the main reasons for poorly controlled BP among African American adults (Solomon et al., 2015). Researchers have identified multiple factors that contribute to non-adherence to antihypertensive medications among African Americans, including complex medication regimes (lack of behavioral control) and poor relationships with providers (negative subjective norms) (Allen, Brownstein, Satsangi, & Escoffery, 2016; Ruppar et al., 2017; Solomon et al., 2015). If providers can assist adults with HTN to increase their behavioral control and give them positive reinforcement, they can predict improved intention to take medications among African American older adults with HTN. Behavioral changes are based on their attitudes about their medications, subjective norms about treatments and self-care, and perceived behavioral control to take medication, measure their BP, and consult their health care provider on a regular basis (Ajzen, 2011).

An individual's willingness and consent to participate in the study indirectly indicates they intend to make behavioral changes to improve their BP and adhere to their medication regimes during the study. Weekly text messages sent for eight weeks by the research nurse will serve as the motivating factor (subjective norm) to influence medication adherence and BP control (behavior change) among participants receiving this intervention. The participants' ability to monitor (self-manage) their BP and record this information on a log sheet reflects their perceived behavioral control. Individuals will be instructed on how to use the automated BP monitor at the start of the study and will be asked to repeat this behavior throughout the study. In addition, a handout describing how to use the automated BP monitor and who to call in case the monitor malfunctions (the PI) will be provided.

The desired behavior change will be assessed using the Hill-Bone Medication Adherence Scale (HB-MAS) to determine an individual’s change in adherence level pre-and post-intervention (Kim, Hill, Bone, & Levine, 2000). BP will also be assessed pre-and post-intervention to determine if changes have occurred. In addition, five researcher-developed evaluation questions, based on the theory, will also be used to explore subjective norms and perceived behavioral control beliefs of participants after the intervention. Despite the belief that subjective norms influence an individual’s intentions, no tool exists to determine when or if participants involved in the study will adhere to long term medication adherence and BP management following the study. However, the indirect measure of an individual’s intention, along with the findings of this study, may help to develop future research studies and programs targeting African American older adults with HTN.

Purpose

The purpose of this study is to determine if a text messaging intervention has an effect on BP and medication adherence among African American older adults with HTN.

Research Question

Is there a difference in BP and medication adherence from baseline (Time 1) to two months post self-management intervention (Time 2) in African American older adults with HTN compared to a control group?

Assumptions

The assumptions for this study are:

1. Older African American adults are generally interested in being healthy and participating in their health behaviors.
2. BP self-management is occurring in the context of adults living independently at home; not in assisted living or acute care situations.
3. Little to no formal education is required to do self-management, except the ability to write down BP numbers or read medicine bottles.
4. African American nurse researchers have the cultural background and sensitivity needed to encourage BP self-management in African American older adults.

Chapter Summary

In conclusion, untreated HTN can have devastating health effects such as heart attack, stroke, and other physical illness (AHA, 2018a). Nearly 25% of new prescriptions for HTN medicine are never filled (CDC, 2016b). Text messaging is one intervention that can be used to potentially improve HTN self-management, which should improve BP outcomes. However, no studies were found that included a large sample of African American older adults, 60 years of age and older, with HTN, and the use of text messaging to improve BP control and medication adherence. More research is needed to determine the effects of text messaging on BP control and medication adherence in this population.

CHAPTER 2

Review of Literature

BP is defined as the pressure of the blood against the walls of the arteries (AHA, 2017b). This pressure is created by the heart as it pumps blood into the arteries and through the circulatory system, referred to as systolic pressure (AHA, 2017b). The diastolic pressure is when the heart relaxes between beats (AHA, 2017b). Recent national guidelines for the prevention, detection, evaluation, and management of high BP have changed how BP is classified (Whelton et al., 2017).

Blood Pressure Category	Systolic	Diastolic
Normal	<120mmHg	<80mmHg
Elevated	120-129mmHg	<80mmHg
Hypertension		
Stage 1	130-139mmHg	(or) 80-89mmHg
Stage 2	≥140mmHg	(or) ≥90mmHg

Table 1. New Blood Pressure Classification (Whelton et al., 2017)

Prior to the 2017 changes, a controlled BP was below 140mmHg systolic and below 90mmHg diastolic (Chobanian et al., 2003). Currently a normal or controlled BP is below130 mmHg systolic and below 80 mmHg diastolic (Whelton et al., 2017). HTN is diagnosed based on the average of at least two readings taken on at least two occasions averaging ≥130/80 (Whelton et al., 2017). The recent changes related to how BP is classified is expected to result in a substantial increase in the prevalence of HTN; about 14% higher than estimated, based on previous reports (Whelton et al., 2017).

Although there are ways to manage HTN, only 52% of patients have their BP under control (Nwankwo et al., 2013). The prevalence of HTN control is lowest among African

Americans (44.6%), compared to Whites (50.8%), and Hispanics (45%; Center for Disease Control and Prevention [CDC], 2017a).

Current Treatment for HTN

Adhering to lifestyle changes and using medications as prescribed can enhance quality of life and reduce complications associated with this disease (AHA, 2017c). Lifestyle recommendations include maintaining a healthy weight (a body mass index between 18.5 and 24.9); eating more fruits and vegetables; less dairy, less saturated fat, and less total fat. Decreasing the amount of dietary sodium to fewer than 1,500 mg a day and limiting alcohol consumption to no more than one or two drinks a day is ideal. In addition, recommendations include being physically active for at least 150 minutes of aerobic and/or resistance exercise per week (AHA, 2017c).

There are a number of antihypertension medications used to treat this disease. Primary medications used to treat HTN include: thiazide diuretics, angiotensin-converting enzyme inhibitors, angiotensin-2 receptor blockers, and calcium channel blockers (Whelton et al., 2017). Other medications referred to as secondary medications such as: loop diuretics, potassium sparing diuretics, beta blockers, direct renin inhibitors and direct vasodilators may also be prescribed later if the primary medications are ineffective (Whelton et al., 2017).

Medication Adherence Research

Non-adherence to prescribed antihypertensive medication has been identified as one of the main reasons for poorly controlled BP among African American populations (Solomon et al., 2015). In a sample of 120 African American adults prescribed HTN lowering medication, 37.5% were found to be non-adherent (Spikes et al., 2018). Several researchers have identified multiple factors that contribute to non-adherence to antihypertension medication among this population, including a lack of adequate HTN knowledge, a lack of social support, complex medication regimes, forgetfulness, an inability to refill medication, and poor relationships with providers (Allen, Brownstein, Satsangi, & Escoffery, 2016; Ruppar et al., 2017; Solomon et al., 2015). Decreasing non-adherence to prescribed antihypertension medication is one of many possible HTN self-management strategies that can be explored to determine its effect on African American older adults with poorly controlled BP.

Medication adherence has been measured in a number of ways ranging from self-report (questionnaires, interviews, visual analog, and time-line recall), to pharmacy refills, electronic monitors, drug levels, and clinician estimates (Dunbar-Jacob & Rohay, 2016). Direct measures (pill count and electronic monitors) are considered to be the most accurate form of assessing medication adherence (Lam & Fresco, 2015). They help to provide physical evidence to show an individual has taken the medication. However, direct measures may be expensive and time consuming (Lam & Fresco, 2015). For example, the Medication Events Monitoring System (MEMS) costs $365 per device (Aardex Group, 2016). MEMS is an electronic monitoring system that digitally records the dosing events, sends an individual reminder to signal the time for the next dose, and provides feedback on adherence performance. The digitally recorded information is taken from a micro sensor located in the cap of the device. This information can be downloaded directly from the device onto a computer. Additional costs may be associated with obtaining feedback regarding adherence levels, and this information is highly dependent on the brand and type of adherence monitoring device. In addition, incorrect use of the MEMS can lead to false categorization of medication adherence (Lam & Fresco, 2015). For this reason, many researchers rely on validated self-report measures.

Methods that have been used to promote medication adherence include encouraging individuals to establish consistent medication routines, increasing social support, having medication counseling and disease education, self-monitoring of BP, and using technology reminders (Solomon et al., 2015; Ruppar, Dunbar-Jacob, Mehr, Lewis, & Conn, 2017). Many of these factors have not been assessed in African American older adults 60 years of age and older; more research is needed in this area.

Self-Management Research

The ability to create a self-management routine, the use of electronic assistive devices, pill boxes, medication logs, and the internet were identified as common facilitators of self-management (Schulman-Green et al., 2016). Other facilitators include using communication technology (smartphones and/or tablets), and encouraging individuals to participate in self-management activities such as exercise, proper diet, sleep hygiene, mediation, and prayer (Moss, Still, Jones, Blackshire, & Wright, 2018).

Common factors that negatively influence self-management include a lack of knowledge concerning a specific disease process and poor understanding of the role of medications and individual treatment plans (Schulman-Green, Jaser, Park, & Whittemore, 2016). Lack of knowledge regarding medication use and adherence are the most common barriers of HTN self-management practices among patients (pooled prevalence 46%; 95% CI 24-64%; Khatib et al., 2014). In addition, forgetting to take medication is another important barrier (55%; 95 CI 35-75%). In terms of changing lifestyle practices and behaviors, making physical activity a priority (27%; 95% CI 12-14), breaking bad habits (27%; 95% CI 9-45%), and factors related to stress and anxiety (34%; 95% CI 27-40%) are common patient barriers (Khatib et al., 2014). Barriers reported by healthcare providers focused on their skill level and limited capabilities to manage and control HTN for their patients (Khatib et al., 2014).

Self-management plays an important role in HTN, however few studies have evaluated this role and its affect on achieving and sustaining BP control (Chandak & Joshi, 2015). Mobile health technology offers new opportunities to assess and evaluate HTN self-management interventions.

Mobile Health Technology Research

Mobile technologies are increasingly being used in healthcare for patient communication, monitoring, education, and to facilitate adherence to chronic disease management (Hamine, Gerth-Guyette, Faulx, Green, & Ginsburg, 2015). Mobile health technology represents an important mechanism by which patients can play a larger role in managing their chronic conditions (Kaplan, Cohen, & Zimlichman, 2017). However, the reported impact of mobile health technology interventions are mixed, with some studies showing modest benefits from some clinical diagnosis and self-management strategies (Hamine et al., 2015).

Marcolino et al. (2018) conducted a systematic review to summarize the impact of mobile health technology interventions on different health conditions. This review included 371 studies published between 2009 and 2016 involving more than 79,665 participants from low to middle-income countries (Marcolino et al., 2018). Mobile health technology interventions consisted of mobile apps, mobile telemonitoring support, and text messaging (Marcolino et al., 2018). Various mobile devices used included mobile phones, smartphones, personal digital assistants, and MP3 players. Mobile health technology interventions were performed for smoking cessation, to increase physical activity, chronic disease management (asthma, congestive heart failure, diabetes, HIV, HTN and chronic lung disease), medication adherence, stress and anxiety management, health information access, and to teach specific health skills, and assess patient satisfaction and social functioning (Marcolino et al., 2018).

Overall, mobile health technology use was beneficial in chronic disease management (Marcolino, et al., 2018). For example, a text messaging intervention showed greater improvement in asthma pooled symptom scores (mean difference 0.36, 95% CI-0.56 to 0.17) compared with the control group. Exercise capacity in cardiac rehabilitation improved a 6-minute walk test from 524-637 meters (p=.009) in monitored exercise training assisted by a mobile phone app. In addition, a mobile phone-based, home glucose monitoring program study decreased $HBA1_c$ from 13.2% to 10.5% after 3-6 months (Marcolino, et al., 2018).

Mobile Technology in HTN Research

Mixed results have been reported related to the use of various forms of mobile health technology and their effect on HTN. Two trials showed no statistically significant reduction in blood pressure when using mobile alerts and reminders (Hacking et al., 2016; Maslakpak & Safaie, 2016). However, despite these findings, text messaging helped enable interactive monitoring of blood pressure, assisted with setting reminders for patients, and was useful in collecting data, and scheduling physician visits (Anthony et al., 2015; Hacking et al., 2016; & Maslakpak & Safaie, 2016).

Text Messaging and HTN

Research conducted in 2014 found text messaging was as much as 45% less expensive than other mobile phone reminders, and telecommunication costs (Beratarrechea et al., 2014; Peiris, Praveen, Johnson, & Mogullura, 2014). Because of the wide use, acceptability, and cost effectiveness of text messaging it may be a useful tool to develop HTN self-management interventions for African American older adults.

For the purposes of this review, seven randomized clinical trials were identified where text messaging was the primary intervention method used to improve HTN and blood pressure management (see Appendix B). Study characteristics varied widely in research location, frequency of text messaging, duration (length of the study), and text messaging content. Only two of the studies were conducted in the United States (Anthony et al., 2015 & Buis et al., 2017). The frequency of sending text messages to participants varied from daily, to weekly, to once a month. The average duration of the studies was six months, with the longest study lasting 18 months. Text messaging content was largely developed by the researcher(s) or primary investigator(s). Two of the studies developed content using behavioral change theory or social cognitive theory (Bobrow et al., 2016 & Varleta et al., 2017). Only one study used HTN management recommendations from the American Heart Association to create text message content, and at least three studies failed to report the text message content sources (Buis et al., 2017).

Other findings revealed that patients were more responsive and likely to report BP measures taken at home following text message reminders ($p=.038$; Anthony et al., 2015). HTN medication adherence increased following a text message and reminder card intervention ($p<0.001$; Maslakpak & Safaie, 2016). Also, a reduction in BP from baseline to 18 months was noted among participants who received weekly text messages and a multicomponent HTN intervention program (systolic BP 19.3 mmHg, $p=.001$; diastolic BP 12.2mmHg, $p<.001$; He et al., 2017).

Overall, very few studies have been conducted in the United States that utilize text messaging as a HTN management intervention. Frequency and study duration varied widely and posed a potential challenge for assessing the impact of this type of intervention. Because of these noticeable differences, perhaps greater emphasis should be placed on text messaging content. Often this is overlooked by researchers and many fail to report this information. Care and attention should be taken to use the most up to date HTN standards and recommendations when creating text messaging content. While there is some evidence to support the use of text messaging to improve HTN outcomes, further study is needed, specifically in ethnic minority groups such as African Americans.

Summary

Based on the research that has been conducted to date, future research studies need to focus on text messaging content, text message frequency, and study duration. Significant findings related to the optimal number of text messages that should be sent and the length of each study has not been determined. Text message content should be based on creditable authority sources, for example HTN guidelines and recommendations provided by the Agency for Healthcare Research and Quality or the American Heart Association. These measures need to be tested against the outcome of lowering BP and replicated among different ethnic groups. No studies were found that include a large sample of African American older adults, 60 years of age and older, with HTN and the use of text messaging to improve BP control and medication adherence. Therefore, the following hypothesis will be tested: individuals who receive a weekly text message intervention will have better BP control (<130/80) and higher medication adherence from baseline to two-months post intervention, compared to a control group.

CHAPTER 3

Methods and Procedures

This chapter includes the methods and procedures used to determine if the use of a text message intervention has an effect on BP and medication adherence among African American older adults 60 years of age and older with HTN. In this chapter, the research design, study sample, setting, measurement methods, procedure, ethical consideration, data analyses, and delimitations will also be described.

Research Design

This will be a pilot feasibility study using a pretest-posttest nonequivalent comparison group design to answer the following research question: Is there a difference in BP and medication adherence from baseline (Time 1) to two months post self-management intervention (Time 2) in African American older adults with HTN compared to a control group? This type of study design will be used to determine the feasibility of a future quasi-experimental study. Furthermore, this study will also be used to test the intervention to determine if it is culturally appropriate for African American older adults with HTN.

Due to limitations in time and funding, only 40 subjects will be recruited, 20 in each group. Randomization to two groups will not be performed to prevent cross-contamination. Cross-contamination may occur if participants in different groups communicate or gain information intended for the other group while the study is taking place (Gliner et al., 2017). For the purposes of this study one church (group 1) will serve as the intervention group while the other church (group 2) will be the control group, this will decrease the risk of cross-contamination among participants enrolled in the study.

Sampling

Participants must meet the following inclusion criteria: a) self-report as African American or Black, b) self-report that a healthcare provider has diagnosed them with HTN for at least one year, c) have a systolic or diastolic BP of ≥130/80 at the baseline evaluation, d) self-report use of at least one antihypertensive medication in the last four weeks, e) 60 years of age or older, f) ability to receive and read text messages on personal mobile telephone, g) ability to use an automated BP monitor and maintain a log of BP measures during the study. Individuals with chronic kidney disease will be excluded from the study, as this condition could potentially bias the results of the study.

Historically, church involvement has played an important role in African American communities (Ellison & Sherkat, 1995). Due to this involvement, religious institutions have served as ideal locations for recruitment of African American samples for research. Prospective participants will be recruited from the church lobby after church services in two churches in north Texas.

The principal investigator (PI) will use convenience sampling to first enroll the treatment group and then the control group. A major strength in using this approach is that participants are not aware of the specific treatment or intervention that will be provided, and they do not decide (self-assign) which group they will be in; this will decrease the threat of assignment bias (Gliner et al., 2017). In order to prevent cross-contamination of subjects in the intervention, the PI will randomly select one church to be the treatment group (church 1) and the other church will be the control group (church 2).

Statistical power for evaluation of this study's objectives was calculated using G* Power software (Faul, Erdfelder, Lang, & Buchner, 2007). Power calculations were computed based on predictive analysis to identify the differences between the groups on the primary outcome, BP, with a two-sided alpha of .05. This pilot study will enroll 40 participants. The following table displays the statistical power based on possible effect sizes with an N of 40. Although pilot studies by definition are underpowered, adequate power will be achieved if the study correlations are greater than f=45.

Effect Size	Small			Moderate			Large	
Cohen's *f*	.10	.15	.20	.25	.30	.35	.40	.45
Statistical Power (1-*b*)	.09	.15	.23	.34	.46	.58	.69	.79

Table 2. Effect Size and Statistical Power for N=40

Setting

Two African American churches located in the Dallas Metroplex area will be the setting for this study. Both congregations are of the same denomination (Church of Christ). The size of these two faith-based communities range from 200-300 members (attendees). These two settings were selected because of the relatively large number of African American members, and the likelihood of recruiting participants who meet inclusion criteria for the study.

Measurement Methods

Demographic Questionnaire

A researcher-designed questionnaire will be used to gather sample demographics (See Appendix C). These will include age, sex, marital status, employment, education level, duration of HTN diagnosis, number of prescribed antihypertension medications, number of co-morbidities, and yearly income.

Blood Pressure Measurement

The Welch-Allyn aneroid sphygmomanometer will be used to measure BP at both time points (Welch-Allyn, 2018). The Welch-Allyn aneroid sphygmomanometer is a non-automated machine used for non-invasive measurements of BP utilizing an inflatable cuff with a pressure sensor and a valve for deflation. This device is used with a stethoscope to obtain manual BP readings. A mercury sphygmomanometer is considered the best non-invasive BP measure (Shahbabu, Dasgupta, Sarkar, & Sahoo, 2016). However, due to potential mercury exposure, the use of such a device is not recommended and has been replaced by aneroid and automated devices (Shahbabu et al., 2016). Literature comparing the use of mercury, aneroid, and automated sphygmomanometers is limited. However, in a recent study consisting of 218 participants, researchers compared all three sphygmomanometers and reported the percentage of absolute difference within 5 mmHg of each BP reading (Shahbabu et al., 2016). Devices are recommended for approval if both systolic and diastolic readings are within 5mmHg of each other at 50% of the readings (Pickering et al., 2005). The aneroid sphygmomanometer for systolic and diastolic BP was 89.4% and 91.7%, compared to the mercury sphygmomanometer. In addition, the correlation between the mercury and the aneroid device ($r=0.98$ systolic, $r=0.84$ diastolic, $p<0.001$) was statistically significant (Shahbabu et al., 2016). For the purposes of the study, the same two aneroid sphygmomanometers will be used at the start of the study and again after the eight week intervention to reduce measurement error.

BP measurements will follow procedures outlined by the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 8; Whelton et al., 2017). The PI, who has over 15 years of experience in patient care, and two trained registered nurses will obtain BP measurements. The two registered nurses have at least six years of experience in patient care, and will be trained by the primary researcher prior to the start of the study on how to use the JNC-8 guidelines. An average of two sitting BPs, two minutes apart, using the Welch-Allyn aneroid sphygmomanometer will be obtained at the start of and at the completion of the study. Restricted clothing will be removed from the arm, and participants will be asked to sit quietly for five minutes prior to having their BP measured. Each participant will be fitted with an appropriately sized cuff (cuff bladder encircling at least 80% of the arm) to ensure measurement accuracy (Whelton et al., 2017). Participants will be asked to remain quiet and seated with their feet flat on the floor, back and arm supported, and their arm at heart level (Whelton et al., 2017). The average BP readings from each participant at baseline and at the end of the study will be recorded. The JNC-8 guidelines define a controlled BP at <130/80 (Whelton et al., 2017). The aneroid sphygmomanometer will be calibrated prior to the start of the study and checked periodically by the primary researcher.

One week before the start of the study, the PI will meet with the two registered nurses and train them on how to use the JNC-8 guidelines. Following the training the PI will ask each nurse to take two BP measures and compare them to the PIs measures. The PI will ensure that the correct procedure is followed and that each nurse is able to obtain an accurate BP measure within 5 mmHg for systolic and diastolic readings. The degree of consistency (inter-rater reliability) between the two registered nurses and the PIs BP measures will be determined.

Medication Adherence Measurement

The nine-item HB-MAS scale will be used to assess common medication taking behaviors, including adherence (Kim et al., 2000). This is a self-report Likert scale where subjects are asked to respond to each question indicating the frequency with which the item is relevant for them (Kim et al., 2000). The four-point response rate format includes: 1 = all the time, 2 = most of the time, 3 = some of the time, and 4 = none of the time (See Appendix D; Kim et al., 2000). Higher scores on the scale indicate a high level of adherence. Based on a previous HTN study, the HB-MAS scales internal consistency Cronbach alpha reliability was .74 (Kim et al., 2000). The item-total correlations were >0.30 for each of the nine-items assessed using the scale (Kim et al., 2000). In addition, the HB-MAS scale has been used to assess medication adherence among African American adults diagnosed with HTN and other chronic conditions like diabetes, chronic obstructive pulmonary disease, and stoke (McHorney, Spain, Alexander, & Simmons, 2009).

Text Message Intervention

The PI will give all participants an Omron automated sphygmomanometer with arm cuff and instructions on how to use this device at home. Demonstration/return demonstration will be provided to each participant on how to use the BP monitor and log sheet. Participants will be asked to take their BP using this device once a week, at the same time of day, and record this information on a researcher-provided BP log for eight weeks (two months), with instructions to bring it with them to the final data collection. If the BP monitor fails to work at any time during the study, participants will be able to contact the PI for equipment assistance (See Appendix E).

Participants in the treatment group will also receive a weekly automated text message using EZ Texting technology. Text messages will be programed to be sent out every Monday, beginning approximately one week after recruitment, for eight weeks. The text message content is designed to encourage participants to adhere to prescribed antihypertension medication regimes and HTN self-monitoring. The content for each text message was created by the PI using information from the American Heart Association (AHA, 2018b; See Appendix F).

Procedures

Recruitment and Consent

Two African American churches in north Texas will be used to recruit participants. The PI will randomly select which church will receive the text message intervention (church 1) and which church will be the control group (church 2) from a list of north Texas churches with large African American congregations. This selection will be made by blindly drawing for each group assignment. The PI will post church flyers and announcements to advertise and recruit potential participants from the church lobby. Flyers and announcements will be posted until all 20 subjects have been recruited from both sites.

The PI will conduct scheduled meetings with small groups of subjects (5 at a time) at both locations until 20 subjects are enrolled. The scheduled meetings will be held every two weeks at each church to explain the study, obtain informed consent, do data collection, and demonstrate how to use the BP monitors. Everyone who has expressed an interest in the preceding two weeks will be invited to one of these meetings. For the intervention group, text messages will begin within two weeks of enrollment in the study. The PI will administer the measurement tools, provide a brief demonstration on how to use the electronic BP machine, and instruct participants on how to record their BP on the log sheet.

Data Collection

After each participant signs the informed consent, they will be verbally asked all questions from the demographic questionnaire and the HB-MAS scale by the PI. Baseline BP readings will also be obtained by the research nurses. This data collection will also be conducted in a private room at the church for the convenience of participants and to protect participant anonymity.

At the end of the two months, both groups will be asked to another meeting at church for post-intervention data collection. Two BP readings will be obtained by the two trained registered nurses following the JNC-8 guidelines, and the PI will administer the HB-MAS scale again. Both groups will be asked to provide the PI with the two-month BP log at the end of the study. In addition, participants in the intervention group will be asked to evaluate the text message intervention. The evaluation tool consists of five questions created by the PI (See Appendix G). Each participant will be asked to fill out the evaluation tool in writing, the PI will also be available to assist if needed.

Data Analysis

Descriptive statistics will be computed to describe sample characteristics. A mixed factorial analysis of variance (ANOVA) will be computed to test the following hypothesis: Individuals who receive the weekly text message intervention will have better BP control (<130/80) and higher medication adherence from baseline to two-months post intervention, compared to a control group. The mixed factorial ANOVA compares the mean difference in BP and medication adherence over time between the two groups (Moore, McCabe, & Craig, 2017). This statistical analysis is often computed when a dependent variable (BP and medication adherence) are measured over two or more time points and subjects have been assigned into two or more separate groups (Moore, McCabe, & Craig, 2017).

Data will be screened prior to analysis and searched for missing values. The percentage and characteristics related to missing data will be calculated and reported. Little's Missing Completely at random (MCAR) will be computed to identify the pattern of missing data. The results of this test will inform the subsequent application of a missing data imputation method. In order to decrease the rate of attrition the PI will limit the number of times data are collected; at baseline and post intervention. Participants will be provided with detailed written instructions about the study and important dates (baseline and post intervention data collection), and the PI's contact information will be provided if participants have any questions or concerns about the study.

Ethical Considerations

BP screening is a standard, noninvasive procedure lasting less than a minute with minimal risk to participants. Potential risks to participants include over inflation of the BP cuff. This potential risk will be eliminated by ensuring that each participant is properly fitted with the correct cuff size. Other potential risks associated with the BP assessment will also be eliminated by following the JNC-8 guidelines and teaching each participant how to correctly use the automated BP monitor.

Potential benefits to participants include an increased awareness of the JNC-8 recommendations for HTN control. Participants will also learn how to take their own BP at home and maintain a log to track these measures. In addition, participants will receive a free automated BP monitor to be used for self- management of the disease at the completion of the study. The findings from the study can also be used to inform future studies designed to improve BP control and increase medication adherence among African American older adults.

Prior to starting the study, approval from the University of Texas at Arlington Institutional Review Board will be obtained by the primary researcher. In addition, church leaders (the minister, elders, and deacons) at both proposed churches will consent to using the church facilities and allow the PI to advertise about the study at church events. All information about participants will remain confidential; this includes demographic characteristics, BP assessments, and adherence scores. This information will be kept in a locked file cabinet in the PI advisor's office. Electronic data will be kept on a secure password protected computer owned by the primary researcher for two years. All information obtained from participants will be referred to as group data; individuals will be assigned a code number and will not be referred to by name or with any personal identifiers. Informed consent will be obtained from all participants prior to the start of study.

Delimitations

There are limitations of the study related to the study design. Study participants will not be randomized to groups (Gliner et al., 2017). The use of two local church congregations in Texas does not fully represent the population, which affects the generalizability of the study findings (Gliner et al., 2017). Another possible limitation is the repeated use of the self-reported HB-MAS scale among the control and intervention groups. Participants will be asked to complete this scale twice during the study (at baseline and again at the end of the study).

Statistical analysis will be calculated to evaluate the potential limitations identified in the study. Future studies using an experimental design that allows for more control and randomization of participants to the intervention may be beneficial. Replicating the study using a larger sample size would also decrease potential limitations. The primary researcher can also continue to explore the use of other reliable and valid medication adherence scales that can be used to assess minority populations with HTN for future research to be conducted in this area.

CHAPTER 4

Findings

This chapter includes the findings of the data analysis used to determine if the use of a text message intervention has an effect on BP and medication adherence among African American older adults 60 years of age and older with HTN. Frequencies and percentages were used to explore the trends in the nominal-level variables. A mixed factorial ANOVA was computed to address the research question. Paired samples t-tests and independent samples t-tests were conducted as follow-up tests.

Description of the Study Sample

Survey responses were collected from a total of 44 participants. All 44 participants completed the survey; therefore, no adjustments were made on the data set for incomplete responses (n=21 control group; n=23 treatment group). Frequencies and percentages were computed to describe the demographic characteristics of the combined groups and are presented in Table 4. Means and standard deviations (SD) were computed to describe continuous variables.

In addition, a series of Pearson chi-square tests were conducted to examine the differences in gender, marital status, highest level of education, employment status, and yearly income between the treatment and control groups (See Table 4). The only significant chi-square comparison was for the demographic variable marital status. Results revealed only one significant demographic difference. The two groups significantly differed on marital status categories, χ^2 (1, 44) = 10.08, p = .018. Significantly more subjects in the treatment group were married.

Independent samples t-tests were also computed to examine differences in age, length of high BP diagnosis (in years), and the number of high BP medications taken between the control and treatment groups. The findings for each of these demographic variables were not statistically significant, although the subjects in the treatment group trended toward being younger than those in the control group (See Table 3).

Variable	Treatment			Control				
	n	*M*	*SD*	*N*	*M*	*SD*	*t*	*p*
Age	23	67.39	5.28	21	71.10	7.04	-1.99	.054
Length of high blood pressure diagnosis (years)	23	18.35	14.69	21	18.38	11.68	-0.01	.993
Number of high blood pressure medications	23	1.57	0.79	21	1.90	0.89	-1.34	.186

Table 3. Independent Samples *t*-tests for Demographics by Treatment and Control Groups

The mean age of the study participants was 69.16 years (SD = 6.39, range 60 - 84). The majority of the sample were female, 32 (72.7%). Over half of the sample (54.5%) was married, 56.8% had a high school diploma or equivalent degree, 59.1% were retired, and 45.5% reported a yearly income of less than $20,000.

Variable	Treatment		Control		Total			
	n	%	*n*	%	*n*	%	χ^2	*p*
Gender							0.03	.853
Female	17	38.6	15	34.1	32	72.7		
Male	6	13.6	6	13.6	12	27.3		
Age							3.59	.309
60-64	9	20.5	5	11.4	14	31.8		
65-69	7	15.9	4	9.1	11	25.0		
70-74	4	9.1	5	11.4	9	20.5		
75+	3	6.8	7	15.9	10	22.7		
Marital status							10.08	.018
Single	3	6.8	2	4.5	5	11.4		
Married	17	38.6	7	15.9	24	54.5		
Divorced	2	4.5	5	11.4	7	15.9		
Widowed	1	2.3	7	15.9	8	18.2		
Highest education level							7.54	.184
Less than high school	3	6.8	3	6.8	6	13.6		
High school diploma or equivalent degree	13	29.5	12	27.3	25	56.8		

Associate degree	6	13.6	1	2.3	7	15.9		
Bachelor's degree	0	0.0	3	6.8	3	6.8		
Master's degree	1	2.3	1	2.3	2	4.5		
Doctorate degree	0	0.0	1	2.3	1	2.3		
Employment status							5.74	.219
Full-time	4	9.1	2	4.5	6	13.6		
Part-time	4	9.1	0	0.0	4	9.1		
Unemployed	2	4.5	2	4.5	4	9.1		
Retired	12	27.3	14	31.8	26	59.1		
Disabled (unable to work)	1	2.3	3	6.8	4	9.1		
Yearly Income							7.04	.218
Less than $20,000	10	22.7	10	22.7	20	45.5		
$21,000-$30,000	2	4.5	7	15.9	9	20.5		
$31,000-$40,000	2	4.5	1	2.3	3	6.8		
$41,000-$50,000	3	6.8	0	0.0	3	6.8		
$51,000-$60,000	2	4.5	1	2.3	3	6.8		
Above $60,000	4	9.1	2	4.5	6	13.6		

Table 4. Demographics by Treatment and Control Groups

Participants were also asked to report comorbidities which included a history of high cholesterol, heart problems (heart attack, irregular heartbeat, or heart failure), or diabetes. More than half of the sample had a history of high cholesterol (63.6%), 11.4% reported a history of heart problems, and less than half of the sample (47.7%) reported a history of diabetes (See Table 5). When asked "how long have you had HTN in years", participants reported a combined average of 18.36 years (SD = 13.18). The average number of prescribed HTN medication was 1.73 (SD = .84). Table 5 also presents the findings of the chi-square test for the study sample comorbidities.

Variable	Treatment		Control		Total			
	n	%	*n*	%	*n*	%	χ^2	*p*
History of high cholesterol							1.05	.305
Yes	13	29.5	15	34.1	28	63.6		
No	10	22.7	6	13.6	16	36.3		
History of heart problems							0.34	.560
Yes	2	4.5	3	6.8	5	11.4		

No	21	47.7	18	40.9	39	88.6		
History of diabetes							0.00	.989
Yes	11	25.0	10	22.7	21	47.7		
No	12	27.3	11	25.0	23	52.3		

Table 5. Description of the Study Sample Comorbidities

Text Message Intervention Evaluation

Study participants in the treatment group were asked to complete a five-item text message evaluation questionnaire post intervention. All participants in this group (n= 23) completed the questionnaire. Twenty-two (95.7%) indicated that they were able to understand the text messages sent "all of the time". Text messages were sent weekly on Monday morning using automated text message technology (EZ Texting). Text messages were programed by the PI at the start of the study and sent to participants for eight weeks. Twenty-one (91.3%) of participants indicated that the text messages were sent at a good time. In addition, 20 (87.0%) of participants indicated that the text messages helped motivate them to take their BP medication, while 3 (13.0%) indicated that text messages did not motivate them. When asked how often each participant would like to receive a text message about BP, 11 (47.8%) said "once a week", 6 (26.1%) said "everyday", 5 (21.7%) said "once a month", and 1 (4.3%) said "never". Frequencies and percentages for the text message items are presented in Table 6.

The final item on the evaluation questionnaire asked participants to describe how the text messages and BP monitor helped them. This question was open-ended and allowed each of the participants to describe the benefits of the intervention. A few examples of the responses were, "It reminded me to always take my medication and go to the doctor"; "The messages were informative; the BP monitor was available for me to be consistent in taking my BP"; "The text messages once a week were good reminders"; and "It inspires me to take charge of my condition".

In addition to the text message intervention, both groups were asked to take their blood pressure at the same time of day each week using the BP monitor provided at the start of the study and record this information on the researcher provided BP log for eight weeks. Upon completion of the study, 40 (90.9%) returned with their BP log completed or partially complete (three or less BP measures missing). More participants in the treatment group 22 (95.7%) completed their BP log than in the control group 18 (85.7%).

Variable	*n*	%
Were you able to understand the text messages sent?		
Some of the time	1	4.3
All of the time	22	95.7
Did the text messages help motivate you to take your blood pressure medication?		
Yes	20	87.0
No	3	13.0
Were the text messages sent to you at a good time?		
None of the time	1	4.3
Some of the time	1	4.3
All of the time	21	91.3
How often would you like to receive a text message about your blood pressure?		
Everyday	6	26.1
Once a week	11	47.8
Once a month	5	21.7
Never	1	4.3

Table 6. Frequency Table for Text Message Variable

Mixed Factorial ANOVA Analysis

Is there a difference in BP and medication adherence from baseline (Time 1) to two months post self-management intervention (Time 2) in African American older adults with HTN compared to a control group?

To address the research question, a mixed factorial ANOVA was conducted to assess for differences in BP and medication adherence over time and by group. A mixed factorial ANOVA is an appropriate statistical analysis used to compare two groups on a continuous dependent variable that is measured more than once (Tabachnick & Fidell, 2013). The independent variable will correspond to group (treatment vs. control) and time (pretest vs. posttest). The continuous dependent variables corresponded to systolic BP, diastolic BP, and medication adherence. The dependent variables were examined through individual mixed factorial ANOVAs.

Assumptions testing. Prior to analysis, the assumptions of normality and homogeneity of variance were assessed. The Shapiro-Wilk test is a robust analysis for violations of normality when the sample size exceeds 30 cases (Stevens, 2009). The dependent variables were examined for normality through use of Shapiro-Wilk tests. Results of the Shapiro-Wilk tests indicated non-significance for diastolic BP baseline (p = .631) and posttest (p = .054), suggesting that the assumption of normality was met for this variable. Results of the Shapiro-Wilk tests indicated significance for systolic BP baseline (p = .006) and posttest (p = .028). Results of the Shapiro-Wilk tests indicated significance for medication adherence baseline (p < .001) and posttest (p < .001). Therefore, the assumption of normality was not met for systolic BP and medication adherence.

The assumption for homogeneity of variance was assessed with Levene's tests. Results of Levene's test did not indicate significance for systolic BP differences (p = .062) or diastolic BP differences (p = .184), suggesting that the assumption of equal variances was met for these variables. However, the results of Levene's test indicated statistical significance for medication adherence differences (p = .011), suggesting that the assumption of equal variances was not met for this variable.

Due to the normality and homogeneity of variance assumptions not being met for every variable, numerous transformations were attempted on the data such as using the square root, log, and square of the data. None of these transformations improved the distribution of normality for both baseline and posttest scores, simultaneously. The mixed factorial ANOVA is described as a robust test with respect to the assumptions of normality and homogeneity of variance (Stevens, 2009). This test is not sensitive to moderate deviations from normality. In simulated studies using a variety of non-normal distributions the false positive rate was not affected by this violation of assumptions (Stevens, 2009).

Systolic Blood Pressure Analysis

Two systolic BP readings were obtained by two trained registered nurses following the JNC-8 guidelines at baseline and post intervention. An average of the two sitting BPs was computed to determine an overall mean BP for each group. This was performed twice during the study at baseline and post intervention. Descriptive measures of systolic BP for all participants showed an average of 137.09 (SD = 17.22) at baseline (Time 1) compared to an average systolic BP post-intervention of 132.77 (SD = 14.31). See Table 7 for systolic BP descriptive statistics by group.

	Control Group	Treatment Group	Combined Group
Baseline (Time 1)	136.71 (17.92)	137.43 (16.96)	137.09 (17.22)
Post Intervention (Time 2)	134.81 (16.56)	130.91 (11.97)	132.77 (14.31)

Table 7. Systolic BP Descriptive Measures

Results over time (pretest vs posttest) for systolic BP were not significant, $F(1, 42) = 3.16$, $p = .083$, $\eta^2 = .070$. Results by group (treatment vs control) for systolic BP were not significant, $F(1, 42) = 0.14$, $p = .707$, $\eta^2 = .003$. Results of the interaction term (time*group) for systolic BP were not significant, $F(1, 42) = 0.95$, $p = .336$, $\eta^2 = .022$. Figure 1 present the line plots of the systolic BP data.

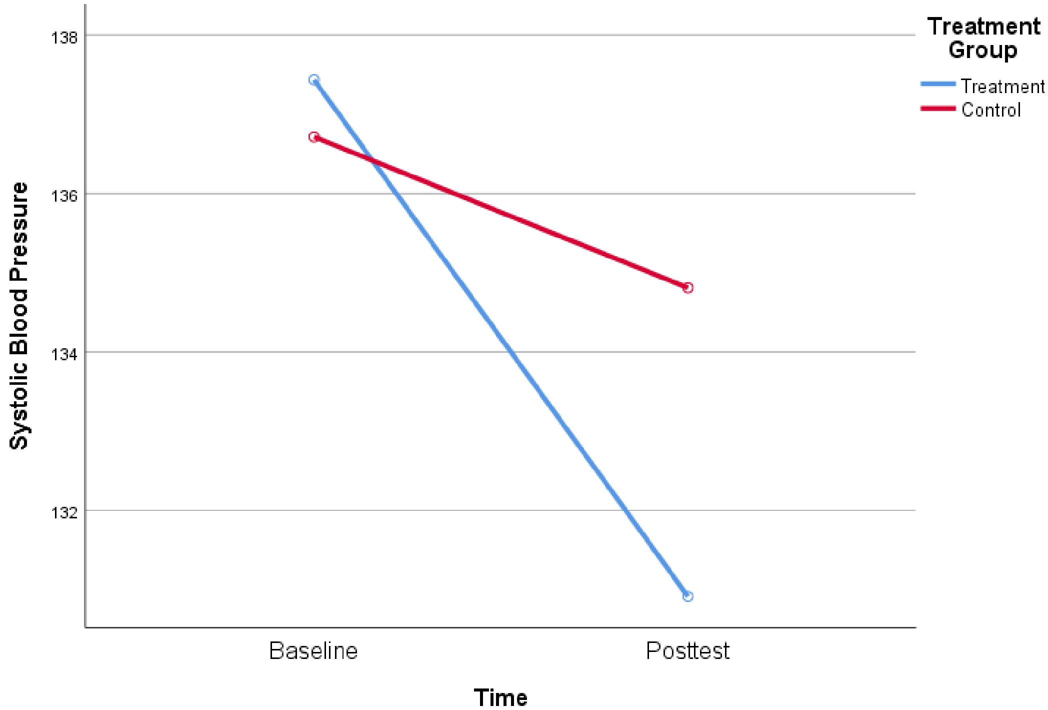

Figure 1. Line plot of systolic BP over time and by group.

Post-hoc analyses for Systolic Blood Pressure. A series of post-hoc power analyses were conducted to examine the achieved power based on the effect size of each statistical comparison for systolic BP. For the variable of time (baseline vs posttest), the statistical power was .94. For the variable of group (control vs treatment), the statistical power was .07. For the interaction (time*group), the statistical power was .49. Table 8 presents the post-hoc power analyses for systolic blood pressure.

	Systolic Blood Pressure (*n* = 44)		
Comparison	Time	Group	Time*Group
Effect size (Cohen's *f*)	.27 (moderate)	.05 (small)	.15 (small)
Statistical Power (1-b)	.94	.07	.49

Table 8. Post-hoc Power Analyses for Systolic Blood Pressure

Diastolic Blood Pressure Analysis

Two diastolic BP readings were obtained by two trained registered nurses following the JNC-8 guidelines at baseline and post intervention. An average of the two sitting BPs was computed to determine an overall mean BP for each group. This was performed twice during the study at baseline and post intervention. Descriptive measures of diastolic BP for all participants showed an average of 82.68 (SD = 9.11) at baseline (Time 1) compared to an average diastolic BP post-intervention of 79.27 (SD = 9.45). See Table 9 for diastolic BP descriptive statistics by group.

	Control Group	Treatment Group	Combined Group
Baseline (Time 1)	82.19 (8.50)	83.13 (9.80)	82.68 (9.11)
Post Intervention (Time 2)	81.10 (8.83)	77.61 (9.88)	79.27 (9.45)

Table 9. Diastolic BP Descriptive Measures

Results over time (pretest vs posttest) for diastolic BP were significant, $F(1, 42) = 5.34$, $p = .026$, $\eta^2 = .113$, suggesting that there were significant differences in diastolic BP between pretest and posttest for all subjects. Results by group (treatment vs control) for diastolic BP were not significant, $F(1, 42) = 0.28$, $p = .601$, $\eta^2 = .007$. Results of the interaction term (time*group) for diastolic BP were not significant, $F(1, 42) = 2.39$, $p = .130$, $\eta^2 =.054$. Figure 2 present the line plots of the diastolic BP data.

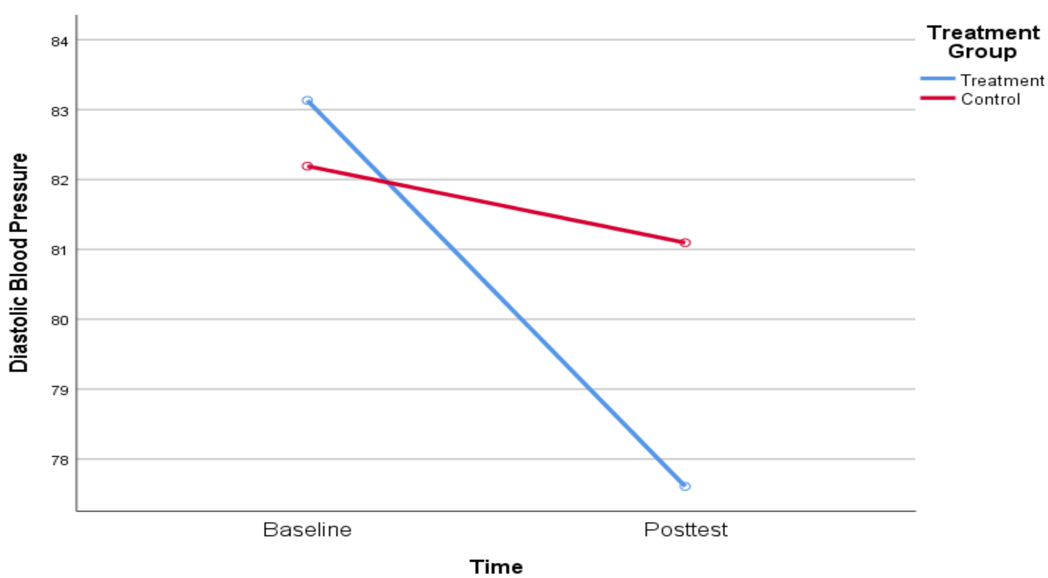

Figure 2. Line plot of diastolic BP over time and by group.

Post-hoc analyses for Diastolic Blood Pressure. A series of post-hoc power analyses were conducted to examine the achieved power based on the effect size of each statistical comparison for diastolic BP. For the variable of time (baseline vs posttest), the statistical power was 1.00. For the variable of group (control vs treatment), the statistical power was .10. For the interaction (time*group), the statistical power was .87. Table 10 presents the post-hoc power analyses for diastolic BP.

	Diastolic Blood Pressure (*n* = 44)		
Comparison	Time	Group	Time*Group
Effect size (Cohen's *f*)	.36 (moderate-large)	.08 (small)	.24 (small-moderate)
Statistical Power (1-b)	1.00	.10	.87

Table 10. Post-hoc Power Analyses for Diastolic Blood Pressure

Medication Adherence Analysis

Results over time (pretest vs posttest) for medication adherence were significant, $F(1, 42) = 15.12$, $p < .001$, $\eta^2 = .265$, suggesting that there were significant differences in medication adherence between pretest and posttest. Results by group (treatment vs control) for medication adherence were not significant, $F(1, 42) = 0.65$, $p = .426$, $\eta^2 = .015$. Results of the interaction term (time*group) for medication adherence were significant, $F(1, 42) = 6.91$, $p = .012$, $\eta^2 =.141$, suggesting that there were significant differences in medication adherence by the combination of pretest/posttest and treatment/control. Figure 3 presents the line plots of the medication adherence data.

Post-hoc analyses for Medication Adherence. A series of post-hoc power analyses were conducted to examine the achieved power based on the effect size of each statistical comparison for medication adherence. For the variable of time (baseline vs posttest), the statistical power was 1.00. For the variable of group (control vs treatment), the statistical power was .15. For the interaction (time*group), the statistical power was 1.00. Table 11 presents the post-hoc power analyses for medication adherence.

	Medication Adherence (n = 44)		
Comparison	Time	Group	Time*Group
Effect size (Cohen's f)	.60 (large)	.12 (small)	.41 (large)
Statistical Power (1-b)	1.00	.15	1.00

Table 11. Post-hoc Power Analyses for Medication Adherence

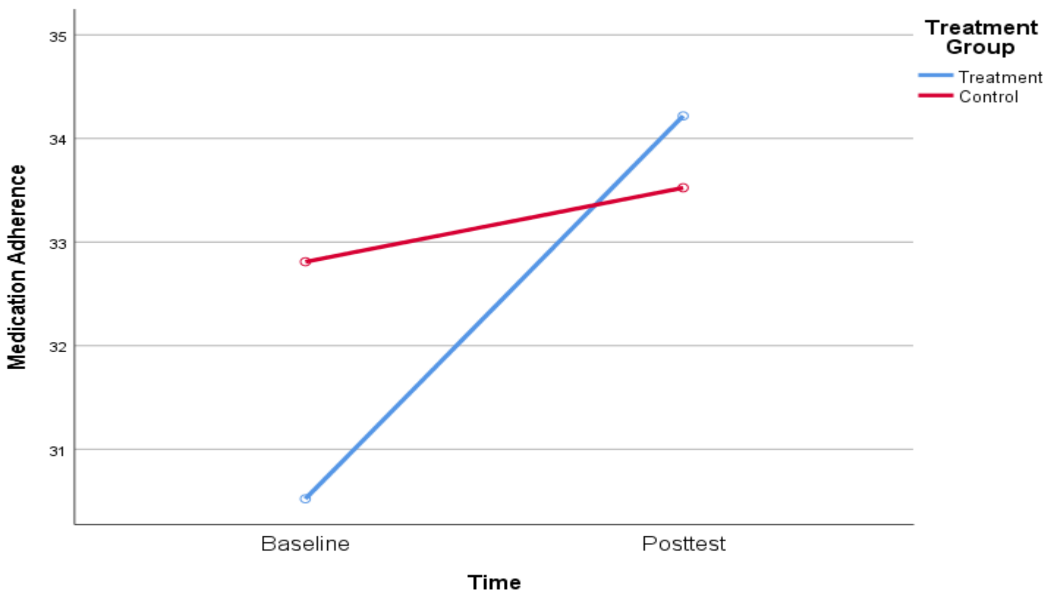

Figure 3. Line plot of medication adherence over time and by group.

Paired Samples t-test for Medication Adherence. Two paired samples *t*-tests were conducted to further examine medication adherence over time for the treatment and control group. Medication adherence scores significantly increased among subjects in the treatment group from baseline to post-treatment, $t(22) = -3.86$, $p < .001$, 30.52 to 34.22 respectively. Results of the paired samples *t*-test for the control group were not statistically significant, $t(20) = -1.28$, $p = .214$. Results of the paired samples *t*-tests are presented in Table 12.

Continuous Variables	Pretest		Posttest		*T*	*df*	*p*
	M	*SD*	*M*	*SD*			
Medication adherence							
Treatment (n = 23)	30.52	4.06	34.22	2.78	-3.86	22	.001
Control (n = 21)	32.81	4.33	33.52	3.86	-1.28	20	.214

Table 12. Paired Samples t-test Medication Adherence

Independent Samples t-test for Medication Adherence. Two independent samples *t*-tests were conducted to further examine medication adherence over time for the treatment and control group. Results of the independent samples *t*-test for the pretest scores were not statistically significant, $t(42) = -1.81$, $p = .078$. Results of the independent samples *t*-test for the posttest scores were not statistically significant, $t(42) = 0.69$, $p = .4958$. Results of the independent samples *t*-tests are presented in Table 13.

Continuous Variables	Treatment (*n* = 23)		Control (*n* = 21)		*t*	*df*	*p*
	M	*SD*	*M*	*SD*			
Medication adherence							
Pretest	30.52	4.06	32.81	4.33	-1.81	42	.078
Posttest	34.22	2.78	33.52	3.86	0.69	42	.495

Table 13. Independent Samples t-test Medication Adherence

Medication adherence was assessed using the nine-item HB-MAS scale; this is a self-report Likert scale (1 = all the time, 2 = most of the time, 3 = some of the time, and 4 = none of the time). Higher scores reflect higher adherence to antihypertension drug therapy. All participants (n = 44) completed the HB-MAS at baseline (Time 1) and post intervention (Time 2). Total scores at baseline ranged from 19 to 36 (mean = 31.61, SD = 4.29). Post intervention scores ranged from 20 to 36 (mean =33.89, SD =3.32). The difference between the two scores represent an increase of 2.28 from the start of the study to the end of study, indicating a higher combined group adherence to antihypertension drug therapy. Post intervention, the treatment group had higher scores on the HB-MAS showing a 3.7 increase compared to the control group with a 0.71 increase. See Table 14 for medication adherence descriptive statistics by group.

	Control Group	Treatment Group	Combined Group
Baseline (Time 1)	32.81 (4.33)	30.52 (4.05)	31.61 (4.29)
Post Intervention (Time 2)	33.52 (3.86)	34.22 (2.78)	33.89 (3.32)

Table 14. HB-MAS Descriptive Measures

Chapter Summary

The findings from this pilot study provides preliminary evidence to support the use of a text message intervention to improve BP and medication adherence. These findings may be used to inform the design of a larger more comprehensive study. In this study a series of mixed factorial ANOVAs were computed to assess for differences in BP and medication adherence over time and by group. Both groups revealed changes overtime in medication adherence and diastolic BP. The treatment group had significantly higher medication adherence than the control group. Findings of the follow-up paired samples *t*-tests indicated that there were significant differences in medication adherence scores between pretest and posttest for the treatment group.

A series of post-hoc power analyses were also conducted to examine the achieved power based on the effect size of each statistical comparison for systolic BP, diastolic BP, and medication adherence. For the variable of time (baseline vs posttest), the effect sizes were .27, .36, and .60, respectively for systolic BP, diastolic BP, and medication adherence. The corresponding power by time was .94, 1.00, and 1.00, respectively for systolic BP, diastolic BP, and medication adherence. The minimum effect size to achieve a power of .80 was f = .22.

For the variable of group (treatment vs group), the effect sizes were .05, .08, and .12, respectively for systolic BP, diastolic BP, and medication adherence. The corresponding power by group was .07, .10, and .15. The minimum effect size to achieve a power of .80 was f = .38.

For the variable of time*group, the effect sizes were .15, .24, and .41, respectively for systolic blood pressure, diastolic blood pressure, and medication adherence. The corresponding power by time*group was .49, .87, and 1.00. The minimum effect size to achieve a power of .80 was f = .22.

The purpose of this study was to determine if the use of a text message intervention has an effect on BP and medication adherence among African American older adults 60 years of age and older with HTN. In this chapter, the findings of the data analyses are presented. A description of the study sample's age, duration of HTN diagnosis, the number of prescribed antihypertension medication, the number of comorbidities, and other demographic data: marital status, employment status, education level, and yearly income were also provided. In addition, the use of a text message intervention was evaluated and discussed in this chapter.

CHAPTER 5

Discussion

The purpose of this study was to determine if a text messaging intervention had an effect on BP and medication adherence among African American older adults with HTN. A total of 44 participants (n=21control group; n=23 treatment group) were enrolled and asked questions from the demographic questionnaire and the HB-MAS. At the end of the two-month intervention, both groups were asked to another meeting for post-intervention data collection. Both groups were asked to provide the PI with the two-month BP log at the end of the study. In addition, participants in the intervention group were asked to evaluate the text message intervention, with the five-question evaluation tool (See Appendix G). This chapter includes the interpretation of major findings and how these findings compare to existing research literature on this topic. Study limitations, implications for nursing practice, and recommendations for additional nursing research are also discussed.

Interpretation of Findings

Descriptive measures of BP for all participants showed an average of 137.09 (SD = 17.22) systolic BP at baseline compared to an average systolic BP post intervention of 132.77 (SD 14.31). This decrease in systolic BP post-treatment is aligned with findings of Buis et al. (2017) and Bobrow et al. (2016), as these researchers reported lower systolic BP within participants following a text message intervention.

When diastolic BP was measured, results of the within-subjects effect (pretest vs posttest) were significant, F (1, 42) = 5.34, p = .026, η^2 = .113, suggesting that there were significant differences in diastolic BP between pretest and posttest. However, results of between-subjects effect (treatment vs control) for diastolic BP were not significant between treatment and control groups. These findings differ from He et al. (2017), that found significant changes in diastolic BP between treatment and control groups following an 18-month text message intervention study. The reason for this discrepancy in outcome may be due to the short length of the present intervention (two months).

Results of the paired samples t-test in medication adherence for the treatment group were statistically significant, suggesting that there were significant differences between pretest and posttest for the treatment group. Findings of paired samples t-tests reinforce the findings of Anthony et al. (2015) who found that medication adherence was greater after text messaging treatment sent twice a day for 15 days. Similarly, these findings are congruent with results of Maslakpak and Safaie (2016) who found that receiving text messages often led to higher adherence rates to medication. However, findings of this study are different from Buis et al. (2017), as those researchers did not find any significant changes to medication adherence after a one-month text message intervention.

Results of the post-intervention questionnaire indicated that, overall, participants found that text messages were useful in motivating them to adhere to medication protocols and that once a week was the most preferred timeframe in which to receive text messages about medication adherence. This is consistent with qualitative research conducted in this area indicating that text message reminders help with motivation and medication adherence (Leon, Surender, Bobrow, Muller, & Farmer, 2015).

Limitations

This study was limited in a few ways. The first limitation was sample size. As the sample size was relatively small (N = 44), results are likely not generalizable to all African American older adults with HTN. Additionally, as all participants were from two sites within close proximity to one another, results of this study may not be generalizable to African American older adults with HTN in other localities. Thus, the use of two local church congregations in Texas does not fully represent the population, which affects the generalizability of the study findings (Gliner et al., 2017).

In addition to limitations regarding sampling, there were limitations within this study related to the study design. Study participants were not randomized to groups, thus groups were not as heterogeneous as in randomized studies (Gliner et al., 2017). Another possible limitation was the repeated use of the self-reported HB-MAS scale among the control and intervention groups, as participants were asked to complete this scale twice during the study (at baseline and again at the end of the study). Although self-report measures are useful in data collection, self-report instruments often alter the way in which participants answer. When researchers use self-report measures, participants may exaggerate answers, or participate in social desirability ways (King & Bruner, 2000). Social desirability bias occurs when participants answer in a way in which they believe is either helpful to the researcher or is the most socially acceptable (King & Bruner, 2000).

Implications for Nursing Practice

This study provides further evidence to support the use of text messaging to improve BP and medication adherence among African American older adults with HTN in primary care or for community-living adults. Weekly text message reminders and BP self-monitoring appear to be beneficial. Approximately 87% of study participants indicated that text messages helped to motivate them to take their BP medication. In addition to the text message intervention, 40 (90.9%) of participants were able to take their BP at home and maintain a BP log. Sending weekly text message reminders and incorporating at home BP self-monitoring as a standard of practice implemented by nurses and other healthcare providers may be warranted to optimize self-management, medication regimes, and HTN outcomes. Additionally, the cost is relatively low for the software to send text messages, and for home-based BP monitors, so primary care practitioners could implement both measures.

Recommendations for Future Research

Currently, there are no universal practice guidelines for using text message interventions to aid in medication adherence and BP control. This lack of universal practice guidelines provides room for further research to be conducted targeting African American older adults with HTN. Existing researchers have varied greatly in their approach to content used for HTN text messages. In this study the text messages were created using information from the American Heart Association. Creditable authoritative sources should be used to guide the development of text message content.

In addition, more research is needed to examine the ideal frequency of text messages to have a measurable effect on BP levels. Furthermore, the use of validated objective measures of medication adherence is also recommended. In other studies, direct pill counts and electronic pill monitoring systems were used with varying degrees of success. More research is needed in this area to determine effective methods that can be used to assess medication adherence practices among African American older adults.

In addition, future research would benefit from observing changes in BP and medication adherence over a longer period of time. Longitudinal studies targeting African American older adults, 60 years and older, with HTN are needed. Finally, because this was a pilot feasibility study to test the intervention, this study should be replicated using a larger sample from diverse racial and ethnic backgrounds.

Chapter Summary

The purpose of this study was to determine if a text messaging intervention had an effect on BP and medication adherence among African American older adults with HTN. Results of this study indicated that text messaging was successful in lowering rates of systolic and diastolic BP and increasing medication adherence among participants. Although this study included sampling and methodological limitations, future research could correct or mitigate some of these limitations.

Future research should focus on replication of this study with a larger sample size, randomized of treatment/control groups, and less use of self-report measures to mitigate effects of social desirability bias. Results of this study indicate that text-messaging interventions may be useful in increasing medication adherence in African American older adults with HTN, however, more research is needed to fully realize the efficacy of this treatment. This chapter included the interpretation of major findings as they relate to previous studies conducted in this area, study limitations, implications for nursing, and recommendations for future research.

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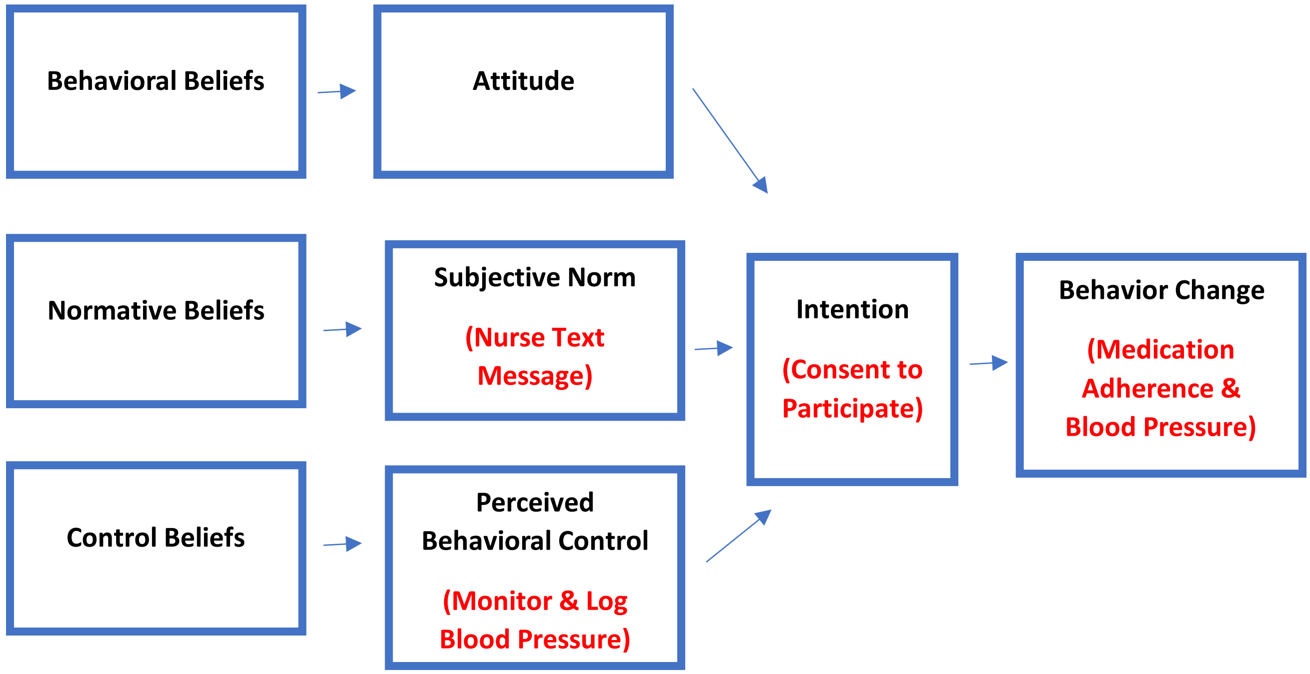
Appendix A

Modified Theory of Planned Behavior Model (Ajzen, 2006)



Appendix B

Literature Review Table

Source/Location	Design	Sample Age	Message Content	Frequency /Duration	Outcome
Anthony et al., (2015) Iowa City, Iowa	RCT -3 grps	N= 123 Adults >20 years of age, mean age 61.3 (text message reminder group), and 58.6 (Bi-directional text message group) Ethnicity not reported	Source not reported	Text messages sent twice a day for 15 days	Participants in the bi-directional text messaging group reported blood pressure measures taken at home more often than those in the text message reminder group (p=.038) and the control group (p<.001). Patients were more responsive to bi-directional text messaging and text messaging reminders over standard practice. This study was not powered to investigate differences in blood pressure or clinical outcomes.
Maslakpak & Safaie (2016) Urmia, Iran	RCT	N=123 Adults 20-60 years of age,mean age 53	Source not reported	6 text messages a week for 3 months	Before the intervention mean adherence to treatment and its dimensions (adherence to diet, drug regimens, and follow-up appointments) between the groups had no statistically significant differences (p>0.05). Following the intervention adherence increased in the text messaging and reminder cards groups compared to the control group (p<0.001).
Bobrow et al., (2016) Cape Town,	RCT -3 grps	N= 1372 Adults ≥21 years of age, mean age	Researcher designed, mapped to a taxonomy of behavior change	Text messages were sent once a week for 1	A small reduction in systolic blood pressure was found in the text message group -1.6mmHg (95% CI, -3.7 to 0.6) when compared to the standard care group -2.2 mmHg

South Africa		54.3	techniques	year	(95% CI -4.4 to -0.04).
Hacking et al., (2016) Cape Town, South Africa	RCT mixed method	N= 223 Adults >20 years of age, mean age 53.83	Researcher designed	90 text messages were sent during a 17 week period	No statistically significant changes in HTN knowledge were found between the control and the intervention group (p=.69). Intervention group had positive increases in self-reported HTN behavior changes (reaffirmed by the focus groups, which also revealed a strong preference for using text messaging interventions).
Buis et al., (2017) Detroit & Southfield Michigan	RCT	N=123 Adults ≥18, mean age 52.2 years (primary care group) 46.4 (emergency department group) Ethnicity-African American	Based on HTN management recommendations from the American Heart Association	Daily text messages at individually customized times for 1 month	Participants who received an automated text message medication reminder showed nonsignificant changes in medication adherence (p=.26, p=.78, and p=.54). Those with higher systolic BP at enrollment exhibited significantly greater improvements at one month (β=-0.63, p<.001)
Varleta et al., (2017) Santiago, Chile	RCT	N=314 Adults 30-80 years of age, mean age	Researcher designed using social cognitive theory	Text messages sent every 12 ±2 days for 6 months	Antihypertensive drug adherence increased from 49% to 62.3% (p=.01) in the text message group compared to the control group whose adherence decreased from 59.3% to 51.4% (p=.1). There

		60.7			was not enough power to make statistical comparisons between the two groups.
He et al., (2017) Buenos Aires, Misiones, Tucuman, Corrientes, and Entre Rios, Argentina	RCT	N=1432 Adults ≥21 years of age, mean age 55.8 years	Source not reported	Text messages sent weekly for 18months	Systolic blood pressure reduction from baseline to 18months was 19.3mmHg for the intervention group and 12.7mmHg for the usual care group; the difference between the groups was 6.6mmHg (95% CI, 4.6-8.6; p=.001). Diastolic blood pressure decreased by 12.2mmHg in the intervention group and 6.9mmHg in the control group the difference between groups was 5.4mmHg (95%CI, 4.0-6.8mmHg, p<.001).

Appendix C

Demographic Questionnaire

1. Age (in years):_____

2. Sex:
   _____Male
   _____Female

3. Marital Status:
   _____Single
   _____Married
   _____Separated
   _____Divorced
   _____Widowed

4. Employment Status:
   _____Fulltime employment
   _____Part-time employment
   _____Unemployed
   _____Retired
   _____Disabled (unable to work)

5. Yearly Income:
   _____less than $20,000
   _____$21,000 to $30,000
   _____$31,000 to $40,000
   _____$41,000 to $50,000
   _____$51,000 to $60,000
   _____Above $60,000

6. Highest Level of Education Completed:
   _____Less than high school
   _____High school diploma or equivalent degree
   _____Associate Degree
   _____Bachelor's Degree
   _____Master's Degree
   _____Doctorate Degree

7. How long have you had high blood pressure (in years): _______________

8. How many prescription medications, meaning from your doctor, are you taking to treat high blood pressure?________

9. Do you also have:
   High cholesterol? _____Yes _____No
   Heart problems (heart attack, irregular heartbeat, heart failure)? _____Yes _____No
   Diabetes? _____Yes _____No

Appendix D

Hill-Bone Medication Adherence Scale

No.	Item	Response: 1. All of the Time 2. Most of the Time 3. Some of the Time 4. None of the Time
1	How often do you forget to take your **high blood pressure** medicine?	
2	How often do you decide NOT to take your **high blood pressure** medicine?	
3	How often do you forget to get prescriptions filled?	
4	How often do you run out of **high blood pressure** pills?	
5	How often do you skip your **high blood pressure** medicine before you go to the doctor?	
6	How often do you miss taking your **high blood pressure** pills when you feel better?	
7	How often do you miss taking your **high blood pressure** pills when you feel sick?	
8	How often do you take someone else's **high blood pressure** pills?	
9	How often do you miss taking your **high blood pressure** pills when you are careless?	

Appendix E

Blood Pressure Instructions & Weekly Log

Instructions:

- Take your blood pressure at the same time every day.
- Remove clothing that maybe too tight around your arm.
- For best result, sit comfortably with both feet on the floor for at least five minutes before taking your blood pressure.
- When you measure your blood pressure rest your arm on a table with your back supported. The blood pressure cuff should be at the same height as your heart.
- Remain quiet when taking your blood pressure.
- Record your blood pressure on this sheet and show it to your doctor

Week 1:	Time:	Blood Pressure:
Week 2:	Time:	Blood Pressure:
Week 3:	Time:	Blood Pressure:
Week 4:	Time:	Blood Pressure:
Week 5:	Time:	Blood Pressure:
Week 6:	Time:	Blood Pressure:
Week 7:	Time:	Blood Pressure:
Week 8:	Time:	Blood Pressure:

Taking your blood pressure is a standard procedure you should not feel any discomfort. Please call your healthcare provider or seek emergency services if you feel uncomfortable in any way. If you have equipment questions or questions about how to properly take your blood pressure please feel free to call Elesha Roberts at ***-***-***

Appendix F

Text Message Intervention

Week 1: Take your pills for high blood pressure exactly as your doctor told you. Taking a pill every other day or splitting your pill in half may be dangerous.

Week 2: Your doctor may ask you to take more than one pill to help you manage your high blood pressure. Talk to your doctor about your medication and what is right for you.

Week 3: Ask your doctor to explain how your pills work and when you should take them. Repeat back what the doctor said to you to make sure you got it.

Week 4: Make a list of all the pills that you take and share it with your doctor and pharmacist.

Week 5: Talk to your doctor before taking over-the-counter pills or supplements.

Week 6: Take your blood pressure log with you to show your doctor at your next appointment.

Week 7: Check your blood pressure every day, write it down and show it to your doctor.

Week 8: Take your pills at that same time every day.

*Check your blood pressure today. Text STOP at any time to stop receiving messages.

Appendix G

Text Message Evaluation Questions

1. Where you able to clearly understand the text messages sent to your phone?
   _____None of the time
   _____Some of the time
   _____All of the time

2. Did the text messages help motivate you to take your blood pressure medication?
   ____Yes
   ____No

3. Were the text messages sent to you at a good time?
   _____None of the time
   _____Some of the time
   _____All of the time

4. How often would you like to receive a text message about your blood pressure?
   _____Everyday
   _____Once a week
   _____Once a month
   _____Never
   _____Other, please explain:
   ____
   ____
   ____
   ____
   ____
   ____

5. How did the text messages and BP monitor help you in your opinion?
   ____
   ____
   ____
   ____
   ____
   ____

Biographical Information

Elesha R. Roberts completed her PhD in Nursing at the University of Texas at Arlington in 2019. She received the Dr. Mary Lou Bond Endowed Fellowship Award for her dissertation study. In addition, she has maintained her membership in the international nursing honor society Sigma Theta Tau Delta Alpha-at-Large Chapter. During her doctoral program she was an Albert Schweitzer Fellow and a Jonas Nursing Scholar. She has been a Registered Nurse for 16 years working in a variety of healthcare settings with adult populations. As an Albert Schweitzer fellow she created and implemented a community program on the east side of San Antonio providing nurse facilitated educational workshops to older adults with hypertension. The goal of this program was to improve blood pressure and promote healthy lifestyle practices within this population. She devoted over 400 hours of service to this community of older adults.

In 2007, Elesha, graduated from the University of the Incarnate Word (UIW) in San Antonio, Texas with a Masters of Science in nursing degree. She completed her undergraduate Bachelors of Science in nursing degree from UIW in 2005. Prior to receiving her bachelor’s degree, she also obtained an Associate Degree in nursing in 2003 from San Antonio College. Elesha currently works as an undergraduate theory and clinical instructor at Baylor University in the Louise Herrington School of Nursing. Prior to this appointment in 2018, she was a Clinical Assistant Professor at the University of Texas Health Science Center in San Antonio. Following graduation, she plans to continue to explore mobile health technologies that can be used to improve blood pressure and medication adherence for community dwelling African American older adults with hypertension.