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Examining the Effects of Psychosocial Stress on the Hypertension Self-Management Behaviors of African American Women

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Examining the Effects of Psychosocial Stress on African American Women's Hypertension Self-Management Behaviors

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University

By

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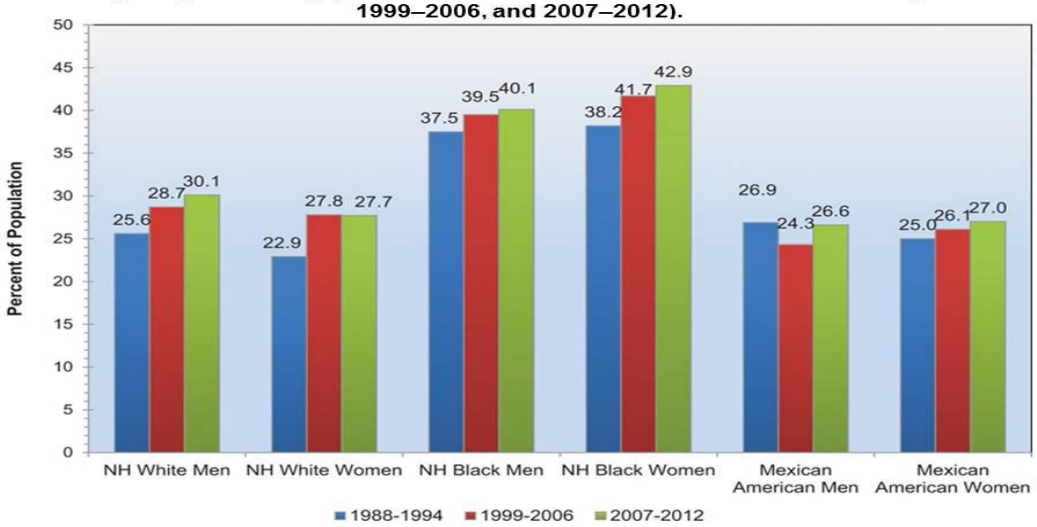
Chapter 1: Introduction

Hypertension is a major health risk factor for several leading causes of morbidity and mortality in the United States including heart disease, end-stage renal disease, and stroke.[1,2] An estimated 69% of people in the US who have a first heart attack, 77% of people who have a first stroke and 74% of those who have congestive heart failure are hypertensive with blood pressures higher than 140/90.[3]

Hypertension prevalence in the U.S. is particularly high among African Americans (See Figure 1.1). African Americans have the highest prevalence of hypertension in the U.S and, according to some estimates, they also have the highest prevalence of hypertension in the world.[3-5]

Figure 1.1 Age-adjusted prevalence trends for high blood pressure in adults ≥20 years of age by race/ethnicity, sex, and survey (National Health and Nutrition Examination Survey: 1988–1994, 1999–2006, and 2007–2012).



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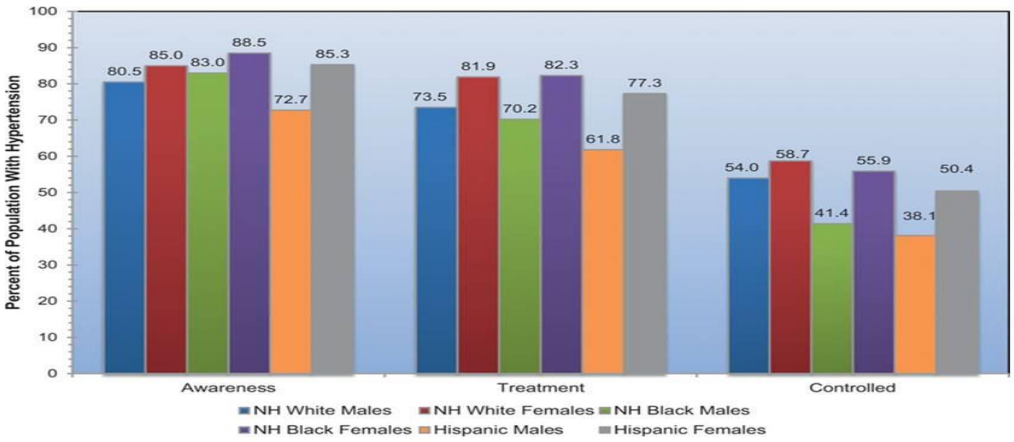
Two in five African American adults in the US have hypertension, compared to one in three adults in the US.[3,6] Not only is hypertension more common among African Americans, but African Americans are more likely to develop hypertension at earlier ages and have difficulty controlling their hypertension post onset.[4,7-10]

Epidemiological data reveal a persistent pattern of disparate hypertension-related health outcomes between African Americans and whites as a result of uncontrolled hypertension.[11] Left uncontrolled, hypertension can lead to and exacerbate many major chronic health conditions and can even result in premature death. Several reports indicate that uncontrolled hypertension is the leading risk factor for three of the top five causes of death among African Americans—heart disease, stroke, and kidney disease.[1,2,12] Data published by the American Heart Association (2010), show that the overall death rate resulting from high blood pressure (HPB) were 17.2 for white males, 50.2 for African American males, 15.0 for white females and 37.1 for African American females.[3,4]

Hypertension is not only more common and fatal among African Americans, but it has been steadily increasing among African Americans compared to other race/ethnic groups in the US since the 1980s.[3,5,13-15] The disturbing trends of high hypertension prevalence and poor health outcomes linked to uncontrolled hypertension among African Americans point to a need to focus more research on identifying factors contributing to poor hypertension management among African Americans in the US. There is widespread consensus among health practitioners, interventionists and researchers that awareness, treatment and effective management to control hypertension are imperatives for reducing hypertension related mortality and morbidity.[3,14,16,17]

Data from the National Health and Nutrition Examination Survey (2007-2010) show very few differences in hypertension awareness by race/ethnicity and gender (See Figure 1.2).

Figure 1.2 Extent of awareness, treatment, and control of high blood pressure by race/ethnicity and sex (National Health and Nutrition Examination Survey: 2007–2012).



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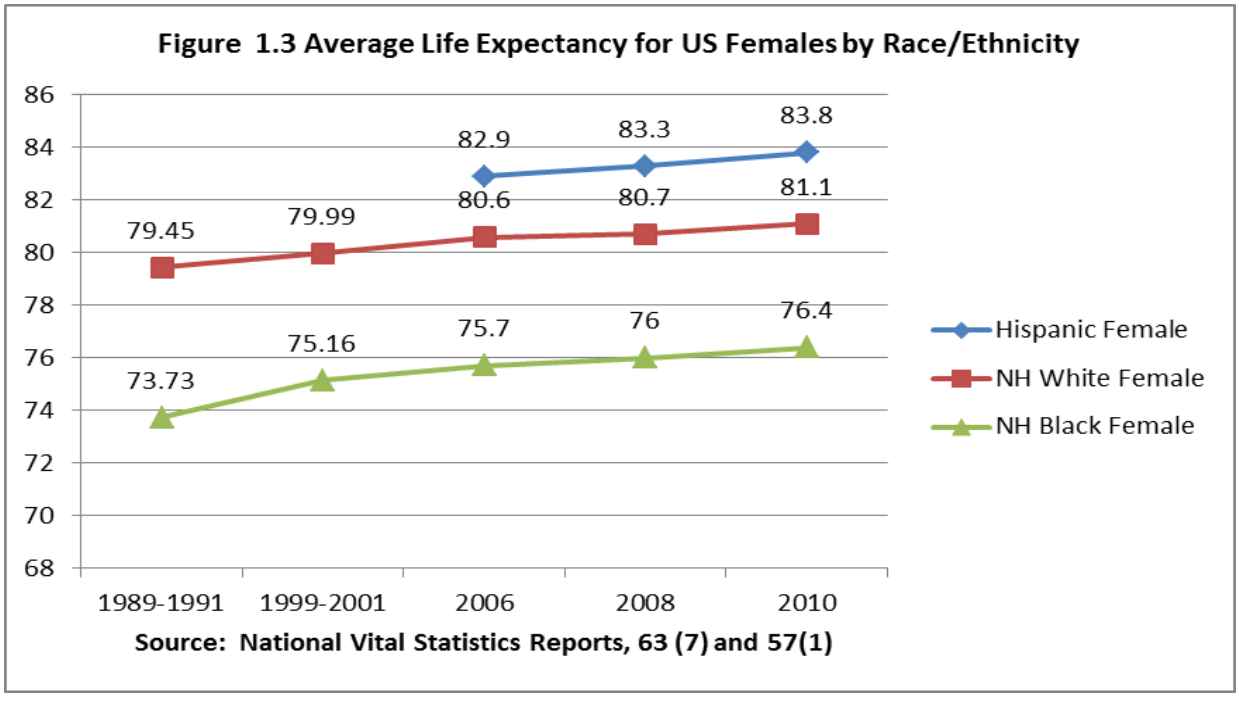
Hypertension awareness ranged from 87.8% in non-Hispanic African American women compared to 84% in non-Hispanic white women and 80% in African American men compared to 79% in non-Hispanic white men.[3] Similarly, hypertension treatment rates were also higher in African American women (80.4%) compared to non-Hispanic white women (79.1%).[3] Comparing treatment rates between African American men and non-Hispanic white men, however the converse was true; treatment was lower for African American men (68.8%) than in white men (72.3%).[3] For hypertensive men and women of any race/ethnicity, blood pressure control remains lower than ideal and lowest among males of color.[3] These race-gender differences in awareness, treatment and control of hypertension are not new but have shown similar trends since the twentieth century.[3,4,16]

Overall these data show that a majority of African Americans with hypertension, similar to other race and ethnic groups are aware of and are being treated for hypertension. However,

when you examine the control rates, you get a picture that is a bit more disconcerting. Based on the data presented in Figure 2, if we are to see significant improvements in hypertension mortality and morbidity, it appears that focusing on control and management is a good place to focus our attention.

Why Focus on Hypertension Among African American Women?

The US has made significant advances in medical research, treatments, and technologies that are reducing mortality and morbidity rates for many diseases across the general population.[18] Notwithstanding this promising progress, African American women continue to die earlier and more frequently than other women in the US from preventable and controllable chronic health conditions and notably due to hypertension and hypertension-related illnesses.[19-21] The average life expectancy for African American females historically has been, on average, five years lower than non-Hispanic white females (see Figure 1.3).[22,23]



While there are multiple factors contributing to the high death rates of African American women, hypertension is one of the most common and modifiable risk factors associated with fatal health outcomes among African American women.[13-15] An estimated 46% of African American women have hypertension compared to 31% of non-Hispanic white women. The rate of death resulting from hypertension is more than double for African American females (38.6) compared to white females (14.5).[14] Even armed with increased knowledge and awareness, African American women are still encountering barriers to controlling their hypertension, which places them at higher risk of becoming sicker and dying earlier than their white counterparts.[13,14,24-26]

Multiple studies have examined barriers to blood pressure management and control in African Americans and found several prevalent factors that inhibit hypertension management.[27-31] Common factors include cultural norms (beliefs, attitudes) about body size linked to obesity risks including beliefs that a thin body means poor health or is unattractive; high dietary intake of sodium and fat; low dietary calcium intake; low adherence to treatment plans; patient-provider relations (including mistrust); stress; age and length of time with HBP diagnosis; negative response to medications; and socio-economic factors including poverty effects (unreliable or no transportation to get treatment, no child care, and work restraints).[16,30,32]

Further, there is persuasive evidence linking the development of hypertension to a complex interaction of risks including age, ethnicity, family history, genetics, behavior, environment, and social factors (e.g. access to health care, insurance status, SES and education) [13,24,33,34] However, a gap in the health literatures on hypertension management is the influence that psychosocial factors play on hypertension self-management behaviors among African American women.[35-37]

African American Women's Hypertension Self-Management: Why Is Psychosocial Stress Worth Studying?

The link between health self-management and improving health-related quality of life, preventing the progression of chronic diseases and premature mortality is virtually undisputed in the health literatures.[38-42] Meta-analyses of self-management intervention studies using randomized trials have consistently found positive outcomes for patients with several major chronic conditions including diabetes, hypertension, arthritis, and asthma.[38,43]

Meta-analyses of self-management intervention studies using randomized trials have consistently found positive outcomes for patients with several major chronic conditions including diabetes, hypertension, arthritis, and asthma.[38,43] However, finding a standard definition of what self-management means is difficult and often disease or condition specific.[38,44-46] For the purpose of moving forward with some simplicity and synthesizing multiple definitions, self-management is defined in this research project as individual behaviors and cognitive decisions directly linked to the control and improvement of one's own health outcomes and day-to-day management of existing chronic conditions or disease. [38,39,41,43]

Rotheram-Borus et al. (2012) propose that the essential elements for successful self-management are: (1) activate motivation for change; (2) apply information from education and self-monitoring; (3) develop skills; (4) acquire environmental resources; and (5) build social supports.[38] The tenets of Rotheram-Borus et al.'s (2012) model are grounded in multiple health behavior theories including, Theory of Planned Behavior and the Integrated Behavior Model, in which evaluations of behavioral outcomes and motivation to comply are key determinants of individual behavior intention which is the direct path to behavior change or behavior outcome. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and

Treatment of High Blood Pressure acknowledges that "the most effective therapy prescribed by the most careful clinician will control hypertension only if patients are motivated."[47] However, different psychosocial factors such as depression, stress or anxiety can impede motivation, self-regulation and adherence to medical regimens.[38] It is plausible, for example, that psychosocial factors such as stress can impede self-management by decreasing motivation to change behavior and interfere with self-monitoring. The rationale is that stressors, if left unregulated, can often dominate a person's daily life and impair decision making. If an individual is constantly dealing with stressors (chronic stress) or feeling burdened by daily stressors, then responding to the stressors becomes a primary focus and health self-management becomes a secondary focus. For example, researchers have found that chronic and even brief (30 minutes) stress exposure can impair decision making and lead to risky health behaviors.[48,49]

Exposure to chronic stress can be particularly harmful for hypertensive patients by predisposing them to risky behaviors that exacerbate their condition. For example, Tryon et al. (2013), in their study on chronic stress exposure and the brain's response to high calorie food cues, found that persistent stress exposure may alter the brain's response to food in ways that predispose individuals to poor eating habits which, if sustained, may increase risk for obesity which is also a risk factor for resistant hypertension.[47,49] Further, Cohen et al. (2007) propose that behavioral changes occurring as adaptations or coping responses to stressors, such as increased smoking, decreased exercise and poor adherence to medical regimens, provide an important pathway through which stressors influence disease risk.[50]

While every person has some level of psychosocial stress, some segments of the population are at greater risk of exposure to multiple stressors that exacerbate the effects of psychosocial stress on their health.[51-53] For example, ethnic minority populations (e.g., African

Americans, Hispanic/Latino) are more likely than whites to live in urban areas where the potential for exposure to daily stressors are high due to environmental and economic conditions (e.g., poverty, violence, food insecurity).[54-56] Some researchers have made the compelling argument that African American women are faced with multiple stressors that negatively impact their health as a consequence of their social status and membership within two historically marginalized groups based on their race and sex—African American and female.[57-59] Population data from the US Census Bureau and socioeconomic data reveal that, compared to white women, African American women are more likely to be single heads of households, primary care givers of aging or sick family members, and live in poor communities or in close proximity to poor communities where violence and victimization are prevalent.[21,60,61] The amalgamation of poverty, exposure to violence, and heightened risk of victimization and discrimination are all factors that place African American women at a particularly high risk for experiencing psychosocial stress.[51,62-64]

Psychosocial stress is defined as the psychological (e.g. excessive worry, fear, anxiety, and anger) and physiological (increase heart rate, nervousness, "butterflies in stomach", headache) responses an individual experiences as a result of social forces (e.g. financial hardship, discrimination, or family problems) that lead to maladaptive behaviors resulting in poor health outcomes.[50,52] Psychosocial stress exposure is not unique to the experiences of African American women. However, several studies highlight important ways that African American women respond to and experience psychosocial stress that warrant concern.[65-68] In their study examining health deterioration and age patterns of allostatic load scores among African Americans and whites in the United States, Geronimus, Hicken, Keene and Bound (2006) found that African American women have higher allostatic load scores than African American men and white

women across age groups ranging from 18 to 64, reporting that the racial differences in allostatic load scores are small in the late teens and early 20s but widen significantly through adulthood and are largest between the ages of 35 and 64. Further, differences were particularly pronounced among non-poor African American women compared with non-poor white women and non-poor African Americans in general have a greater probability of high allostatic load scores than do poor whites.[68,69]

It is not so much the mere presence of stress or brief periods of stress exposure, but the accumulation of multiple or chronic stressors repeated over time that can deteriorate health and result in poor health outcomes, which is a concept that Geronimus refers to as "weathering."[68] In a qualitative study testing the "weathering" hypothesis on heart disease among African American women living in an urban area, researchers found a negative correlation between heart health and cumulative stressors including individual, family, neighborhood, and socioeconomic stressors.[70] In another study of African American women participating in a behavioral intervention to promote weight loss, researchers found that interpersonal, family, work/occupational, legal, and structural (transportation) stressors can act as barriers to African American women's participation in health interventions to modify behaviors associated with obesity.[66]

Applying the "stress and strength" hypothesis to African American women's breast cancer screening, Black and Woods-Giscombe (2012) found that a prevailing identity among many African American women is that of the "strong black woman" and, in fulfilling this role, African American women are more likely to delay their own self-care in exchange for providing support and giving care to family members or significant others. These "strength behaviors" may not only be the source of their stressors, but may exhaust African American women's personal

resources for prioritizing or engaging in preventive care (i.e. diet, exercise, screening, and medical management).[71]

Gaining a better understanding of the ways in which psychosocial stress can act as a barrier or attenuate health self-management behaviors of African American women could yield useful findings for improving hypertension treatment results in African American women. It could also prove invaluable to advancing knowledge about the hypertension self-management behaviors of African American women by examining closely the differences between those women who are managing their hypertension by adhering to the medical guidelines (i.e. medication adherence and behavior modifications related to physical activity and healthy diets) with women who are non-adherent and not managing their hypertension as prescribed by a medical provider, controlling for psychosocial stress.[47,72]

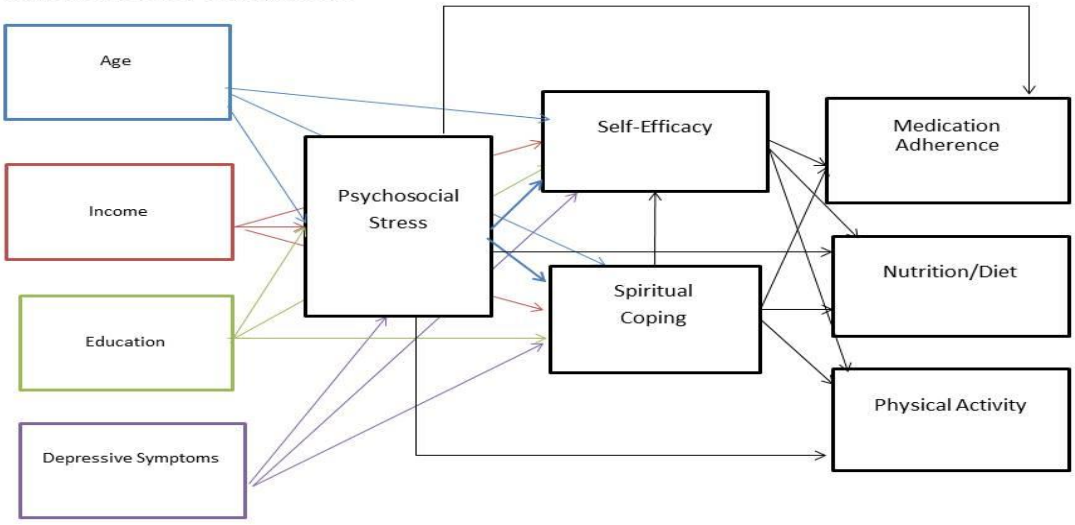
Aims of this Research Project

The specific objective of this research project is to conduct a mixed-methods study using focus groups and a cross-sectional survey of hypertensive African American women, aged 21 to 64, to better understand African American women's responses to psychosocial stressors and the dynamic ways in which psychosocial stress affects hypertension self-management behaviors (i.e. physical activity, nutrition and medication adherence) of African American women, accounting for multiple social and behavioral factors including SES, age, self-efficacy, coping responses (spiritual) and self-reported symptoms of depression. The specific aims of this study are to: (1) Identify and explore the nuanced ways in which hypertensive African American women aged 21 to 64 in the low and mid-to-high socioeconomic stratums describe how they experience psychosocial stress and identify specific stressors that are prevalent in their daily lived

experiences and the ways psychosocial stress caused by theses stressors impacts their hypertension self-management behaviors.

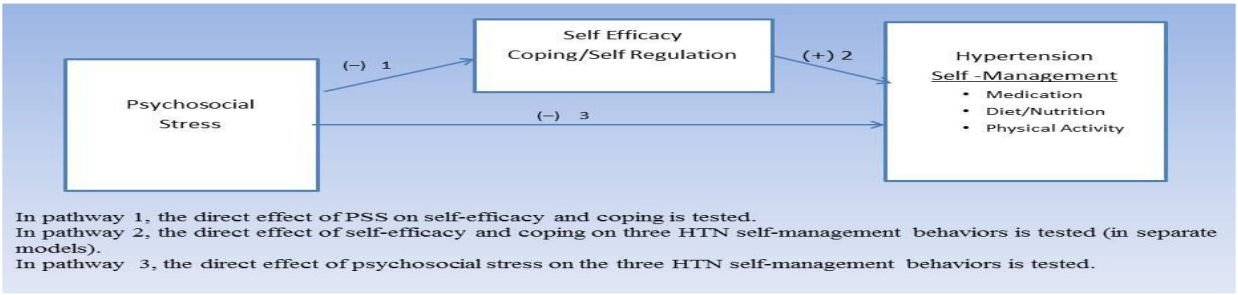
(2) Examine the relationship between psychosocial stress and three hypertension self-management behaviors (e.g. physical activity, diet/nutrition, and medication adherence) and test whether this relationship is mediated by self-efficacy and coping responses, controlling for age, SES, and depressive symptomology. A conceptual model of the relationship between the predictor, mediator and outcome variables identified in Aim 2 is illustrated in Figure 1.4.

Figure 1.4
Conceptual Model Examining Effects of Psychosocial Stress, Self-Efficacy, and Spiritual Coping on Hypertension Self-Management



The conceptual model as illustrated in Figure 1.4 assumes the following relationships and effects as illustrated in Figure 1.5; the (the exogenous (demographic) variables are not included in the following illustrations but are tested in the model):

Figure 1.5
Conceptual relationship of a full mediation model of among psychosocial stress, self efficacy, coping/self regulation, and hypertension self management



In pathway 1, the direct effect of PSS on self-efficacy and coping is tested.
In pathway 2, the direct effect of self-efficacy and coping on three HTN self-management behaviors is tested (in separate models).
In pathway 3, the direct effect of psychosocial stress on the three HTN self-management behaviors is tested.

The hypotheses that are tested in this research study are as follows:

H_1: In a sample of African American women with hypertension, psychosocial stress will be negatively associated with three hypertension self-management behaviors—healthy diet, physical activity and medication adherence. Specifically, higher reported psychosocial stress levels are associated with lower hypertension self-management behavior scores.

H_2: In a sample of African American women with hypertension, self-efficacy and coping response will mediate the effects of psychosocial stress on hypertension self-management behaviors such that, relative to the overall sample, the following will be supported by the data:

H_{2a}: Psychosocial stress will negatively predict coping responses and coping responses, in turn, will positively predict three hypertension self-management behaviors: medication adherence, diet, and physical activity.

H_{2b}: Psychosocial stress will negatively predict self-efficacy, in turn, self-efficacy will positively predict three hypertension self-management behaviors: medication adherence, diet, and physical activity.

H_3: In a sample of African American women with hypertension, there will be demographic and psychological differences in the sample in their spiritual coping responses, self-efficacy, and psychosocial stress levels.

Overview and Layout of Manuscripts

The dissertation is organized into five parts—introduction; three manuscripts (systematic review, qualitative, and quantitative) written and formatted for submission to peer-review journals; and a conclusion summarizing the significant findings from the overall study, its impact on future research and study limitations. The manuscripts connect together by first providing a foundation of what currently exists in the literature on African American women's hypertension management and what gaps exist that this study attempts to partially fill, followed by a qualitative exploration of the ways in which hypertensive African American women describe how they manage their hypertension and the barriers they encounter, the impact of psychosocial stress and related stressors, including family, financial, and work-related stressors; and an analysis of a statistical model that tests a mediation effect between self-efficacy, spiritual coping, and psychosocial stress on three hypertension self-management behaviors—medication adherence, physical activity, and healthy diet, examining differential associations by socioeconomic status (SES) and depression.

This study will advance knowledge in the control of hypertension among African American women in two important ways: (1) elucidate the ways in which psychosocial stress effects the hypertension self-management of African American women with consideration of multiple psychosocial, behavioral and demographic variables; and (2) identify psychosocial, behavioral, and demographic differences that may exist between women who are controlling their hypertension through self-management guidelines (adherent) and those who are not

controlling their hypertension through to self-management behaviors (non-adherent). This information has significant clinical implications by providing evidence-based guidance on how to improve African American women's adherence to hypertension self-management regimens by elucidating how psychosocial stress can act as a barrier to adherence.

Findings from this research study can also provide guidance in developing effective health promotion interventions to improve health outcomes for African American women with a primary focus on reducing cardiovascular disease and related mortality. In agreement with Crowley et al., (2011), many clinicians lack convenient tools to help identify patients who are unlikely to follow hypertension self-management recommendations.[73] This research could help clinicians to better address an important barrier to three key hypertension self-management behaviors: medication adherence, physical activity, and diet; the latter two (diet and physical activity) are requisites for weight management, which is identified as a critical hypertension self-management behavior.

Chapter 2/Paper 1: Psychosocial Stress and African American Women's Hypertension Self-Management Behaviors: A Systematic Review

Abstract

Purpose of Review. The existing health literatures provide strong evidence about the epidemiology of hypertension among African Americans in general and African American women in particular. Despite a plethora of research findings on hypertension prevalence, bio-physiological outcomes associated with hypertension, and clinical trials testing the efficacy of hypertension medications, there is a dearth of research in the literature that shine light on the psychosocial factors that facilitate or act as barriers to African American women's hypertension self-management behaviors.

Method. This review followed guidelines recommended by the Institute of Medicine's "Standards for Systematic Review" (2011) and included systematic electronic searches from credible scientific databases (PubMed/Medline, CINAHL, and other (e.g. Cochrane Reviews and grey literature). Based on the review's inclusion and exclusion criteria, the initial search yielded a total of 2,700. After going through the systematic review process (outlined in detail in this paper), 30 articles were selected for final review and discussion.

Findings. Fourteen of the 30 articles included in the review are on studies that specifically focused solely on African American/black women. Many of the articles presented findings on descriptive and epidemiological statistics, cultural influences, health beliefs, barriers and facilitators to hypertension management. However, findings from this review provide convincing support for the need to expand from the descriptive profiles, epidemiological studies, and clinical trials that pervade the literature and begin to build a more a more prolific literature that examines more psychosocial contributors to African American women's hypertension self-management.

Introduction

Uncontrolled hypertension is a major risk factor for three of the top five leading causes of death (heart disease, stroke, and kidney disease) among blacks in the US.[1,2,12] An estimated 46% of US black women have hypertension compared to 31% of non-Hispanic white women and 43% of black men.[14] Not only is the prevalence of hypertension higher among black women, but black women are also more likely than white women to die from hypertension-related health conditions including cardiovascular disease, stroke, and renal disease.[1,13,14,74] The rate of death resulting from hypertension is more than double for black women (38.6) compared to white women (14.5).[3,4,14 75]

Racial/ethnic disparities in the prevalence of hypertension is well documented; however, there is a dearth of information explaining the differences in the management and control of hypertension by race/ethnicity and sex/gender.[76] An estimated 88% of black women compared to 84% of white women are aware of their hypertension, with 80% of black women compared to 79% of white women receiving treatment for hypertension.[3] Although more black women are aware of and being treated for hypertension, they are less likely than white women to adhere to hypertension self-management regimens to control their hypertension, including maintaining a healthy weight and taking physician-prescribed medications.[13,14,24,77,78] The low control rates among black women is particularly disconcerting because, even armed with increased awareness and treatment, black women are failing to control their hypertension and are at higher risk of becoming sicker and dying earlier than white women.[13,14,24-26]

Effective self-management of hypertension can significantly reduce the risk of chronic disease and adverse clinical outcomes including morbidity and mortality attributable to end-stage renal disease, stroke, and heart disease.[3,41,74] Long-standing and widely accepted lifestyle

modifications that have proven effective in lowering blood pressure include maintaining a healthy weight, medication adherence, eating a healthy diet low in fat and sodium and rich in fruits and vegetables, engaging in regular physical activity and smoking cessation.[3,79,80]

Although clinical trials have demonstrated the efficacy of certain antihypertensive medications in lowering and keeping blood pressure at clinically acceptable levels, blacks are less likely to adhere to antihypertensive medications as prescribed by their physician than whites. The disparity in medication adherence between blacks and whites remains across multiple studies regardless of the methods used to measure adherence.[11,81,82] For example, in a longitudinal study examining racial differences in antihypertensive medication adherence, blacks were less likely to adhere to prescribed medications compared with whites (55% vs. 61% respectively, $P<.05$).[11,83] Similarly, when controlling for Medicaid use, researchers have found lower scheduled pharmacy refills among black Medicaid patients compared to white Medicaid patients (19.69% vs. 36.11%, $P=.001$).[82]

In addition to medication adherence, maintaining a healthy weight through diet and physical activity is vitally important in the control of hypertension and is routinely instructed for most hypertensive patients.[13 84] However, long-term weight management has been particularly difficult for African American women to achieve.[85,86]

Significance of Current Review

The existing literature on hypertension has yielded persuasive evidence linking the development and progression of hypertension to a complex interaction of risk factors including age, ethnicity, family history, genetics, behavior, environment, and social factors (e.g. health care access, and socioeconomic status including income and education).[13,24,33,34] Despite a plethora of research findings on hypertension prevalence, bio-physiological outcomes associated with

hypertension, and clinical trials testing the efficacy of hypertension medications, there is a dearth of research in the literature that shine light on the psychosocial factors that facilitate or act as barriers to African American women's hypertension self-management behaviors.

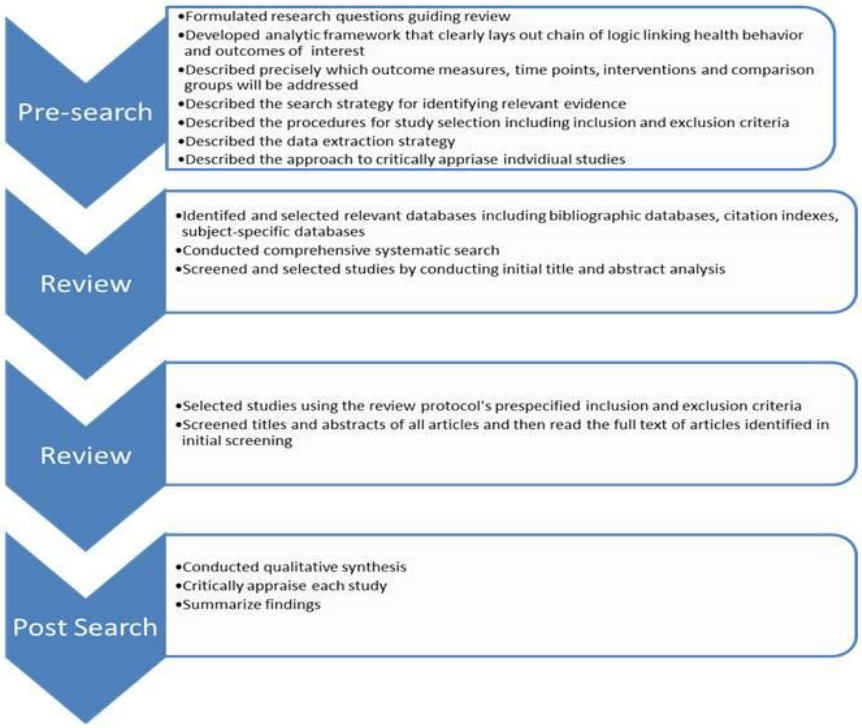
One way to advance research on hypertension among African American women is to shift from the traditional focus that treats blacks as a homogenous population to one that provides a better understanding of gender-specific differences that manifest nuanced behaviors affecting black women's health outcomes.[87-89] This proposed paradigm shift in hypertension research among African Americans seems reasonable considering the fact that sex- or gender-specific research in general is a growing trend in medical and health research.[90-92] There is increasing recognition that race-gender differences remain insufficiently studied and as a result may be contributing to inequities in health provision and outcomes across medical conditions.[90]

The objectives of this review are to examine the existing literature on hypertension that was published over the past decade (1994 to 2016) to: (1) synthesize what is already known about the factors associated with black women and hypertension management; and (2) highlight gaps in the literature on hypertension management of black women, with particular interest in studies that have examined the psychosocial stress and its influence on self-management or self-care behaviors. It is proposed that knowledge from this review can inform ways to improve black women's hypertension self-management and thereby reduce their risk for higher incidences of hypertension-related mortality and morbidity. Findings can also help to inform the development of effective health interventions and health promotion campaigns designed to reduce hypertension and hypertension-related mortality among black women.

Methods

For the purpose of this study, a systematic review of the literature was conducted between April 2014 and June 2016. Using the definition suggested by Bambra (2011), systematic reviews are guided by clearly formulated questions and explicit methods to select, synthesize, and critically appraise relevant research.[93] The process adopted for this systematic review use the guidelines recommended by the Institute of Medicine's "Standards for Systematic Review" (2011) (see Figure 2.1).

Figure 2.1 Systematic Review Process



Literature Search

The PubMed/Medline, CINAHL (Cumulative Index to Nursing and Allied Health), and Psychology and Behavioral Sciences Collection electronic databases were searched for this systematic review covering the years 1994 to 2016.[i] In addition, the Cochrane database was used

to search for articles and papers specifically concerned with clinical trials, methodology and reviews related to hypertension management and control. The review also includes a search of grey literature databases including the American Heart Association, National Institutes of Health, and the Centers for Disease Control and Prevention for hypertension updates, papers from relevant working groups, and papers not easily found in the indexes of journal articles. Additional articles were hand searched and retrieved by reviewing the reference citations noted in the bibliography of the selected articles.

Article Inclusion and Exclusion Criteria

The inclusion criteria were: (1) articles that were published within the specified publication time period from 1994 to 2016; (2) articles that reported findings from qualitative or quantitative studies on hypertension that included African American/black women as a target population of study; (3) articles that reported on hypertension self-management or self-care behaviors of African American/black women. Articles were excluded if they: (1) were published in a different language other than English; (2) used studies that did not include African Americans/blacks and women in their population of study and were conducted on populations outside of the US; (3) reported on studies that did not include a measure of hypertension or hypertension control/management as either a primary or secondary outcome variable; (4) were pharmacological studies that did not study patient adherence; (5) were dissertations, book reviews, symposium summaries or conference abstracts; and (6) were published before 1994. The medical subject headings (MeSH) and text-word terms used to search the databases were: African Americans/blacks, African American/black women, hypertension, hypertension self-management, control or adherence. There was also an interest in examining specifically psychosocial factors in particularly psychosocial stress; therefore the following terms were also

added to the search: psychosocial and psychosocial stress and hypertension or hypertension management.

Conceptual Framework

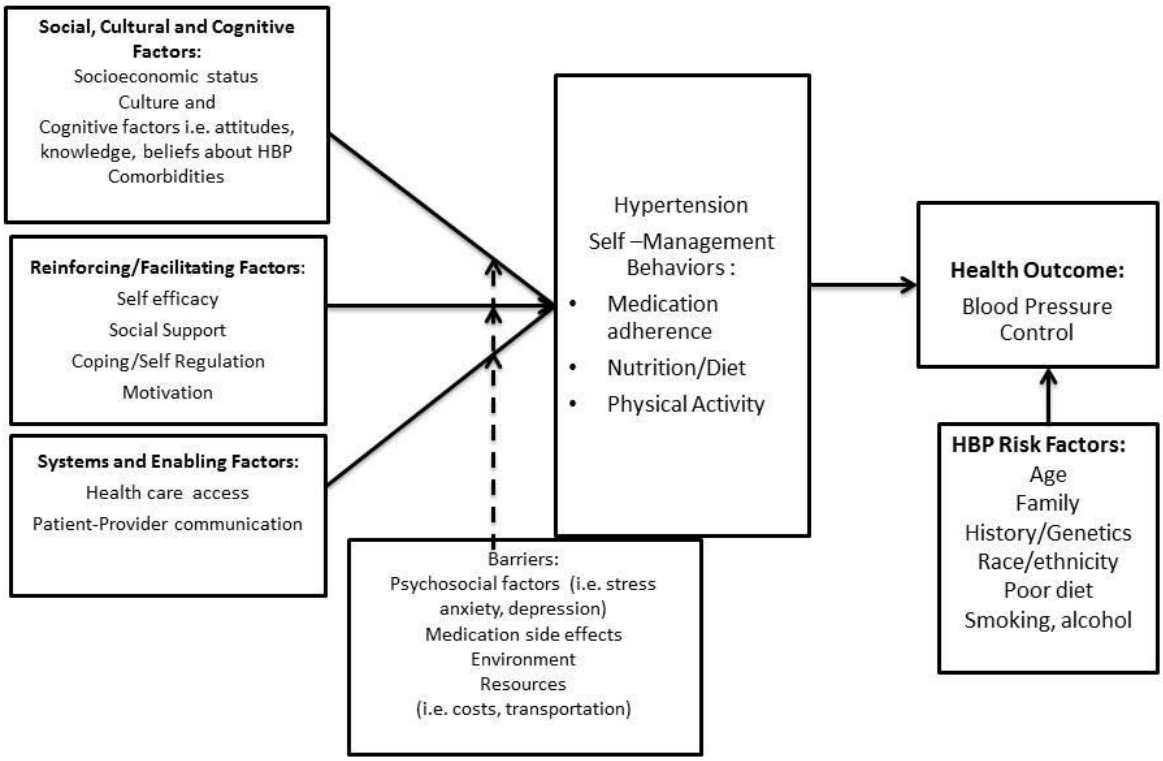
In absence of a current model on black women's hypertension self-management behaviors in the literature, the conceptual framework for this review is guided by Lewis's (2012) model of medication adherence in hypertensive blacks and factors highlighted by the International Society on Hypertension in Blacks (ISHB) consensus statement on the "Management of High Blood Pressure in African Americans."[16]

In the ISHB report, Flack et al., (2010) propose that non-physiologic factors linked to hypertension control in blacks include: high levels of stress, being worried about hypertension, experiencing side effects of antihypertensive medication, age, self-reported medication non-adherence, and length of time with hypertension diagnosis. Further, Flack et al. identify nonmedical beliefs (belief that hypertension cold be cured) and patient-provider interactions as playing an important role in the control of hypertension in blacks.[16] Adopting five dimensions of adherence proposed by the World Health Organization, Lewis's model identifies social factors (including age, income, education), health team and system related factors (including patient-provider communication and barriers to health care), health condition related factors (for example severity of blood pressure and comorbidities), therapy related factors (for example complexity of medication regimen and medication side effects) and patient-related factors (including knowledge, attitudes and beliefs) as factors specifically influencing medication adherence among blacks with hypertension.[11]

The conceptual model that is used in the current review proposes a simplified model combining the factors identified by Lewis and the ISHB that explores behavioral, psychosocial

(stress), cognitive and cultural (norms, beliefs, knowledge), social, and system and enabling factors as influencing hypertension self-management behaviors. This conceptual model is illustrated in Figure 2.2.

Figure 2.2 Conceptual Model of Factors Influencing Hypertension Self-Management Behaviors



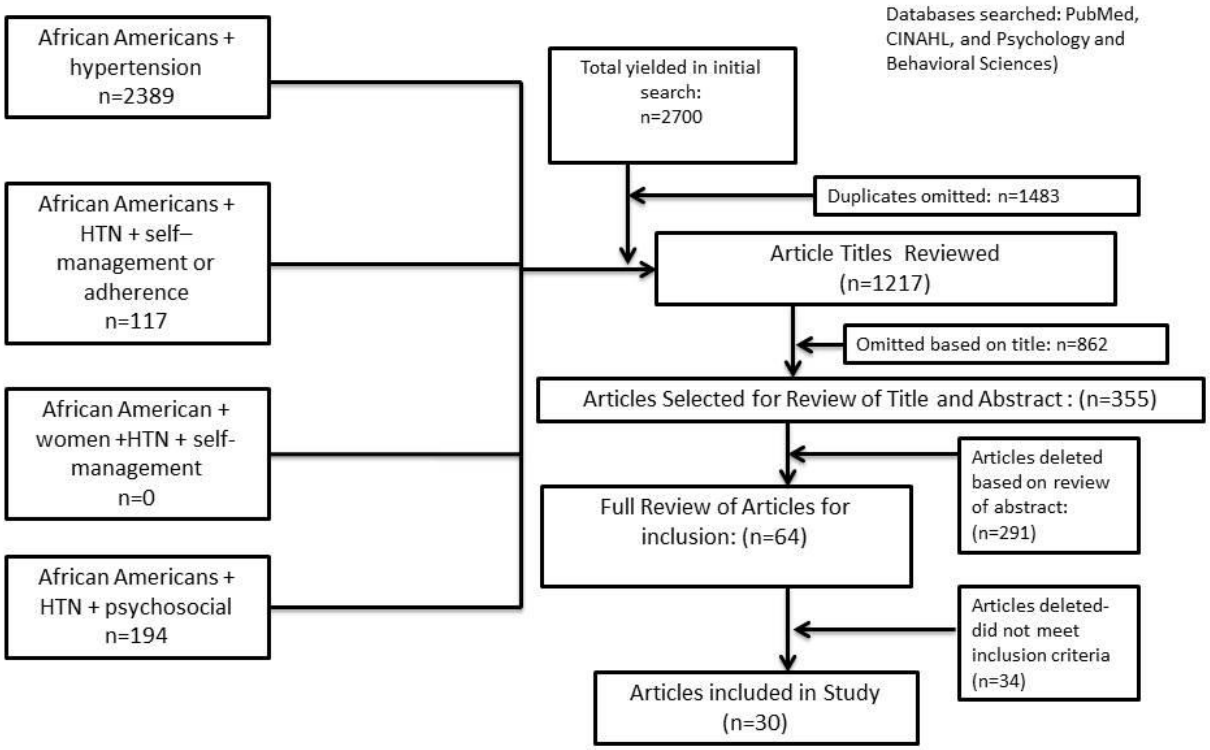
Review Process

The electronic searches from each of the databases (PubMed/Medline, CINAHL, and other (e.g. Cochrane Reviews and grey literature) yielded a total of 2,700 articles (see Figure 2.3 for break down by database) for the initial search. After reading the titles and cross-referencing for duplication, 1,483 duplicates were found and eliminated. Following the elimination of duplicate articles, a total of 1,217 articles remained. The titles of the remaining articles were

then read for relevance of which 862 were rejected and eliminated based on the title resulting in 355 remaining articles. (Articles were rejected at this point in the process if they reported on pharmacological trials, genetic testing, biogenetics, epidemiology of hypertension and international (non-US) data.)

The next step in the process was a review of both the title and the abstracts of the remaining articles. Based on a review of the titles and abstracts (n=355), 291 were deleted based on the exclusion criteria, resulting in 64 articles for next step in the review process. After reading the abstract, methods, results and discussion sections of the 64 articles, 34 articles were deleted after it was determined that they did not meet the aforementioned inclusion criteria: (1) articles that were published within the specified publication time period from 1994 to June 2016; (2) articles that reported findings from qualitative or quantitative studies on hypertension that included African American/black women (adults) as a target population of study or examined gender/sex differences; (3) articles that reported on studies that included either as a primary or secondary outcome variable a measurement of hypertension self-management or self-care behaviors of African American/black women. A total of 30 articles remained after the review and selection process that met the full inclusion criteria; those articles are discussed in the study. The article selection process is illustrated in Figure 2.3.

Figure 2.3 Systematic Review Article Selection Process



Abbreviations: Hypertension (HTN); Cumulative Index to Nursing and Allied Health (CINAHL)

Results

The criteria used to assess the quality of the articles included in this review were: (1) qualitative, quantitative or random control trial (RCT) studies examining hypertension in African Americans; (2) more than 50% of study population were African American women; and (3) hypertension self-management or hypertension control were included as outcome or dependent variable in the study. Table 2.1 provides criteria for quality rating of articles.

Table 2.1 Criteria for Quality Assessment of Articles			
Quality Categories	High	Medium	Low
Hypertension in African Americans	Only	Mixed	Not included
Percentage of African American women	75-100%	50-75%	<50%
Hypertension self-management or adherence measures	Primary outcome variable	Primary or secondary outcome variable	Not included in study
Psychosocial factors	Primary outcome	Secondary	Not included

Table 2.2 (see Appendix) provides a summary of the articles included in the study highlighting key details including the first author and year published, purpose, study design, target population, age, study variables, and results including statistically significant and key findings.

Based on an assessment of the types of studies that were selected for inclusion, the articles can be categorized according to six main categories: (1) studies (n=7 that were primarily descriptive, producing results about hypertension prevalence and predictors of medication adherence among African American women[94-100]; (2) studies (n=6) examining psychosocial and psychological factors that influence hypertension management among African American women such as stress and depression [101-106]; (3) studies (n=4) that discussed the influence and effects of culture and the beliefs among African American women about hypertension, its treatment and management[107-109]; (4) studies (n=7) that primarily examined and reported on facilitators of hypertension control or management among African American women[110-116]; (5), studies (n=3) that primarily identified and reported on barriers to hypertension management among African American women [117-119]; and (6) studies (n=3) that reported on both facilitators of and barriers to

hypertension management among African American women.[31,120,121] These categories are unpacked and articles under each are discussed in the subsequent section.

Descriptive: Hypertension Prevalence and Predictors of Medication Adherence

Four of the 30 articles included in the review were ranked low in terms of the article quality criteria (see Table 1) and primarily provide a descriptive analysis of hypertension prevalence and factors associated with hypertension medication adherence for African American women's self-management.[94-96] Not surprisingly, Braverman and Dedier (2009) found that medication adherence was significantly correlated with systolic blood pressure. However, what was particularly telling were the following findings: single African American females were more likely to adhere to hypertension medication than males or married (partnered) females; least educated males were most likely to be medication adherent on average where conversely least educated females demonstrated the lowest adherence among the female population. [95] Braverman and Dedier (2009) also found that self-reported medication adherence was marginally correlated with self-efficacy for medication adherence. Whereas, Richardson et al., (2014) found that weight-based discrimination and self-efficacy were associated with medication adherence among African Americans under study, which were predominantly female (71%).[94] No articles emerged from the search that focused on adherence to physical activity, healthy eating or weight management protocols for hypertension self-management among African American women specifically. However, in their study, Warren-Findlow and Seymour (2011) examine and describe the demographic and health differences between adherers and non-adherers of three primary hypertension self-care behaviors among an African American sample of hypertensive patients, the majority of whom were female (72%). More than half of Warren-Findlow and Seymour's (2011) sample were adherent to medication usage (58.6%) and engaging in physical

activity (52%) “on most days of the week.” In contrast to the medication and physical activity adherents, less than one-fourth reported following a low-salt diet “on most days of the week” and a little less than one-third (30%) who reporting following “good weight management practices”.[96]

Psychosocial and Psychological Factors Associated with African American Women’s Hypertension Self-Management

One insightful albeit not unsuspecting association that is described across the studies is the correlation between self-efficacy and hypertension self-management. A majority of these studies found a higher prevalence of medication non-adherence and poor hypertension self-management among African American women and low self-efficacy.[94-96]

Two of these studies describe the prevalence of psychosocial characteristics including depression and stress as correlates of hypertension self-management behaviors.[101,103] Jones et al., (2009) in their study on stress and health promoting behaviors, in particular nutrition and diet, among African American women with hypertension found that physical stress and behavioral stress were significant predictors of health promoting nutrition behavior. These researchers conclude that behavioral stressors may impede self-care or health promoting behaviors among hypertensive African American women and thus possibly increase their risk for uncontrolled hypertension.[103]

In a different study, researchers found that depression mediated the effects of stress on diastolic blood pressure; and women with higher levels of depression had significantly higher levels of diastolic blood pressure, were more likely to smoke and eat fewer fruits and vegetables, and have more stress and less support.[101] Konerman et al. (2011) provided support for the argument that psychosocial factors are just as important to identify among hypertensive patients

as physical conditions. These authors found that individuals with high physical functioning and low mental health scores displayed the lowest rate of adherence to hypertension medication.[102] Konerman et al. (2011) also highlight an important association between high perceived physical health accompanied by low perceive mental health as a risk factor for non-adherence urban African Americans.

Examining predictors of depression among hypertensive African American women, Abel, Crane and McCoy (2014) found evidence supporting earlier findings linking depression among African American women with poorer medication adherence. The study also showed that there were additional confounding variables that were linked to the depression and poor medication adherence relationship specifically lower income levels, greater mobility and lower active coping scores.[104]

Cultural and Commonsense Beliefs about Hypertension

Three articles focused particularly on cultural beliefs among hypertensive African American women about the causes, and consequences of hypertension in general and poor hypertension management.[107,108] Lewis (2011), for example, found that among older hypertensive African American women, medication adherence was influenced by older African American women's cultural beliefs. Specifically, Lewis (2011) found that among older African American women with hypertension, a reliance on spiritual teachings (such as "the Lord helps those who help themselves") and faith-oriented support systems are helpful in promoting antihypertensive medication adherence.[107] For example, participants in that study reported that spirituality gave them the ability to cope with medication side effects, which is a common predictor of low medication adherence. These findings are not surprising considering the influential role spirituality plays in the life of African American women. Using faith or

spirituality as a coping mechanism has played an important role in control and maintenance of multiple chronic health conditions for African American women.

In a systematic review of beliefs about hypertension and its treatment among African Americans, the review found that many patients exhibit strong faith in the efficacy of medications however used them only as needed to treat perceived intermittent hypertensive episodes and often resorted to home remedies in place of medications that presented unwanted or intolerable side effect.[109] In Buckley, Labonville, and Barr's (2016) review, they conclude that evidence points to the need to better reconcile the differences between patient and provider expectations for hypertension management as a means to improving adherence to and acceptance of medical treatments among African Americans with hypertension.[109]

Facilitators to Hypertension Self-Management among African American Women

The most frequently cited facilitators to hypertension self-management among African American women reported in the articles are: social support, especially from family; positive relationships with doctors (such as good doctor-patient communication); and spirituality or religious beliefs.[31,113,120-122] Several studies were also categorized under facilitators that highlighted the positive influence of self-efficacy, stress-management and positive-affect intervention on improving medication adherence and facilitating positive hypertension self-management among African American women.[99,100,110-112,123] Martin et al. (2008) found that women who had higher levels of "exercise self-efficacy" were more likely to overcome two barrier factors commonly cited—inconvenience and worry—and more likely to engage physical activity as part of their hypertension management regimen. Similarly, Warren Findlow, Seymour, and Huber (2012) tested the association between self-efficacy and hypertension self-care activities among African American adults and found that good self-efficacy was a robust

measure, increasing adherence to medication, eating low salt diets, engaging in physical activity, not smoking and practicing weight management techniques, all of which are vitally important to controlling hypertension.

Although findings from Greer and Ostwald's study (2015) could fall into the category of cultural influences to hypertension management among African American women, their study points to the use of culturally tailored faith-based interventions as a facilitator to improving adherence among African American women with uncontrolled hypertension. Specifically, the Greer and Ostwald found comparing a control group with an intervention group of African American women that women who participated in the culturally tailored health intervention classes (90 minutes each week for six weeks) addressing attitudes, beliefs and knowledge and provided social support to hypertensive women showed improve blood pressure and were more likely to adhere to their blood pressure medication prescriptions.[115] Therefore, one could conclude from this study that treatment regimens that are perceived as culturally relevant can facilitate better adherence outcomes among African American women with hypertension.

Barriers to Hypertension Self-Management among African American Women

The articles that reported on the barriers to hypertension self-management among African American women identified several common barriers across the studies that were essential the converse to what was reported in the articles that reported on facilitators: cost of medications, side effects of medication, poor patient-doctor communication; lack of support including from family. Sometimes the patient-doctor communication barrier was confounded by other factors.[117] For example Cuffee et al. (2013) found that racial discrimination was associated with lower medication adherence; this association was partially mediated by trust in physicians. Among African American women, approximately 39% of the relationship between the discrimination

barrier to medication adherence was influenced by trust compared with 28% for African American men. Fongwa et al. (2006) found the most common barriers to treatment included negative beliefs about hypertension medicine, cultural beliefs (home remedies) and psychosocial factors including depression and stress.[116]

Discussion

It is particularly important to note that the article search process, using the most logical key terms related to the subject matter of this review—hypertension self-management and Black or African American women—yielded no articles in any of the databases. Fourteen of the 30 articles included in the review are on studies that specifically focused solely on African American/Black women. This is important for two reasons: (1) using the databases used in this review, hypertension in African Americans has been widely studied (2700 articles published between 1994-2016 in preliminary search), which supports a widely held assumption that much is already known about hypertension among the general Black/African American population; and (2) because of the profusion of research articles in the literature on hypertension in African Americans, there is the assumption that health behaviors including adherence and management have received significant attention; this proved to be partially correct. Importantly, this review found that a preponderance of the studies on hypertension in African Americans have focused largely on the epidemiology of hypertension in African Americans (i.e. prevalence and morbidity) and RCTs testing pharmacological efficacy and biophysics of the disease.

The current review has found that although many of the studies included a large percentage of African American women in the study population, there is a scarcity of research studies that have: (1) examined hypertension management behaviors of African American women exclusively; and (2) examined the psychosocial factors influencing the self-management,

self-care or adherence behaviors of African American women to manage or control hypertension. This review further suggests that contrary to the popular assertion that hypertension in African Americans has been widely studied, there remain clear and evident gaps in the literature that if studied further can possibly shine greater light on the factors that enable or impede the hypertension self-management or control behaviors of African American women.

Conclusion

African American women face high risk of becoming hypertensive at an early age and having more difficulty controlling the chronic health condition once it develops. [16] This review provides evidence-based support for the need to better develop and implement hypertension health management protocols that can help to facilitate better adherence to hypertension management regimens among African American women that take into account their cultural beliefs and provide strategies to mitigate the negative effects of psychosocial factors including stress and depression. This review further highlights the need to conduct additional research that specifically studies hypertension management among African American women without the confluence of treating all African Americans, without regard to gender and gender differences, as a homogeneous group.

While much is known about the prevalence of hypertension among African American women, this review shows, exploring two decades of published research, that much still remains unknown about African American women's health management behaviors in response to living with hypertension. The more we know about what the facilitators, barriers and contextual factors are influencing African American women's hypertension self-management behaviors the more precise we can be in developing hypertension management protocols that have a greater chance of resulting in favorable adherence and compliance outcomes. Based on this review there are

conspicuous gaps in the literature worth exploring for example further studies should aim to investigate further the role that patient-provider relations including communication plays as well as the influence of discordant health beliefs in the hypertension management of African American women. These two areas—patient-provider relations and discordant health beliefs could contribute to the literature on African American women and hypertension management as innovative inquiries into a relatively limited research literature.

Chapter 3/Paper 2: Qualitative Study

"I Know Stress Contributes to Everything" African American Women Identify Barriers to Managing Their Hypertension

Abstract

The hypertension death rate is more than double for African American women than White women in the U.S. Although levels of knowledge and awareness about hypertension are comparable, African American women are less likely to manage their hypertension than Whites. The study explored the hypertension self-management behaviors of African American women and the barriers they identify to managing their hypertension with a specific interest in the effects of psychosocial stress. Data from four focus group discussions with hypertensive African American women (N=29), aged 21 to 64, were collected and analyzed. The women in this study reported some effort to practice standard hypertension management behaviors and use of diverse homeopathic or home remedies to manage their hypertension. Several stress-related barriers to hypertension management emerged including care-taker responsibilities and coexisting health conditions. Further examination of these barriers could prove instructive in developing interventions to help improve hypertensive African American women's hypertension self-management.

Hypertension is a leading cause of premature death, preventable hospitalization, and chronic health conditions among African American women in the United States. [3,124] An estimated 47% of non-Hispanic African American women compared to 31% of non-Hispanic White women have hypertension [3], with a hypertension-related death rate more than double for African American women (38.6) compared to White women (14.5).[3,14]

Although African American women, in general, are aware of and being treated for hypertension, they are less likely than White women to adhere to hypertension self-management regimens to control their hypertension including maintaining a healthy weight and taking physician prescribed medications as instructed. [13,14,78,125] African American women's failure to manage their hypertension successfully not only places them at high risk for premature death but is also a precursor for renal failure, stroke and cardiovascular disease. [1,14,74] In order to develop interventions that will help improve African American women's hypertension self-management and thereby reduce hypertension-related mortality and morbidity, it is important to first gain a better understanding of the barriers they encounter that prevent successful hypertension management.

Barriers to African American Women's Hypertension Self-management

The Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure in its JNC7 report recommends six self-care practices as the clinical standards to help control high blood pressure including reducing sodium intake, adhering to antihypertensive medication regimen, engaging in regular physical activity, limiting alcohol and stopping or not smoking.[47,126] However, for African American women practicing these self-care protocols have been difficult to achieve.

Multifaceted factors have been identified as barriers impeding African American women's compliance with the JNC7 guidelines including the inability to pay for medications, side effects of medications, and lack of transportation to doctor's visits and pharmacies.[27,119] Cultural factors (e.g. food preparation practices), mistrust of doctors, myths about effects of medications, and environmental disadvantages (e.g. living in high poverty areas and food deserts) have also been identified as specific barriers to African American women's hypertension management.[31,120,127] Despite what we know about demographic, cultural, and environmental barriers, there is still much we do not know about what is preventing African American women from managing their hypertension sufficiently. One area that is worth exploring, but heretofore has received very little attention, is the effects of psychosocial stress on African American women's hypertension management behaviors.

Psychosocial Stress and African American Women

Population data from the US Census Bureau reveal that, compared to White women, African American women are more likely to be single heads of households, primary care givers of aging or sick family members, and live in poor communities or in close proximity to poor communities where violence and victimization are prevalent.[21,60,61] The amalgamation of poverty, exposure to violence, and heightened risk of victimization and discrimination are all factors that place African American women at a particularly high risk for experiencing psychosocial stress.[51,62-64]

Several studies highlight important ways that African American women respond to, and the effects of, psychosocial stress on African American women's health that warrant cause for concern.[65-68] When examining stress effects on African American women's health, researchers

have observed a "weathering" effect, which is the accumulation of multiple or chronic stressors repeated over time that lead to health deterioration and compounding poor health outcomes.[68]

African American women are also particularly burdened by expectations to demonstrate strength ("strong Black woman" hypothesis) when confronted with stressors which can impair health promotive behaviors.[128] For example, Black and Woods-Giscombe (2012) found that the "strong Black woman" coping responses of Black women to daily stressors contributed to a delay of breast cancer screenings and triggered emotional suppression or "downplaying" the urgency of potential health problems. Similarly, Cox et al., (2011) found that different types of stressors (interpersonal, family, work/occupational, legal, and structural (transportation)) were often distractors to African American women's successful completion of behavior modifications to reduce obesity.[66] Maintaining a healthy weight and engaging in healthy lifestyle modifications that support weight loss and healthy eating are critical to successful hypertension management.[129,130] Although there is a dearth of research on the effects of psychosocial stress on hypertension management, it is worth exploring psychosocial stress as a potential barrier to African American women's hypertension self-management, given the aforementioned evidence.

Theoretical Framework

The theoretical framework used in this study combines constructs from both grounded theory [131] and African American feminist epistemology.[132-134] Grounded theory is particularly useful for this study because it orients the researcher to induce patterns of behaviors from individual responses to describe a group or collective experience or shared phenomenon, for example, hypertension self-management.[131] Grounded theory provides a way to move beyond describing the essence of the phenomenon to identifying key concepts that could inform the

development of a theory or a "unified theoretical explanation" about stress and its effect on the hypertension management behaviors of African American women.[131]

African American Feminist Epistemology integrates historical contexts with contemporaneous experiences and has great utility when examining beliefs, knowledge or "acceptable truths" held by African American women.[132,134] It is proposed that African American women's health behaviors are shaped and influenced, not just by their present experiences or context but also by dynamic historical contexts that have influenced their lived experiences. Using African American Feminist Epistemology, this study examines African American women's hypertension self-management behaviors and their perceptions of the effects of psychosocial stress through the following paradigm: (1) their lived experience as a way of gaining and giving meaning to knowledge and beliefs about their health condition and behavior; and (2) the narratives they use to describe and explain their experience, knowledge, perceptions and beliefs that represent a shared or collective experience.[132,134] African American Feminist epistemology places African American women's opinions, beliefs, perceptions and historical and contextual experiences as central and interconnecting elements to validate their knowledge of the factors contributing to their health behaviors.

Methods

Study Design. Four focus groups were conducted with a purposive sample of self-identified hypertensive African American women, aged 21 to 64, in two southeastern states. Using focus groups, the first author was able to engage in in-depth discussions with the research participants to generate deeper understanding of the participants' experiences, perceptions, and beliefs and construct from individual responses descriptive text that captured and described the group's behaviors, beliefs, and experiences in the collective.[131,135] Focus group data that

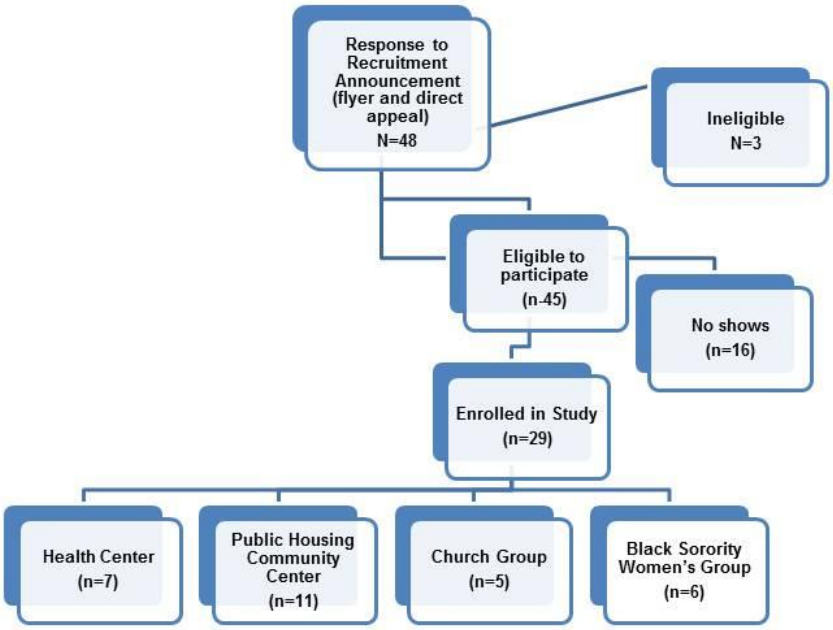
elucidated specific stressors affecting African American women's hypertension self-management behaviors were also used to inform the development of items included in a cross-sectional survey (administered as part of the larger study). Authorization to conduct this research was received from the Institutional Review Board at Virginia Commonwealth University in Richmond, Virginia. Assurance of anonymity and confidentiality was given and no participant identification information was used in the transcripts or data analysis.

Setting and Sample. This study used typical case purposive sampling. Purposive sampling is a frequently used technique in qualitative studies aimed at gaining greater depth of information from a subgroup of carefully selected cases that share similar characteristics (i.e., demographic, health condition, experiences).[131,136,137] The eligibility criteria for inclusion in the study were: female, self-identify as African American or Black, aged 21 to 64, and diagnosed with hypertension. Women were excluded from participating in the study if they: (1) were pregnant; (2) unable to give oral or written informed consent; (3) and were non-English speaking.

Recruitment method. Women were recruited using passive and active recruitment methods from two different groups: low-to-mid SES groups (patients at a free clinic and one public housing community) and mid-to-high SES group (one African American sorority and a women's group of professionals at a historically African American church). The passive recruitment methods used were distributing and posting flyers using the targeted canvassing strategy, which has been useful in recruiting minorities for clinical trials and "hidden populations" (e.g. drug users).[138] Flyers were posted in African American beauty salons, public libraries, community center information boards, African American churches, community health centers, waiting and reception areas of a high blood pressure clinic serving low-to-moderate income patients, a public health center located within a public housing community, an acute care

and women's health units within a major medical hospital, and in public housing communities. Additionally, word-of-mouth, which is an effective strategy to recruit minorities in research, was also used.[139-141] Women were asked to share the informational flyers with potentially eligible participants within their peer network. The active recruitment methods used included calling from a list of hypertensive women that was provided by a high blood pressure clinic servicing low-income women and direct appeals made to women attending meetings sponsored by African American women's organizations including sororities, historically African American churches and civic groups (e.g. Eastern Stars). In addition, an email announcement about the focus group (flyer in email format) was also sent to key gatekeepers of African American women's sororities and civic organizations identified by the first author using personal contacts within her social network. Recruitment for the qualitative study began May 2014 and ran concurrently until the last participants were recruited into the final focus group in July 2014. (See Figure 3.1 for the study's recruitment and enrollment assignments.)

Figure 3.1 Focus Group Recruitment and Enrollment Assignments



Setting. One focus group was held at a historically African American church, one at community clinic specifically targeting patients with high blood pressure, one at a public housing recreation center, and one was held at a African American women's gathering sponsored by a member of a historically African American sorority. Focus groups were held at a convenient time for easy access to the participants including in the evening hours after 5 o'clock p.m. with exception of one focus group, which was held during the lunch hour.

Focus group discussion. A facilitator's guide was developed and used that included questions and prompts related to hypertension management and psychosocial stress. The focus group questions were constructed to elicit knowledge, experience and perceptions of African American women about their hypertension including: 1) their hypertension self-management

behaviors; 2) the salient stressors in their day-to-day life experiences; 3) how they describe psychosocial stress and assess its effects on their hypertension management behaviors; 4) perceived barriers that impede hypertension self-management and facilitators that promote effective hypertension self-management. Participants were given two copies of the study's IRB approved consent form to read and if they consented to participating were asked to sign both copies; one copy was given to the first author and the other copy was retained by the participant. After the consenting process, participants were asked to complete a brief demographic questionnaire, which included questions on their highest level of education, annual household income, marital status, insurance coverage, and other chronic health conditions. No personal identifying information was collected. All focus group sessions were audio recorded. Each focus group lasted approximately 60 to 75 minutes. All eligible focus group participants received $25 cash following their participation.

Data Analysis. The focus group data were analyzed with the goal of identifying common themes and patterns of behavior reflecting the shared hypertension self-management experiences of the participants. With the theoretical framework in mind, specifically grounded theory, the first author and coders analyzed the data looking for and connecting meanings and explanations given by individual participants that reflected the behaviors, perceptions, and experiences of the group. This process included using the constant comparison method to search for salient or common themes and continuing to search the data until no new themes emerge.[131]

Data Coding. The first author and two independent coders conducted a thematic content analysis to inductively derive from the data essential themes that characterized first the essence of African American women's experiences self-managing their high blood pressure and perceptions about psychosocial stress and its effects on their self-management behaviors. The

first author and a second coder began with open coding by identifying and highlighting quotes and key words that captured the essence of the group's or collective responses and applied descriptive codes that characterized the experience and perceptions for each sub group (SES groups) and then for the entire sample. Once the first author and the first coder completed the open coding and created categories of the themes, a second coder, using axial coding technique, looked for emergent themes from initial coding and any new themes that were not captured or identified by the first coder.

In collaboration, the second coder and first author used a constant comparison method to go through the themes identified to agree upon the dominant themes that emerged from the data. The axial coding involved identifying dominant themes that reflected the essence of the responses to the questions about the participants' hypertension self-management behaviors, stressors and the effects of psychosocial stress on their hypertension self-management behaviors. This process was then followed by a comparative analysis whereby themes were compared between and within SES groups to identify dominant themes that best answered the research questions. In the event that there were themes identified by coders whereby there was disagreement, the discrepancies were discussed and explored further. If consensus was not made on including themes that were identified by a coder, these themes were pulled from the final thematic analysis and recorded as a memo. The data analysis was an iterative process and was not completed until redundancy of the themes was achieved, no new emerging themes were derived from the data and agreement was reached by the coders.

Results

Participant Characteristics. Twenty-nine women participated in the four focus group discussions. The focus groups were stratified according to SES groups—two focus groups were

held with women in the low-to-mid SES group (public health clinic and public housing community participants) and two were held in the mid-to-high SES group (African American sorority and women's professional support group at a historically African American church). The mean age of the low-to-mid SES group was 46.28 (SD 13.92) compared to 55.91 (SD 12.11) for the women in the mid-to-high SES group. More women in the low-to-mid SES group were mothers, single, never married, had lower education and household incomes, and used public health insurance programs Medicaid and Medicare. Women in the low-to-mid SES group also reported having hypertension for a shorter period of time [10.5 years (SD 13) than women in the mid-to-high SES group (16.9 years, (SD11.4)], which could be attributed to the mean differences in age between the two groups. Anxiety was the most common health condition reported by both groups. Depression (55.6%) and diabetes (27.8%) was most commonly reported by the low-to-mid SES women while high cholesterol (63.7%) and obesity (36.4%) were reported most often by the women in the mid-to-high SES group. See Table 3.1 for detailed demographic characteristics.

Table 3.1 Focus group participant characteristics		
Demographic Characteristic	**Low-Mid SES (n=18)**	**Mid-High SES (n-11)**
Mean age in years, (SD)	46.28 (SD, 13.92)	55.91 (SD, 12.11)
Highest level of education		
Less than High School graduate	28% (5)	0
High School/GED	39% (7)	0
Some college or 2-year degree	17% (3)	18% (2)
4-year college	11% (2)	18% (2)
Graduate degree or higher	6% (1)	64% (7)
Marital status		
Legally married	6% (1)	9% (1)
Cohabitating, not married	6% (1)	0
Separated	6% (1)	0
Divorced	17% (3)	36% (4)
Widowed	17% (3)	18% (2)
Single, never married	50% (9)	36% (4)
Children		
Yes	89% (16)	55% (6)
Mean number of children (SD)	2.59 (1.73)	1.33 (.71)
Employment Status		
Employed	11% (2)	64% (7)
Unemployed	83% (15)	18% (2)
Retired	6% (1)	18% (2)
Annual household income		
$0 to $9,999	61% (11)	0
$10,000 to 32,999	29% (5)	9% (1)
$33,000 < $60,999	6% (1)	64% (7)
≥ $75,000	0	27% (3)
Health Insurance		
Medicaid	50% (9)	0
Medicare	17% (3)	0
Employer health plan	0	90% (9)
Private	0	10% (1)
Not insured	33% (6)	0
Mean length of time (in years) with HBP	10.5 years (SD 13)	16.9 years (SD, 11.4)
Self-reported Most Common Health conditions other than HBP	Anxiety (61%, n=11) Depression (56%, n=10) Diabetes (28%, n=5) Cancer (22%, n=4)	High Cholesterol (64%, n=7) Anxiety (46%, n=5) Obesity (36%, n=4) Cancer (36%, n-=4)

*Percentages and frequencies reported except where mean is reported.

Dominant Themes. Several dominant themes emerged from the textual data across all four focus groups. These themes were captured in responses to the primary research questions and categorized as: hypertension management behaviors; barriers to hypertension self-management; facilitators to hypertension management; stressors encountered in daily lived experience that affect hypertension management; and effects of psychosocial stress on hypertension management. The data are reported based on the dominant themes that emerged across SES groups with comparisons between the two SES groups nested in the results.

Hypertension Self-Management Behaviors. In general participants knew the standard treatment of hypertension and what was required of them in order to keep their hypertension under control. There were also little differences in the behaviors or actions that women in both SES groups did to manage their hypertension. The dominant themes that emerged depicting the hypertension management behaviors were standard care, focusing on minimizing stress, and using home remedies to control their blood pressure when it was presumed to be above normal or "too high."

Standard Care. Most women reported making an effort to follow routine doctor's orders or standard care guidelines to manage their hypertension including taking medications as prescribed, limiting or avoiding salt intake or using a salt alternative, making healthy food choices when dining out and exercising (mostly walking) and monitoring blood pressure at home. A participant in the mid-to-high SES describes managing her hypertension as: "I have purchased a blood pressure monitor machine for home and I'll check it and make sure that it is high or if it's not high, but I do take my medication every morning." Other frequent responses describing how the women were attempting to comply with standard treatment guidelines as follows:

"When I go to the library, I'm walking. You know my church is at the <street>. I walk to church. So I am active… and eating, you know I really, especially now with the sugar, pre-pre-diabetic, I'm even more now conscious." [Low-to-mid SES group participant]

"Walk and I don't like a lot of salt, and that's a good thing. So I mean say I'll order French fries with no salt, and it tastes fine to me. So even if I go out to eat, I'll tell them don't put it in salt, but if it's… or whatever, and if it's highly seasoned I'll send it back and I'll tell them to cook it and don't put anything on it." [mid-to-high SES participant]

Stress Management. Without prompting, managing stress was identified by women in both groups as a way to manage their hypertension. One participant in the low-to-mid SES group stated: "I try to stay away from things that stress me, and things that's high in sodium to kind of help manage it, on top of taking my medication." Another participant described how trying to manage stress facilitates her hypertension management as follows:

"I know stress contributes to everything with me, so just finding something that I enjoy and trying to make sure that I do that one thing that I like, maybe 30 minutes out of the day, whether it's a favorite TV show or reading a book or something." [mid-to-high SES group participant]

Use of Home Remedies. The women in both SES groups identified home remedies they commonly used to manage their hypertension. The most frequently cited home remedy by women in both SES groups was the use of vinegar to keep blood pressure low. For example, one low-to-mid SES group participant referenced a lesson she learned from an older woman: "she

just turned 98, and she has high blood pressure too. She said she takes a teaspoon of vinegar in like one-third cup of water, and that's what she drinks to keep her blood pressure down." Other women in both groups also gave examples of using vinegar to lower their blood pressure.

> "And like she said, I do try to remember that I did take it, if I start feeling faint or lightheaded or I'll take some vinegar. I will actually take my vinegar because I just heard that that helps it go down fast. It can get that quick, (snapping finger) downward spiral from it being up higher. So I'll have vinegar and I'll take some vinegar." [mid-to-high SES group participant]

Maladaptive Behaviors. Maladaptive behaviors such as use of controlled substances, alcohol and smoking cigarettes were reported among several of the low-to-mid SES group participants but did not come up in the discussion with the mid-to-high SES group. Excerpt 1 provides one response that received head nods in agreement along with laughs from other participants in one of the low-to-mid SES group.

Excerpt 1: Exchange between facilitator and Low-to-Mid SES group respondent

1	Participant:	And I have shots (to manage high blood pressure)
2	Facilitator:	Oh, a drink? A shot of what?
3	Participant:	Gin.
4	Facilitator:	So alcohol.
5	Participant:	A little weed will take it down too. Take it all the way down.

Symptomatic Triggers. Waiting until symptoms appear, indicating that their blood pressure is too high, often is a trigger for the low-to-mid SES women who then take action to try and get it back at an acceptable level. Therefore, for these women hypertension self-management is sometimes a reactive response to symptoms of feeling sick and not a proactive

behavioral response before hypertension symptoms occur. One participant expressed this reaction as follows:

> "…when I get the headaches and when I know that it, 'cause I suffer from migraines and fibromyalgia as well, and that I know that there's basically a difference is only because either my eye or at the very top of my head, and that's when I drink more water, and then I will take a pill, and then <H> will make my appointment to come back in [to see doctor]."

Barriers to African American Women's Hypertension Self-Management. The most commonly shared barriers to hypertension self-management behaviors among the women across SES groups were time (for exercise and health food preparation), family demands and caregiver roles, and the effects of psychosocial stress. Other barriers that differed slightly between the two SES groups were systemic barriers including lack of affordability of medications and healthy foods, which emerged from both SES group discussions, however, was identified more frequently as a barrier among the low-to-mid SES group participants.

Side Effects of Medication. Women in both groups frequently discussed the side effects from the medications including making them feel bad and weight gain as a barrier to their hypertension management. For example, one participant in the mid-to-high SES group said: "I don't like taking medicine anyway, and I'll just take it if I have a headache or when I'm sick, but I just don't like taking medicine."

Another participant in the low-to-mid SES group described her reaction to the high blood pressure medicine she is prescribed as follows:

> "I'm young, of course, and so the amount of times that I was going to the bathroom, and then sometimes barely making it, I didn't like that and it would make me not want to take

it. Denial about the fact that I was taking medication, number one, and then number two, that I had high blood pressure because I always was one that felt like I could eat and stay small, and you know the things I ate, I didn't think it would affect me, and so when it finally did, you know I was walking around with numbers that was ridiculous and still didn't want to take the medication 'cause I was getting up in the night peeing, and then it was breaking my sleep, and it just was like I don't like the way it make me go to the bathroom, and that was my main reason for not taking the medication."

Several of the women, particularly in the low-to-mid SES group, described feeling better not taking their hypertension medication than they do when they are taking it as prescribed. Sometimes you be overmedicated. I have went to the doctor and haven't taken medicine in like a week and a half, and when I went in the doctor's office, I'm looking at her saying 'I know she's getting ready to say 'your blood pressure is sky high.'' My blood pressure was 120 over 80, and I hadn't taken no medicine in like a week.

Caregiver Roles. Caregiver roles and responsibilities were also frequently identified as common barriers to hypertension self-management among participants in both SES groups. Placing the health care of others (e.g. family members) as a priority over one's own self-care was a barrier that the women described repeatedly and with passion or emotion, indicating that this was a major concern.

"I was taking care of my mother and my daughter, and at the time my brother, who was incarcerated. My daughter was going through this point where she was… having stomach issues. And then my mom suffers from a few mental health issues, you know, Post-Traumatic Stress due to something my brother had done. So with managing all

three of them, you know, I felt like I was giving my time to them and wasn't taking care of myself. So that was, you know, and that usually be my excuse, 'Well you know I got to take care of them. I'm a get to my medication.' So I guess helping everybody else would be another reason why I wouldn't take it [hypertension medication]." [low-to-mid SES group participant]

Similarly, a woman in the mid-to-high SES group explained the caregiver role in the context of the "strong African American woman" hypothesis:

"So I think that historically African American women have, you know we really have taken on all of the burdens because I think we've all thought that's what we were supposed to do, that was our role. That was our calling. That was the expectation, and for so long that's what we've done that we don't know how to take care of ourselves." [mid-to-high SES group participant]

"I think often what I've seen from myself and even my mother and other people is a lot of times as an African-American woman, you feel like you have to take on so much and be okay with it. You're supposed to be strong and all that. I think that's a double-edged sword, although I do believe African-American women are very strong. I think it can be a double-edged sword and sometimes we put even more stress on ourselves because we're trying to live up to some type of strong standard, I think, that is almost impossible." [mid-to-high SES group participant]

Hypertension Self-Management Facilitators. The women in both SES groups were able to clearly articulate and identify facilitators that can help them to better manage their hypertension including stronger support system, relief from child care and care

provider responsibilities, more education on hypertension management, and counseling to help deal with feelings of depression and having to focus attention on coexisting health conditions.

Coexisting Health Conditions. Some of the women attributed the need to attend to a coexisting chronic health condition or illness (for example, recovering from a stroke) as a facilitator or motivating factor to pay close attention to managing their hypertension.

> "I make sure now nothing gets in the way of me taking my medication 'cause, like I said, when I had that stroke, and I didn't even know I had a stroke, it was a wake-up call for me that I need to do exactly what they said to do, and not do things in the time that I think they should be done. I need to do them in the time that I'm told to do them, and it has made my life a lot easier, you know. I'm kind of leveled off in terms of like I have like that little pill thing. It has like two sections. Like I can take my pills in the morning and my pills in the evening, and I got them all lined up. So I keep that sitting on the kitchen table, so I won't ever like miss a time." [low-to-mid SES group participant]

Women in both groups identified having someone to encourage and motivate them was a facilitator that was needed and helpful. One woman from the mid-to-high SES groups articulated it this way: "Having somebody to motivate me. I think if I had a walking partner, that would help. That would get me out, 'cause once I'm out walking, I'm fine. It's just getting out."

Women in the mid-to-high SES group agreed that an important facilitator is when their physician gives guidance on how they should manage their hypertension.

> "And I just wanted to say that Primary Care Physician, before putting me on medication, you know he sat down, he did talk to me and ask me, 'Okay, what's going on in your life? What type of stress do you have? How do you handle stress? Have you tried using

this, this and this method to help you? We're gonna try. These are some other ways I could help you, before moving on to medication, and we're gonna work on a timeline before that. I want that to be a last resort.' Now it's 'Okay, we have to get you off this medication. You need to work on this, this and this. What else is happening? What else has come into your life to not change this?" [mid-to-high SES group participant]

Psychosocial Stress Effects on Hypertension Self-Management. There were slight differences between the two SES groups in the types of stressors that trigger psychosocial stress. For example, discrimination and work-related stressors were identified by women in the mid-to-high SES group but not in the low-to-mid SES group. Family stressors (children and aging or sick parents) and intimate partner (spouses or boyfriends) stressors were commonly cited by women in both groups.

The women in both groups also made clear connections to the effects of psychosocial stress on their hypertension self-management behaviors and identified distinct ways that they believed stress affected their hypertension. Feeling depressed and passive responses to the stressors encountered including "just want to be left alone" (social isolation), excessive sleeping and "not doing anything" were common responses to the stressors that women felt were presenting as barriers to their hypertension self-management.

"I know I frequently become depressed. I don't care about anything. I just want to lay in the bed and sleep and hopefully wish that everything would just go away, magically, or I know I also turn to shopping… I will not take my medicine (blood pressure) the whole time, and I guess elevated stress, elevated blood pressure. That's pretty much it." [mid-to-high SES group participant]

Stress also resulted in delayed self-care and poor health behaviors that indirectly affected good hypertension management behaviors, mostly by disrupting healthy eating behaviors.

> "And I'd probably eat more if I'm stressed. I end up eating more, so you know that's probably not very good, but usually I'm looking for some comfort foods, if I'm totally stressed, something that I feel is gonna give me that 'Okay, I need something food for right now. It's been a stressful day." [mid-to-high SES group participant]

> "For me, stress gets in the way because I'm the type of person, I have a big heart and I help everybody… I might be at that time taking my medicine, but as soon as you call and say something wrong, I'm gone out the door and I'm not taking the medication." [low-to-mid SES group participant]

Discussion

Although there is much agreement among medical professionals, including researchers and practitioners, about the causes of and risk factors for hypertension among African American women, including a complex interaction of risks factors such as age, ethnicity, family history, genetics, behavior, environment, and social factors (e.g. access to health care, insurance status, SES and education), there is limited understanding of the factors affecting the African American women's hypertension self-management behaviors.[13,24,33,34] Heretofore, no other qualitative study could be found in the health literature (using PubMed, CINAHL, and Web of Science) that focuses specifically on African American women's narratives and perspectives about their hypertension self-management and the psychosocial barriers that impede or interrupt their self-management. There is also a conspicuous absence of studies that focus on the effects of psychosocial stress on African American women's hypertension self-management behaviors

despite evidence to suggest that psychosocial stress negatively influences African American women's health behavior across the spectrum of illness and disease.[66,71,101,128]

Using African American Feminist Epistemology that considers African American women's histories as members of two historically marginalized groups based on their ethnicity and gender and how both shapes their current experiences, the purpose of this study was to explore how African American women described their hypertension self-management behaviors and the barriers they identify to managing their hypertension with a specific interest in the effects of psychosocial stress. Several factors emerged from focus group data that provide insight into the barriers and facilitators to African American women's hypertension self-management behaviors, taking into account different socioeconomic statuses.

The study results suggests that African American women with hypertension in both socio-economic groups generally know what to do to manage their hypertension ranging from adhering to standard medical guidelines on the treatment of hypertension including engaging in physical activity and eating healthy diets, to a nontraditional approach such as using home remedies specifically vinegar to lower their blood pressure when they perceive it is too high. The effects of vinegar on lowering high blood pressure has received some attention in the literature, for example, controlled studies using laboratory mice,[142] as has the use of home remedies by both African Americans and Whites to manage chronic diseases including hypertension.[143] The results of the current study suggests that use of home remedies and nontraditional methods to control hypertension may be worth investigating further especially in studies that are specifically designed to explore the non-traditional ways in which African American women manage their hypertension.

The data from this study also illuminate that caregiver responsibilities was the most commonly identified stressor in both groups and identified as barrier to African American women's hypertension self-management. When designing protocols for hypertension management, providing resources such as information on support groups and free or low-cost care services to help mitigate the care-taker stressors are important. In many cases, it is not feasible to eliminate the stressors but more education on stress management strategies and support groups comprised of women with similar profiles can be given to assist women in managing the stress caused by the care-taker stressor so that it doesn't interfere with or reduce their hypertension self-management behaviors.

Co-managing multiple health conditions or chronic illnesses was also commonly identified by women in both SES groups as a barrier to their effectively managing their hypertension. It is not unreasonable to assume that women who have suffered from uncontrolled hypertension for an extended period of time to also have coexisting chronic health conditions including diabetes and kidney disease.[144] Hypertension is one of the most predictable risk factors for stroke, kidney and cardiovascular disease and is a precursor for poor health outcomes among African Americans in general.[8,75]

Also worth noting is the frequency in which women in both groups reported feeling depressed as a common response to stress that also often gets in the way of their hypertension management. Both groups identified better incorporation of mental health counseling and supports into routine health protocols as a way to facilitate better hypertension management. There are compelling and consistent research findings that establish a link between stress, depression and cardiovascular disease through multiple and complex pathways.[145-147] The findings from this study provide additional evidence suggesting a link between stress,

depression, and hypertension that is worth exploring further. The study findings also highlights the importance of physicians addressing the effects stress can have especially when combined with depression on African American women's hypertension management and related health outcomes. It also may be worthwhile to screen for stress and depression as well as physical symptomology as a part of the routine primary care for treating high blood pressure in African American women.

While education alone does not result in predictable changes in behavior, the women agreed that more practical education on how to manage their hypertension through healthy diets and physical activity can prove beneficial. Some of the suggestions ranged from a doctor giving a list of actual nutritionist to refer patients, having personal cooks prepare foods and nutrition class, to simply having times to check in with the doctor to specifically discuss how they are managing the nutrition and physical activity part of their regimen.

Although African American women are less likely than Whites to enroll in clinical trials testing the effects of hypertension medications, it is important that they do so.[148,149] It is clear from the responses of this sample of hypertensive African American women that the side effects from their medications are a major barrier to hypertension medication adherence. The data from this study suggests that side effects may contribute to African American women's reluctance to participate in clinical trials if the clinical trials are testing blood pressure medicines; further research is needed to explore this assumption. Developing better ways and information about how to allay some of the side effects from hypertension medications may be worth exploring further. For example, instead of simply stating the side effects, providers can give more guidance on how to offset or respond to the side effects without patients having to stop taking the medication as prescribed.

Limitations

There are several limitations that must be considered in the interpretation of the study findings. Two limitations were discovered during the recruitment process that can provide instructive insight for future studies on hypertensive African American women who are represented across the SES stratum. Recruiting and retaining minorities in research has proven a daunting task for many researchers for various reasons i.e. mistrust, fear of being exploited or maltreated, low literacy, SES-related barriers, communication issues, and researcher-participant cultural incongruence.[140,150-154] Furthermore, many health disparities related studies recruit from lower SES populations, however, studies including ethnic minorities at the higher SES level are limited. This suggests that recruiting from this population may present some access and response challenges.

One limitation related to recruitment for this study dealt with population access and study attrition. With regards to access, using a gatekeeper or person who has direct access to and the trust of the population understudy to access hard to reach populations is a common and widely endorsed research practice.[154-157] However, in this study, although gatekeepers were used (i.e. president of sorority or civic organization) to gain access to and inform the women about the study, the response rate was still very low. It cannot be assumed that a well-known stakeholder or one who holds a leadership position within an organization will be able to influence participation of African American women in a research study even though they have access to the target population. Although women in the mid-to-high SES group expressed a general interest in and recognized the importance of helping to advance research on African American women and hypertension, there were multiple reasons they gave for not enrolling in the study

including not enough time due to competing priorities and activities on their weekly schedules, a general discomfort engaging in a public (albeit small group), and dealing with other chronic health condition such as diabetes or multiple health problems that were overwhelming.

Another limitation is the way in which SES group assignments were determined. Using annual household income and education did not prove to be the best measure of SES among this sample. The findings from this study supports existing research that have identified similar challenges with SES measurement including accounting for retired persons, women, and lack of reliability across studies.[158,159]

Furthermore, there is the limitation related to the methodology chosen—using focus groups as opposed to structured interviews. A recognized limitation of focus groups is that by the nature of the way in which focus groups are conducted in group settings, which may discourage sharing of sensitive or personal information due to lack of trust or feeling embarrassed.[131,160] By design, focus groups discussions are not fully confidential or anonymous, because the material is shared with the others in the group, which presents some limitations to using focus group methodology in studies that address health issues and personal health behaviors. Discussing health information and personal health behaviors in a group setting was met with some skepticism especially among those recruited in the mid-to-high SES groups. Even when women from the mid-to-high SES group agreed to participate in the study, perhaps from a social desirability perspective (thinking or believing it is the right thing to do or wanting to appease the organization's gatekeeper), because there was some perceived level of reluctance to openly discuss health behaviors and health issue.

Finally, although there is some debate about whether or not to consider generalizability in qualitative studies [131,161,162], it may be important to state that this study used a purposeful sample

of African American women living in two Southeastern states. These experiences may or may not reflect the experiences of African American women living in other regions of the country; replication of the study with the same profile of women in a different region may be warranted.

Despite the limitations, overall the findings from this study provide useful qualitative data on the perspectives of hypertensive African American women about the barriers they face when attempting to self-manage their hypertension. Although not identified a priori, there were several recommendations that the women gave that they felt could better assist them and other African American women in being more successful in managing their hypertension. These recommendations included providing instruction on about how to prevent and successfully control hypertension as a routine part of physical examinations for African American women even if they are not diagnosed with the condition; providing resources and education on stress-management that takes into consideration the "real things" many African American women encounter in their daily life experiences including being single heads of households, often managing work and education or multiple jobs; and being primary care givers to other family members including fictive kin (close friends); and improving doctor-patient communication with doctor's being more sensitive to individual patient needs and experiences and not treating all African American women as a homogeneous group. Future interventions can be designed with these recommendations based on the first-hand experiences and perspectives of hypertensive African American women combined with the key findings from this study in mind.

Chapter 4/Paper 3: Quantitative Study

Examining the Relationship between Psychosocial Stress, Self-Efficacy and Coping on African American Women's Hypertension Self-Management Behaviors

Abstract

African American women are at greater risk of getting hypertension at younger ages, becoming sicker and dying earlier from hypertension than other women in the US. The etiology, treatment, and health outcomes associated with uncontrolled hypertension among African American women have been broadly studied; however, very little is known about the effects of psychosocial factors, including stress, on African American women's hypertension self-management behaviors. **Method.** Using a cross-sectional survey, this study examined the effects of psychosocial stress, self-efficacy, and spiritual coping on three hypertension self-management behaviors of African American women ages 21 to 64 (n=191): medication adherence, diet, and physical activity. Associations of demographic variables with three independent variables were also examined. **Results.** Findings reveal higher psychosocial stress scores are associated with lower medication adherence; however, no statistically significant support was discovered for self-efficacy or spiritual coping as mediators of this relationship. The demographic variables and depression were robust with statistically significant associations across each model. The results suggest that psychosocial stress and depression are worth further examination influences of African American women's hypertension self-management behaviors.

Trends associated with the awareness, treatment, and control of hypertension among the general US population have shown marginal yet steady improvements since the late 1990s.[3,163] However, despite this important progress, there remains observable disparities by race and gender in hypertension prevalence and control.[3,164] Overall, the prevalence of hypertension among African Americans is among the highest in the world.[3,165] It is estimated that two in five African American adults compared to one in three adults in the general US population have hypertension.[3,6,165]

Controlling for sex or gender, the disparity in hypertension prevalence and mortality is particularly pronounced among women. Forty-three percent of non-Hispanic Black women are hypertensive compared to 28% of non-Hispanic white females.[3,165,166] Not only do African American women have the highest prevalence of hypertension but they also develop hypertension at a younger age and are more likely than White women to die prematurely from hypertension and hypertension-related illnesses.[15,19-21] Given the link between hypertension and other chronic health conditions, such as, kidney disease, stroke and cardiovascular disease, it is not unpredictable that the hypertension-related death rate is more than double for African American females (35.1) compared to white females (15.2).[166]

Despite the potentially fatal health consequences that can occur with the onset and progression of uncontrolled hypertension, high blood pressure is a modifiable risk factor that with appropriate treatment can be managed and its fatal effects mitigated.[41,74] However, despite being armed with knowledge and awareness about hypertension and its health risks, African American women are encountering barriers that are preventing them from reaching medically acceptable levels of hypertension control and management.[163-165] Research evidence indicates that even after adjusting for other variables such as income and age, Blacks treated for

hypertension are more likely than whites not to reach BP goals and women are more likely than men to fail treatment.[24,95]

Although multiple clinical trials have demonstrated the efficacy of certain antihypertensive medications in controlling hypertension, researchers have found that blacks, compared to whites, were significantly less likely to adhere to antihypertensive medications; this disparity remains across studies despite the methods used to measure adherence.[11,167] For example, in a longitudinal study examining racial differences in antihypertensive medication adherence, African Americans were less likely to adhere to taking their medications as prescribed than Whites (55% vs. 61% respectively, $P<.05$).[11,83]

In addition to medication adherence, maintaining a healthy weight through diet and physical activity is vitally important in the control of hypertension.[13,84] African American women (57%) are more likely to be obese or overweight than White women (33%) and African American men (37%).[168-170] Exacerbating the obesity burden that African American women share is the challenge of long-term weight management, which has been particularly difficult for African American women to achieve.[85,86] African American women are less likely than white women to engage in regular physical activity to reduce or maintain a healthy weight, which can worsen hypertension risk and management. [171-173] Failure to maintain a healthy weight can place normotensive women at high risk for developing hypertension and hypertensive women at risk for worsening their condition. [47]

Much of what is known in the existing literature about hypertension among African Americans has been produced through research studies and reports on the epidemiology, bio-physiological outcomes associated with hypertension, linkages to other chronic health conditions such as diabetes and kidney disease, and clinical trials testing the efficacy of hypertension

medications.[13,24,33,34] However, very few studies have examined psychosocial factors that facilitate or impede the management of hypertension among African American women. Psychosocial factors are defined as the interaction between mental states, psychological traits and aspects of the social environment that often have negative connotations, for example depression, hopelessness, stress, and hostility.[174] Despite an established link between stress and multiple adverse health outcomes, the effects of psychosocial stress on African American women's health behaviors has received little attention.[50,52,175,176]

Psychosocial stress is defined as the psychological (e.g.,, excessive worry, fear, anxiety, and anger) and physiological (increased heart rate, nervousness, "butterflies in stomach," headache) responses an individual experiences as a result of social factors (e.g.,, responses to financial hardship, discrimination, or family problems) that lead to maladaptive behaviors that often result in poor health outcomes.[50,52] Although every person has some level of psychosocial stress, some segments of the population are at greater risk of exposure to multiple stressors that exacerbate the effects of psychosocial stress on their health.[51-53] African American women, for example, are faced with multiple stressors that negatively impact their health as a consequence of their social status and membership within two historically marginalized groups based on their ethnicity and gender.[57-59]

Population data from the US Census Bureau and socioeconomic data reveal that, compared to White women, African American women are more likely to be single heads of households, primary care givers of aging or sick family members, and live in poor communities or in close proximity to poor communities where violence and victimization are prevalent.[21,60,61] The amalgamation of poverty, exposure to violence, and heightened risk of victimization and

discrimination are all factors that place African American women at a particularly high risk for experiencing psychosocial stress.[51,54,62-64]

Several studies also highlight distinct ways that African American women respond to psychosocial stress that warrant cause for concern.[65-68] Applying the "strong Black woman" hypothesis, which is a phenomenon associated with the coping style of African American women, Black and Woods-Giscombe (2012) found that the "strong Black woman" coping response to daily stressors often results in negative health outcomes by delaying preventive self-care and emotional suppression (e.g.,, downplaying urgency of potential health problems).[177]

The "strength behaviors" of African American women can also act as a double-edge sword, either as a source of stress that depletes African American women's personal resources and delays self-care or conversely, a factor that can manifest into pro-active responses such as positive reframing, spiritual coping, or active coping styles.[71,104,178]

African American women's health is often deteriorated by what Geronimus coined as the "weathering" effect, which is the accumulation of multiple or chronic stressors repeated over time that result in health decline and poor health outcomes.[68,70] In a study testing the "weathering" effect on heart disease among urban African American women, researchers found a negative association between heart health and cumulative stressors including individual, family, neighborhood, and socioeconomic stressors.[70]

It is also possible that psychosocial stress can impede health self-management behaviors by decreasing motivation to change behavior and impeding self-monitoring. The rationale here is that if an individual is constantly dealing with stressors (chronic stress) or feeling burdened by daily stressors, then responding to the stressors becomes a primary focus and health self-

management becomes a secondary focus. Both motivation and self-monitoring are critical in effective hypertension self-management.[47,179,180]

Theoretical Framework. Two theories provide the framework for this study: Bandura's (1986) Social Cognitive Theory (SCT) and the Transactional Model of Stress and Coping (TMSC).[181,182] SCT was chosen because of its consideration of triadic reciprocal determinism, which indicates the mutual influence of environmental, behavioral and individual factors that influence individual and group behaviors and its consideration of self-efficacy or an individual's beliefs about his or her ability to perform behaviors that bring about a desired outcome and self-regulation or controlling behavior through self-monitoring and the enlistment of social support, which are several of the theory's core constructs.[182]

Self-efficacy is the primary SCT variable of interest in this study. Numerous studies have shown that the performance of many health behaviors is predicted by self-efficacy beliefs, including health-promoting physical activity, healthy sexual behavior, and disease management (e.g., diabetes and hypertension).[112,183-185] Among hypertensive African Americans, self-efficacy has been associated with self-report and objective measures of adherence to medication regimens, participation in physical activity, and to be a predictor of other health behaviors associated with diet and weight loss.[112]

Many studies have examined the relationship between self-efficacy and diabetes self-management; however, there is a dearth of published studies examining the relationship between self-efficacy and hypertension self-management.[112] One of the few published studies that specifically examines the association between self-efficacy and hypertension self-care activities among African American adults found that hypertension self-efficacy was strongly associated

with adherence to five of the six JNC7 prescribed self-care activities among African Americans with hypertension.[112]

The TMSC is a framework for evaluating processes of coping with stressful events and the importance given to the management and regulation of stress.[181] This theory is particularly applicable because it takes into consideration the inter-relationship between stress and the coping response to stress as an important influence of health behavior and outcomes. According to the TMSC framework, stress does not affect all people equally, but rather, some people live through stressful experiences and manage to cope well and avoid becoming ill as a result of the stress, while the converse is true for others.[181] The difference in health outcomes related to the effects of stress is determined by several factors including stress appraisal and stress management or regulation.[181] Our study focuses primarily on spiritual coping, one of the three dimensions of coping responses proposed by the TMSC Model proposes.[181] Spiritual coping was chosen, in large part, because of its importance and saliency in the lived experiences of many African Americans.

According to the Pew Research Religion & Public Life Project, nearly eight-in-ten African Americans (79%) say religion is very important in their lives, compared with 56% of all U.S. adults; more than half (53%) of African Americans report attending religious services at least once a week; more than three-in-four (76%) say that they pray on at least a daily basis; and nearly nine-in-ten (88%) indicate that they are absolutely certain that God exists.[186] Because of the historical significance and major influence religion plays in the lives of African Americans, religious practices and spiritual beliefs are ubiquitous coping responses for stressful life events, especially among African American women.[59,187-191] For example, in their study on how African American women cope with workplace stress, Hall et al. (2012) found that African American

women reported a heavy reliance on prayer and church attendance to manage and cope with stress on the job. In another study on African American women, researchers found that church attendance served as a method of functional, instrumental and emotional coping by providing guidance, advice, financial assistance, and positive affirmation that aided women in coping with stressful life events.[59] In addition, studies have found a positive correlation between spiritual coping and quality of life indicators among African American women breast cancer survivors ($r = 0.70$, $P < .05$).[192]

Study aims and hypotheses. Much remains unknown about the *explicit* ways that psychosocial stress influences the self-management behaviors of African American women; however, what is well known is that patients who manage their hypertension tend to have better health outcomes.[71,112,193,194] Our study uses cross sectional data to examine the effects of psychosocial stress and two mediating factors—self-efficacy and spiritual coping—on the hypertension self-management behaviors of hypertensive African American women, aged 21 to 64, assessing the influences of SES, age, and depression symptomology. The specific hypotheses tested are as follows:

H_1: In a sample of African American women with hypertension, psychosocial stress will be negatively associated with three hypertension self-management behaviors—healthy diet, physical activity and medication adherence. Specifically, higher reported psychosocial stress levels are associated with lower hypertension self-management behavior scores.

H_2: In a sample of African American women with hypertension, self-efficacy and coping response will mediate the effects of psychosocial stress on hypertension self-management

behaviors such that, relative to the overall sample, the following will be supported by the data:

H_{2a}: Psychosocial stress will negatively predict coping responses and coping responses, in turn, will positively predict three hypertension self-management behaviors: medication adherence, diet, and physical activity.

H_{2b}: Psychosocial stress will negatively predict self-efficacy, in turn, self-efficacy will positively predict three hypertension self-management behaviors: medication adherence, diet, and physical activity.

H_3: In a sample of African American women with hypertension, there will be demographic and psychological differences in the sample in their spiritual coping responses, self-efficacy, and psychosocial stress levels.

The hypothesized relationships between psychosocial stress, two mediator variables—self-efficacy and spiritual coping—and three outcome variables—medication adherence, healthy diet, and physical activity are shown in the conceptual model as illustrated in Figures 4.1. and 4.2. It is predicted that —psychosocial stress (PSS) along with the two mediators—self-efficacy and the coping variable (spiritual coping) have both indirect and direct effects on the three hypertension self-management behaviors. Specifically, it is predicted that PSS directly affects the three hypertension self-management variables—diet, physical activity and medication adherence. It is also posited that the three hypertension self-management variables are indirectly affected by PSS through self-efficacy and spiritual coping variables; and self-efficacy and coping are negatively associated with PSS and positively associated with the outcome variables (three hypertension self-management variables). The main predictor variable, PSS, is negatively

associated with the three outcome variables (both directly and indirectly through self-efficacy and the spiritual coping variable).

With regards to the exogenous variables, it is posited that age and SES (measured by income and education) will be positively associated with self-efficacy and coping and negatively associated with psychosocial stress. Further, it is proposed that depression will be positively associated with psychosocial stress and negatively associated with self-efficacy and the coping response. No hypothesis was proposed a priori with regards to the association of the exogenous variables on the outcome variables, and therefore the full model was not controlled for the SES variables. However, tests of association between the exogenous variables and mediators were made.

Figure 4.1
Conceptual Model Examining Effects of Psychosocial Stress, Self-Efficacy, and Spiritual Coping on Hypertension Self-Management

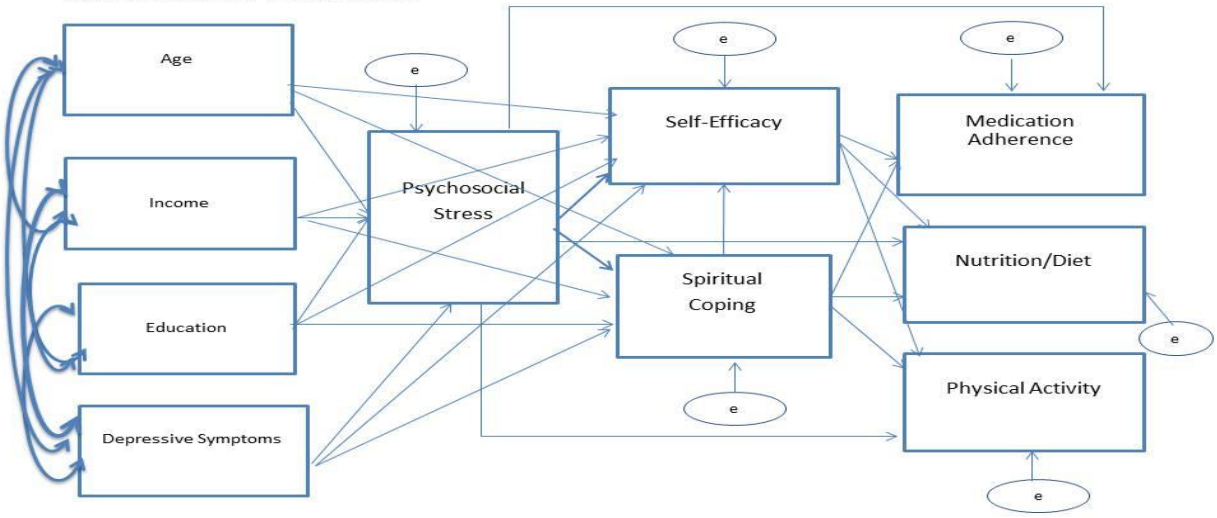
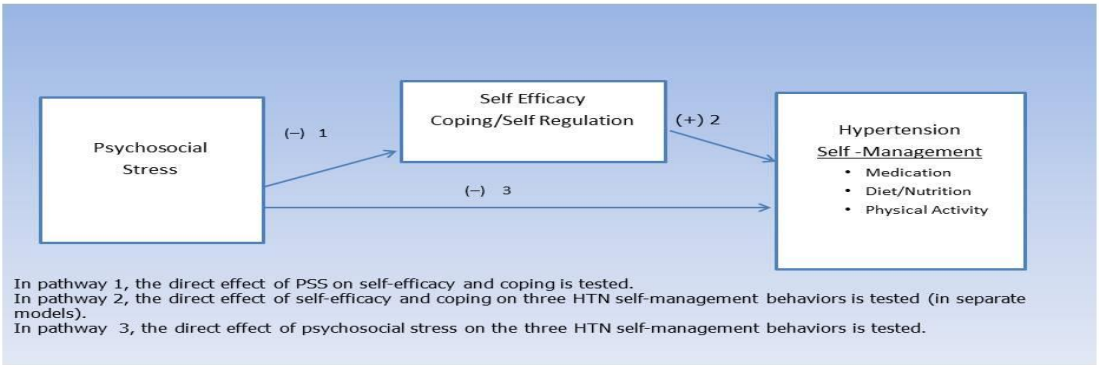


Figure 4.2
Full mediation model of the conceptual relationship among psychosocial stress, self efficacy, coping, and hypertension self management



Methods

Sample. Data from a cross-sectional survey is used to test these hypothesized relationships between stress, coping and hypertension self-management behaviors of African American women. The study sample consists of African American women, ages 21 to 64, with a diagnosis of hypertension, and living in two neighboring southeastern states. Women who did not self-identify as Black or African American; were pregnant; unable to give oral or written informed consent; and non-English speaking were excluded from the study.

Recruitment. Recruiting and retaining minorities in research has proven a daunting task for many researchers for various reasons including mistrust, fear of being exploited or maltreated, low literacy, SES-related barriers, communication issues, and researcher-participant cultural incongruence.[140,150,151] And, while many health disparities related studies recruit from lower SES populations, studies including minorities at the higher SES level are limited. This

suggests that recruiting from this population may present some access and response challenges. With these recruitment challenges in mind a robust recruitment strategy was employed.

The goal of recruitment for this study was to identify and recruit African American women with a clinical diagnosis of hypertension and diverse SES status representing low and mid-to-high SES. The primary recruitment methods included referrals from a high blood pressure management clinic serving moderate to low income individuals; direct appeals made to patients waiting to be seen at ambulatory care, women's, and nephrology clinics at a major hospital; direct appeal made through oral presentations to members of predominantly and historically Black women's organizations, including sororities, civic organizations, and churches. Using the targeted canvassing strategy, which has been useful in recruiting minorities for clinical trials and "hidden populations," (e.g., drug users),[138] flyers were posted in African American beauty salons, public libraries, community center information boards, African American churches, community health centers, waiting and reception areas of a high blood pressure clinic serving low-to-moderate income patients, a public health center located within a public housing community, acute care and women's health units within a major hospital, and in public housing communities. Additionally, word-of-mouth, which is an effective strategy to recruit minorities in research, was also used. [139-141] Women were asked to share the informational flyers with potentially eligible participants within their peer network. In addition, an email announcement about the study recruitment was also sent to key gatekeepers of African American women's sororities and civic organizations identified by the first author using personal contacts within her social network.

Data Collection. Participants completed a 98-item survey using one of three formats: over the telephone; directly using paper-pen version of the survey; or online using Qualtrics

program. All data without regard to collection method (by phone, pen-paper or online) were entered into a main database using the Qualtrics online survey platform. Given that this study posed minimal risk and did not ask participants to provide personal identifying information associated with their responses, a waiver of consent was granted by the Institutional Review Board of Virginia Commonwealth University. A statement of implied consent was included, however, at the beginning of every survey without regard to the format (online, pen-paper, or telephone version). To ensure anonymity and to prevent multiple responses from the same computer, the Qualtrics link was formatted to ensure anonymous responses and non-duplication or "ballot stuffing" as is referred to in the Qualtrics system. The survey took on average 45 minutes to complete.

Caution was given to ensure participant confidentiality; the only time that personal identifying information was collected was if a participant agreed to have her name included in a drawing at the end of the survey. Participants who consented and completed the survey were asked if they wanted their names entered into a drawing for the opportunity to win a $50 gift card as a token of appreciation for their participation. If they consented to being included in the drawing, they were prompted either online or asked to complete a form separate from the survey by providing their contact information, including name, email address (if any) and telephone number. There were a total of eight drawings done until the close out of the study.

Measures

Demographic variables. Included in the survey are: income, highest level of education, partner/marital status, family composition (e.g., single head of household), number of children, depressive symptoms, health conditions history checklist and a general health rating. The income

question is asked using a scale, as findings from other studies suggest that many people are resistant to reporting absolute income.[195,196] Self-reported height and weight are also included and were later used to compute the BMI of the respondent. Age is measured in years.

Depressive Symptomology. To measure depressive symptomology, a subscale from the Center for Epidemiological Studies Depression Scale (CESD) [197,198] is used. The CESD measures symptoms of depression in community populations; it does not indicate a diagnosis of clinical depression.[197] The scale does, however, discriminate between clinically depressed patients and others and it correlates highly with other depression rating scales, such as the Beck Depression Inventory.[198] Using the 7-item CESD scale respondents are asked "How many days during the past week" (0-7) have they felt certain symptoms of depression. Responses are summed and were used to produce a composite depression score ranging from 0 to 56 with higher scores indicating greater depressive symptomology. The CESD composite showed acceptable internal consistency (α=.91).

The primary outcome variables for the study are hypertension self-management adherence for three specific behaviors: medication adherence, healthy diet, and physical activity.

Medication Adherence. To measure adherence to prescribed medication, an adapted version of the Hill-Bone Medication compliance to high blood pressure therapy scale was used.[199,200] Using 7 questions, this scale measured adherence by assessing patients' forgetfulness in taking medication, filling prescriptions and ensuring they did not run out of blood pressure medication. Minor wording changes were made to a few items and instead of asking participants to use a one week (seven day) time recall period, the scale for this study was revised to cover a one month (30 day) period. There is general consensus that there is no optimal recall window that totally eradicates recall bias or error.[201,202] However, some researchers make the persuasive

argument that although shorter recalls such as one week are often used, shorter recall windows are not necessarily optimal, but should be based on different factors, including type of questions and the larger context of study design.[201] The justification for making the change in the time frame for recall in this study from one week to one month considered increasing the likelihood of capturing nuanced changes that may occur beyond a seven-day window. For example, someone could have been sick the week before the survey was taken and the answers would have captured behaviors that were perhaps affected because of the temporary illness or unexpected event. Asking the respondents to report their behaviors within the last month is more sensitive to such changes and captures more realistic routine behavior. Responses categories were bounded accordingly: zero (perfect adherence), 1 to 7 days, 8 to 14 days, 15 to 20 days, 21 to 23 days, and 24 to 30 days (80% non-adherent); the lower the number the greater the adherence. The bounded response categories were coded from 0 to 6 and the responses summed. The mean scores were used to produce a composite medication adherence score ranging from 0 to 42. Internal consistency of this scale was adequate (α=.76). As the individual subscale scores are sums, participants with any missing items from any of the subscales were excluded from the analysis for this particular variable.

Diet and Physical Activity Compliance. A modified version of the Hypertension Self-Care Activity Level Effects subscale (H-Scale) for weight management, diet and physical activity (Warren-Findlow, Seymour, & Huber, 2011) was used to assess physical activity and diet/nutrition. Two items from the H-Scale were summed to assess compliance with physical activity regimens routinely prescribed to hypertension patients—at least 30 minutes of moderate physical activity each day and doing a healthy physical activity other than what would normally be done at home or at work, such as taking stairs or parking further away from buildings. The

reference period was within the last seven days ranging from zero (no days) to 7 days (every day in the last week). The composite score ranged from 0 to 14. The higher the score, the more compliant to physical activity regimen. Internal consistency of this scale was adequate (α=.71). The diet scale composite was measured using 11 items from the H-Scale that focused on dietary behaviors related to eating foods high in sodium, sugars and fatty meat or pork products. The responses were summed to produce a composite healthy diet compliance score ranging from 0 to 77. Internal consistency of this scale was slightly below what is considered as adequate (α=.66). The main predictor and mediation variables are psychosocial stress, self-efficacy and spiritual coping response.

Self-efficacy. To assess self-efficacy to manage hypertension a modified version of Warren-Findlow, Seymour, and Huber's hypertension self-efficacy scale was used to assess self-efficacy to manage hypertension. The scale asked respondents to rate on a percentage point scale, from 10% (not confident) to 100% (totally confident), their level of confidence performing five specific hypertension management behaviors. A composite self-efficacy score was computed using the mean of the sum scores (0 to 55), with higher scores indicating higher level of self-efficacy. Internal consistency of this scale was adequate (α=.86).

Psychosocial Stress. Cohen's Perceived Stress Scale was used to measure perceived stress[112,203]. The Perceived Stress Scale (PSS), one of the most widely instruments for measuring the perception of stress, measures the degree to which situations in one's life are appraised as stressful and how unpredictable, uncontrollable, and overloaded respondents felt as a result of the stress.[203] Studies using the PSS have found higher PSS scores were associated with several behavioral outcomes including failure to quit smoking and failure among diabetics to control blood sugar levels. A short version of the PSS was used creating a 13 item scale. Participants

were asked to rate, on a scale of 1 (never) to five (every day), how often in the last month did they feel a certain way due to a stressor or stressful event. The summed scores, ranging from 1 to 65 were used to create a PSS composite. Internal consistency of this scale was adequate (α=.89).

Thirteen items from the Brief COPE inventory [204] was used to assess different coping responses. However, from the 13 items inventory, only the three items measuring spiritual coping were used. Respondents were asked "when things get difficult to handle or you feel stressed, how often do you do the following" using a scale of 1 (never) to 5 (very often). The summed scores for the spiritual coping variable, ranging from 3 to 15 were used to create the composite spiritual coping score. Internal reliability of this scale was adequate (α=.70).

Using the common stressors that emerged from the qualitative study, the survey also included a rating scale using a 5-point Likert scale asking respondents to rate the degree to which the common stressors affect the way in which they manage their hypertension, using a scale from (1) not at all to (5) always. These items were not tested in the regression model; however, they were analyzed using chi-squared statistics for frequencies and proportions.

Data Analysis

Descriptive statistics. The characteristics of the study sample are reported using frequencies and percentages for the categorical data and means and standard deviations for the continuous variables. The data were screened for missing responses and normality (skewness and kurtosis).[205] ML is the estimator used in for continues data in SEM which requires that the data follows a multivariate normal distribution. Violating this assumption could lead to problems in terms of the accuracy of the statistical tests.[205] Skewness is the degree to which a variable's

distribution is asymmetrical with a positive skew describing a distribution where many scores are at the low end of the scale. For the skewness index, absolute values greater than 3 are extreme. Kurtosis on the other hand, is an index of the peakedness of distributions; absolute values higher than 8 are problematic.[205]

Demographic data were analyzed and compared between perfectly adherent and non-adherent for the three hypertension self-management behaviors using chi-square and Independent t-test. Descriptive data (means and standard deviations) and bivariate correlations for the demographics and model variables were also assessed. Spearman correlation coefficients were calculated to assess the bivariate relationships between the demographics and structural equation model variables. When appropriate (e.g., assessing relationships between continuous variables in the model), Pearson correlation coefficients were calculated. All demographic data analyses were performed using IBM SPSS (v23). MPlus (v7) was used to analyze the results of the structural equation model.

Structural Equation Model. The hypothesized relationships and fit of the proposed model were tested using the MPlus (v7) statistical analysis program.[206] Full Information Maximum Likelihood (FIML) is the default estimator in MPlus (v7) and was used to estimate model parameters. FIML is the preferred method for three main reasons: (1) it robustly handles missing data when estimating the fit of the hypothesized model; (2) it makes use of all available information and there is no loss of observations via listwise or pairwise deletion; and (3) it tends to result in less bias and sampling variability.[206]

Model Fit. The model fit was assessed using X^2, the Root Mean Square Error of Approximation (RMSEA), and the Comparative Fit Index (CFI). Chi Square (X^2) measures the goodness of fit of the model. A non-significant X^2 statistic ($p>.05$) in SEM suggests that the

model fit is acceptable in which case the observed covariance is similar to the predicted covariance.[205]

The RMSEA is an absolute fit index and essentially can be viewed as a "badness of fit" or lack-of-fit measure, testing how poorly the model fits the data. Values less than .05 indicate a reasonably close estimated fit; values greater than .10 indicate a poor fit.[207] The RMSEA is relatively less sensitive to other issues, such as violations of assumptions about distribution and sample size, which made it a good fit index to use for this study.

To compare the target model with the null or independent model in which the variables are assumed to be uncorrelated, the Comparative Fit Index (CFI) was used. CFI is considered an "incremental fix index" and is estimated as the ratio between the discrepancies of the target model compared to the null or independent modal. CFI values greater than .95 are considered acceptable model fit.[207] The CFI is less sensitive to sample size and was chosen for this study.

Results

Participant Demographics. A total of 213 African American women with hypertension completed the survey either online, via paper-pen format or over the telephone. After cleaning the data and accounting for missing data, 22 surveys that had missing data on all independent variables were omitted from the analysis. The omitted surveys including four participants who reported ages over 65; six participants who left more than 70% of the survey incomplete including the test variables; and eight participants who completed the survey online but who indicated that they did not live in the two southeastern states that were used as the sampling frame. After the excluded surveys were purged, the final sample size for the study was 191 hypertensive African American females, ages 21 to 64, living in two neighboring southeastern states.

Table 4.1 provides a detailed description of the sample's demographic characteristics. A majority of the participants have some college, a two or four-year degree or higher (64%); are single (30%) vs. married (27%) and reported annual household incomes of either $25,000 to $55,000 (32%) or higher (23%). The majority of the participants worked full-time (47%) and was insured by private, employee or military providers (58%). The mean BMI, which was computed using the self-reported weight and height, for the sample population was 36 (SD 9). Although there has been some controversy over the reliability and validity of the BMI as an accurate measure of obesity and indicator of poor health, a BMI of 30 or greater is considered obese.[208,209] Thirty-six percent of the participants identified obesity as one of their existing health conditions. Other common comorbidities reported were high cholesterol (37%), diabetes (29%), and depression (25%). A vast majority (85%) reported that they were currently taking high blood pressure medications; the average length of time having high blood pressure was 11 years (SD9).

Also detailed in Table 4.1 is a between group comparison comparing the demographics of the medication adherent (N=110) with the participants who scored as non-adherent (N=45) on the medication adherence scale including significance tests of difference. Medication adherence is one of the most critical self-management behaviors linked to poor control results among African American women.[31,95] Although the mean age among the adherent African American women and non-adherent (ages 52 and 49 respectively) differed slightly, the difference was not statistically significant. There were statistically significant differences in education, annual household income, insurance status, smoking history and length of time with high blood pressure. Specifically, the medication adherent group had a larger proportion of participants than the non-adherent group who completed some college or higher (86%, 71% respectively);

reported higher annual household incomes (78% vs. 18% respectively); and were married (25%). A larger proportion of respondents in the medication adherent group also had private or employee insurance (52% vs. 13%), although they also had a larger number of participants who reported Medicaid or Medicare as their primary health insurer. The medication adherent group also had a diagnosis of hypertension the longest in years, thirteen years (s.d. = 10) compared to nine years for the non-adherent group (s.d. = 7) as well as a larger proportion of respondents who currently smokes (56% for the adherent group compared to 43% of the non-adherent group). Although the mean BMI, primary care giver status, employment status and whether or not the participant was on high blood pressure medication were different between the medication adherent and non-adherent group, these differences were not statistically significant.

Table 4.1 Characteristics of Hypertensive African American Women ages 21 to 64				
Characteristic	**Overall** N (SD or %)	**Medication Adherent** N (SD or %)	**Medication Non-Adherent** N (SD or %)	**Between Group Comparisons**
Total Population	191	110 (58%)	45 (24%)	
Demographics				
Age (mean)	49 (10.9)	51.88 (SD, 10.07)	48.81 (SD, 11.01)	T (135)=1.55,p=.125
Education				X^2 = 25.55, p=.000* (df_6, N=148)
<HS diploma	15 (9%)	4 (4%)	8 (20%)	
Completed HS/ no College	35 (18%)	21 (19%)	4 (4%)	
Some College, no degree	40 (23%)	22 (20%)	11 (28%)	
2-year or Associates degree	22 (12%)	9 (8%)	7 (18%)	
4-years or BA degree	32 (18%)	24 (22%)	7 (18%)	
Graduate degree or higher	30 (17%)	27 (25%)	1 (3%)	
Other	3 (2%)	1 (1%)	2 (5%)	
Marital Status				X^2 = 13.99, p=.016* (df_6, N=148)
Currently Married	51 (29%)	37 (34%)	6 (15%)	
Cohabitating, not married	13 (7%)	4 (4%)	7 (18%)	
Separated	13 (7%)	8 (7%)	4 (10%)	
Divorced	33 (19%)	23 (21%)	8 (20%)	
Widowed	11 (6%)	9 (8%)	1 (3%)	
Single, never married	57 (32%)	27 (25%)	14 (35%)	
Have Children	152 (80%)	89 (70%)	38 (30%)	N=127, p=.04*
Annual Household Income				X^2 = 10.84, p=.055* (df_5, N=145)
<$15,000	53 (28%)	23 (16%)	16 (11%)	
≥$15,000<$25,000	13 (7%)	5 (3%)	5 (3%)	
≥$25,000<$55,000	62 (32%)	42 (29%)	12 (8%)	
≥$55,000	44 (23%)	36 (25%)	6 (4%)	
Employment Status				X^2 = 3.78, p=.436

				(df_4, N=149)
Work Full-time	89 (47%)	56 (38%)	22 (15%)	
Unemployed (not retired)	34 (18%)	17 (11%)	6 (40%)	
Retired	24 (13%)	18 (12%)	3 (2%)	
Insurance Status				X^2 = 12.99, p=.043* (df_6, N=149)
Medicaid/Medicare	46 (24%)	25 (17%)	13 (9%)	
Private/Employee/ Military	111(58%)	78 (52%)	19 (13%)	
Uninsured	17 (9%)	5 (3%)	5 (3%)	
Primary care giver (Yes)	23 (12%)	12 (60%)	8 (40%)	X^2 = 1.73, p=.148 (df1, N=20)
BMI (mean)	36 (9.0)	36 (SD 8.45)	36(SD 9.72)	T (133)=.-100, p=.921
Current Smoker (Yes)	50 (26%)	21 (56%)	16 (43%)	X^2 = 5.66, p=.017* (df_1, N=37)
Length of Time with HBP (years)	11 (SD 9.3)	13 (SD 10)	9(SD 7)	T (107)=2.80, p=.006*
On HBP medication	163 (85%)	110 (71%)	45 (29%)	N=155

*indicates significant at p<.05; ** indicates significant at p<.01. Column 1 percentages based on total population.

Data Characteristics

Normality testing. Before performing any analyses, the data were checked for normality by running descriptive analysis and QQ plots to compare the distribution of the sample data against that of normal theoretical data. Table 4.2 shows the descriptive statistics for the continuous data used in the model. An examination of the skewness (asymmetric distribution of the data around the mean) and kurtosis (measure of the tails or peakedness) of the data indicate relatively normal data distribution. With the exception of medication adherence, the skewness and kurtosis of the data indicated a relatively normal distribution (skewness ≤3 and kurtois≤7). The medication adherence variable was positively skewed (2.87) (heavy left tail) and leptokurtic

(11.919) indicating that many of the participants were reporting low scores on the medication adherence scale.

It is also important to note, that as stated in the previous section explaining the scoring for the depression scale, the CESD scale is not a clinical assessment of depression. It does, however, discriminate between clinically depressed patients and others and it correlates highly with other depression rating scales, such as the Beck Depression Inventory. The mean score among this sample suggests that the sample population ranks near the middle of the scale indicating neither high nor low levels of self-reported depression symptoms but rather what could be determined as somewhere the middle. This mean score of 20.58 is a clear indication that depression is a concern and worth further investigation. It is also suggests that asking about depression symptoms when consulting with African American women on hypertension management is worthwhile and may be an important indicator in their overall health assessment.

Table 4.2 Descriptive statistics for the continuous variables in the model

	N	Min	Max	Mean	Std. Deviation	Skewness	Std. Error	Kurtosis	Std. Error
Age	164	23	65	49.48	10.95	-.577	.19	-.652	.38
Depression	183	7	56	20.58	12.45	.966	.18	.030	.36
Diet	187	12	77	42.00	11.71	-.070	.18	.168	.35
Annual Household Income	172	1	6	3.10	1.80	.273	.19	-1.224	.37
Medication Adherence	155	0	35	3.69	4.96	2.871	.20	11.919	.39
Physical Activity	187	2	16	7.06	4.14	.530	.18	-.683	.35
Psychosocial Stress	184	15	65	33.82	9.33	.673	.18	.452	.36
Self-efficacy	187	9	55	39.75	10.59	-.526	.18	-.381	.35
Spiritual Coping	183	3	15	10.92	2.82	-.322	.18	-.555	.36

Model Analysis

Model Fit. The fit indices indicate that the final models', overall, have good fit based upon a non-significant X^2 (p>.05); CFI value greater than 95; and RMSEA value less than .10. Table 4.3 reports the results from the model fit indices for each of the outcome variables. Each model is identical however three different analyses were run—one for each outcome variable. The results of each of the outcome models are reflected in the subsequent sections.

Table 4.3 Goodness of Fit indices for each model

Model	X^2	p-value	df	CFI	RMSEA, (90% CI)
Medication Adherence model	9.48	.050	4	.96	.09 (.000 - .171)
Physical Activity Model	6.67	.154	4	.98	.07 (.000 - .148)
Diet Model	3.44	.486	4	1.00	.00 (.000 - .112)

Medication Adherence

Table 4.4 provides the standardized parameter estimates for the medication adherence model. The results show support for the following hypotheses: (1) there is a statistically significant relationship between psychosocial stress regressed on age (-.17, p=.005) and depression (.67, p=.000); and (2) there is a statistically significant relationship between self-efficacy regressed on education (.35, p=.000) and spiritual coping (.22, p=.004). Further, the

results show that considering the effects of self-efficacy and spiritual coping, there is a statistically significant relationship between medication regressed on psychosocial stress ((β=.17, p=.055). No statistically significant relationship was found in the model for medication adherence regressed on self-efficacy and spiritual coping.

Table 4.4 Standardized coefficients for exogenous and mediation variables in Medication Adherence model			
	B	SE	p-value (2-tailed)
PSS on			
Age	-.17	.06	.005**
Education	.05	.08	.477
Income	.13	.08	.121
Depression	.70	.06	.000**
SE on			
Age	.05	.08	.478
Education	.35	.09	.000**
Income	-.09	.09	.318
Depression	-.06	.10	.526
Psychosocial Stress	-.12	.12	.289
Spiritual Coping	.23	.08	.004**
Spiritual Coping on			
Age	.11	.08	.211
Education	-.05	.10	.658
Income	.10	.10	.339
Depression	-.14	.11	.218
Psychosocial Stress	.05	.12	.655
Standardized parameter estimates for effects of mediators on Medication Adherence outcome variable			
Medication Adherence on			
Self-efficacy	-.00	.08	.972
Spiritual Coping	.02	.09	.869
Psychosocial Stress	.17	.08	.055*

**Significant at the 0.01 level (2-tailed) *Significant at the 0.05 level (2-tailed)

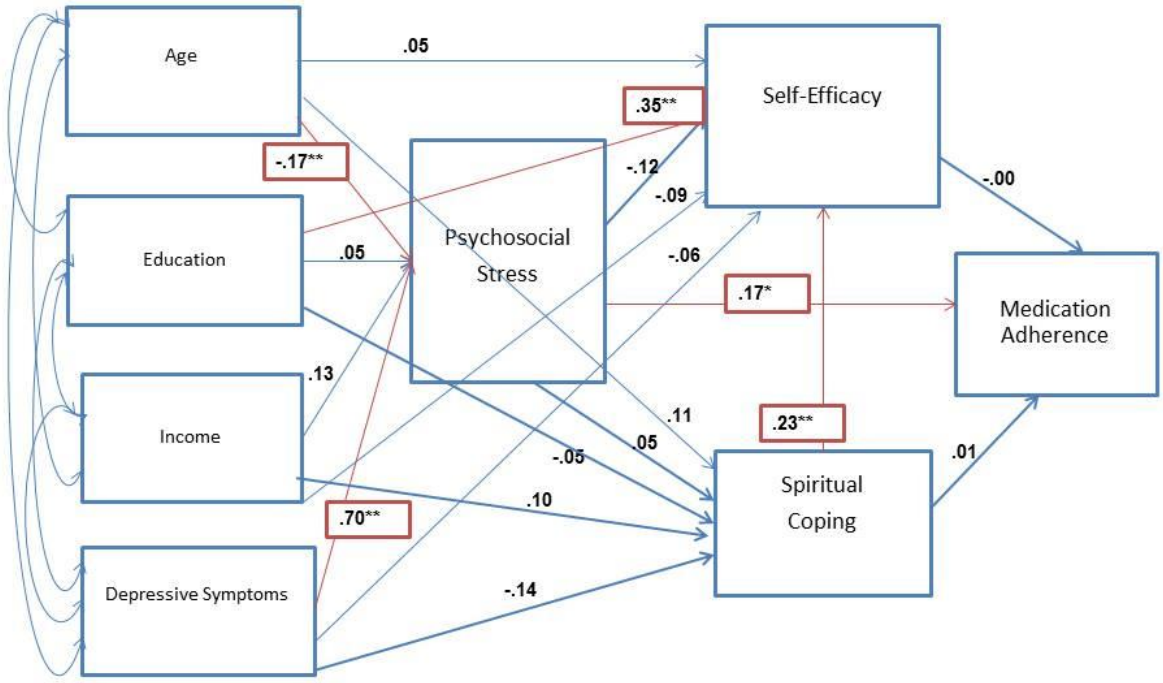
Table 4.5 reports the parameter estimates and 95% percentile bootstrap confidence intervals for the total, direct, and indirect effects (full mediation model). The results show a statistically significant total effect (TE) from psychosocial stress to medication adherence (TE =.17, CI .[043, .315]). Further there was a statistically significant direct effect between medication adherence and psychological stress (DE=.17, CI. [.043, .325]). The data did not yield a statistically significant indirect effect from psychosocial stress, self-efficacy or spiritual coping to medication adherence. There was no statistical evidence to support the hypothesis that self-efficacy and spiritual coping mediated the effects of psychosocial stress on medication adherence. The full model parameter estimates are illustrated in Figure 4.3.

Table 4.5 Full Medication Adherence model with direct and indirect effects (standardized)

	B	SE	95% CIs
Effects from Psychosocial Stress to Medication Adherence			
Total	.17*	.08	.043, .315
Total indirect	.00	.02	
Specific Indirect			
Medication Adherence Self-efficacy Psychosocial Stress	.00	.02	-.030, .019
Medication adherence Spiritual Coping Psychosocial Stress	.00	.01	-.024, .019
Medication Adherence Self-efficacy Spiritual Coping Psychosocial Stress	.00	.00	-.006, .003
Direct			
Medication Adherence Psychosocial Stress	.17*	.09	.043, .325
Effects from Self-Efficacy to Medication Adherence			
Total	-.00	.09	-.160, .134
Total Indirect	.00	.00	.000, .000

Direct			
Medication Adherence			
Self-Efficacy	-.00	.09	-.160, .134
Effects from Spiritual Coping to Medication Adherence			
Total	.02	.10	-.163, .170
Total indirect	-.00	.02	-.04, .03
Specific indirect			
Medication Adherence			
Self-Efficacy			
Spiritual Coping	-.00	.02	-.038, .030
Direct			
Medication Adherence			
Spiritual Coping	.02	.09	-.150, .158

Figure 4.3 Full Medication Adherence model's standardized parameter estimates



Model Variance. Psychosocial stress, self-efficacy, and spiritual coping accounted for an estimated 2.7%of the total variance in medication adherence.

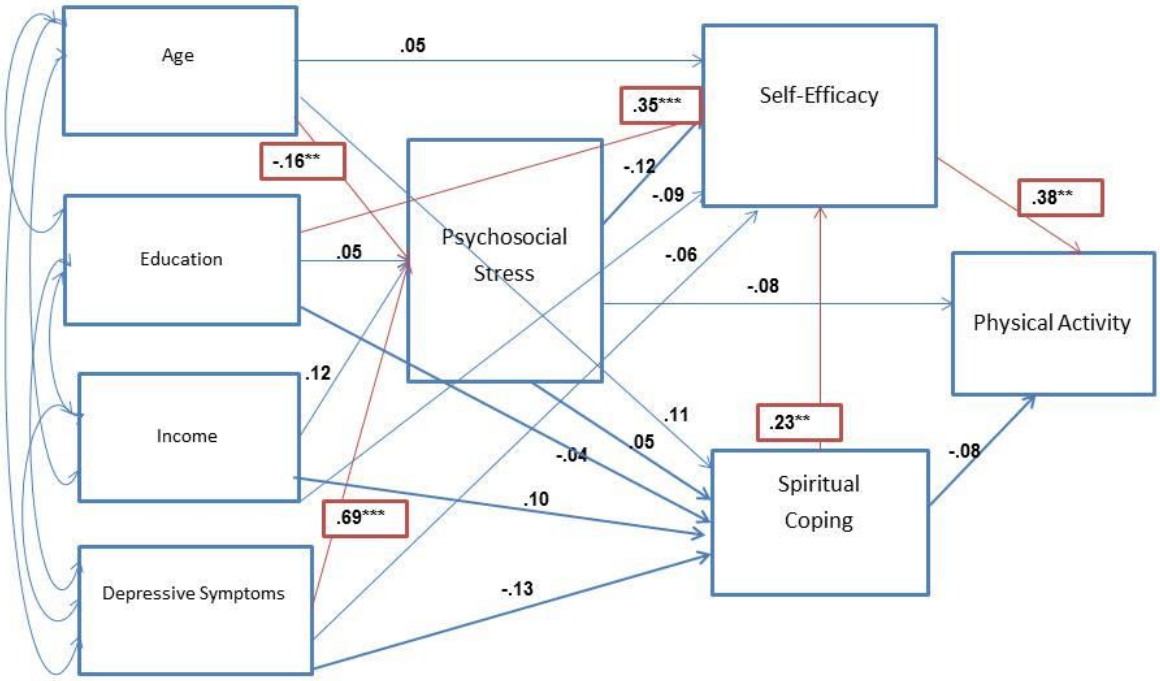
Physical Activity

Table 4.6 provides the parameter estimates for the physical activity model. Four of the study hypotheses are supported by the results in this model: (1) there is a statistically significant relationship between psychosocial stress, age, and depression. Specifically, age is negatively associated with psychosocial stress (β= -.16, p=.005) and positively associated with depression (.69, p=.000). Further as hypothesized, there is a statistically significant relationship between self-efficacy and education (β=.35, p=.000) and spiritual coping (.23, p=.004). When the endogenous mediation variables were tested in the model, self-efficacy was the only variable to yield as statistically significant result (β=.38, p=.000). Figure 4.4 provides a full illustration of the model.

Table 4.6 Standardized coefficients for exogenous and mediation variables in the Physical Activity model

	B	SE	p-value (2-tailed)
PSS on			
Age	-.16	.06	.005**
Education	.05	.08	.477
Income	.12	.08	.121
Depression	.69	.06	.000**
SE on			
Age	.05	.08	.478
Education	.35	.09	.000**
Income	-.09	.09	.318
Depression	-.06	.10	.526
Psychosocial Stress	-.12	.12	.289
Spiritual Coping	.23	.08	.004**
Spiritual Coping on			
Age	.11	.08	.211
Education	-.04	.10	.658

Figure 4.4 Full Physical Activity model's standardized parameter estimates



Income	.10	.10	.339
Depression	-.13	.11	.218
Psychosocial Stress	.05	.12	.655
Standardized parameter estimates for effects of mediators on the Physical Activity outcome variable			
Physical Activity on			
Self-efficacy	.38	.07	.000**
Spiritual Coping	-.08	.08	.259
Psychosocial Stress	-.08	.08	.247
**Significant at the 0.01 level (2-tailed)			
*Significant at the 0.05 level (2-tailed)			

The total, direct, and indirect effects (full model) of the model variables in the physical activity outcome are presented in Table 4.7. There is a statistically significant direct effect of

physical activity regressed on self-efficacy (β=.38, CI. [265, .488]). Further, based on the findings, there is a statistically significant indirect effect of physical activity and self-efficacy through spiritual coping (DE= .09, CI=.032, .146. Therefore, the effects of self-efficacy on physical activity are mediated by spiritual coping, which provides partial support of one of the hypotheses.

Table 4.7 Full Physical Activity model with direct and indirect effects (standardized)

	B	SE	95% CIs
Effects from Psychosocial Stress to Physical Activity			
Total	-.13	.09	-.271, .017
Total indirect	-.05	.05	-.130, .028
Specific Indirect			
Physical Activity Self-efficacy Psychosocial Stress	-.05	.05	-.126, .024
Physical Activity Spiritual Coping Psychosocial Stress	-.01	.01	-.032, .015
Physical Activity Self-efficacy Spiritual Coping Psychosocial Stress	.01	.01	-.012, .028
Direct			
Physical Activity Psychosocial Stress	-.08	.07	-.193, .0.40
Effects from Self-Efficacy to Physical Activity			
Total	.38	.07	.265, .488
Total Indirect	.00	.00	.000, .000
Direct			
Physical Activity Self-Efficacy	.38*	.07	.265, .488
Effects from Spiritual Coping to Physical Activity			

Total	.00	.08	-.135, .131
Total indirect	.09*	.04	.032, .146
Specific indirect			
Physical Activity			
Self-Efficacy			
Spiritual Coping	.09*	.04	.032, .146
Direct			
Physical Activity			
Spiritual Coping	-.09	.08	-.209, .040

Diet

Tables 4.8 and 4.9 provide the parameter estimates for the model testing the effects of psychosocial stress, self-efficacy, spiritual coping in the diet outcome variable.

Table 4.8 Standardized coefficients for exogenous and mediation variables in the Diet model			
	B	SE	p-value (2-tailed)
PSS on			
Age	-.16	.06	.005**
Education	.05	.08	.477
Income	.12	.08	.121
Depression	.69	.06	.000**
SE on			
Age	.05	.08	.478
Education	.35	.09	.000**
Income	-.09	.09	.318
Depression	-.06	.10	.526
Psychosocial Stress	-.12	.12	.289
Spiritual Coping	.23	.08	.004**
Spiritual Coping on			
Age	.11	.08	.211
Education	-.04	.10	.658
Income	.10	.10	.339
Depression	-.13	.11	.218
Psychosocial Stress	.05	.12	.655
Standardized parameter estimates for effects of mediators on the Diet outcome variable			
Diet on			
Self-efficacy	.26	.08	.001**
Spiritual Coping	.09	.08	.287
Psychosocial Stress	.14	.09	.106

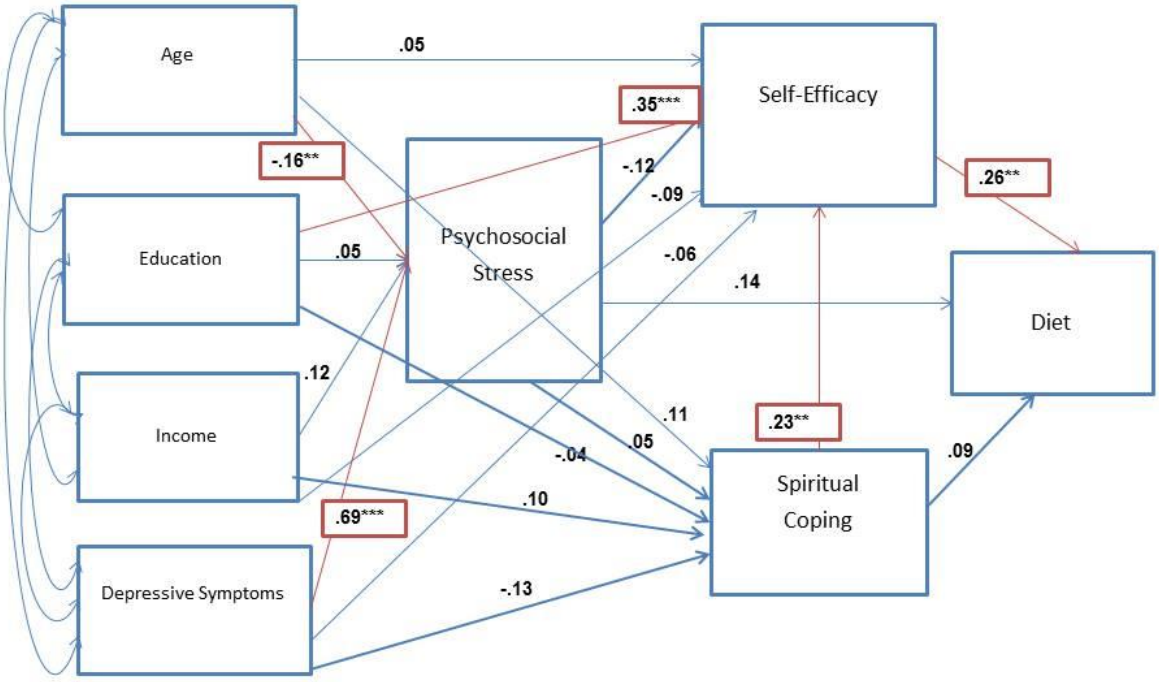
**Significant at the 0.01 level (2-tailed) *Significant at the 0.05 level (2-tailed)

Table 4.9 Full Diet model with direct and indirect effects (standardized)			
	B	SE	95% CIs
Effects from Psychosocial Stress to Diet			
Total	.114	.09	-.042, .268
Total indirect	-.02	.04	-.096, .044
Specific Indirect Diet Self-efficacy Psychosocial Stress	-.03	.03	-.093, .015
Diet Spiritual Coping Psychosocial Stress	.01	.02	-.017, .033
Diet Self-efficacy Spiritual Coping Psychosocial Stress	.00	.01	-.008, .021
Direct Diet Psychosocial Stress	.14	.09	-.003, .276
Effects from Self-Efficacy to Diet			
Total	.26**	.08	.129, .380
Total Indirect	.00	.00	.000, .000
Direct Diet Self-Efficacy	.26**	.08	.129, .380
Effects from Spiritual Coping to Diet			
Total	.14	.08	.000, .272
Total indirect	.06*	.03	.017, .110
Specific indirect Diet			

Self-Efficacy Spiritual Coping	.06*	.03	.017, .110
Direct Diet Spiritual Coping	.09	.08	-.053, .213

The diet model results provide support for the hypothesis that self-efficacy predicts diet as a hypertension self-management behavior (β=.26, CI=.129, .380). Testing the total, direct, and indirect effects in the full mediation diet outcome model, self-efficacy has an indirect effect on diet through spiritual coping (IE=.06, CI=[.017, .110]). (See Figure 4.5)

Figure 4.5. Full Diet model's standardized parameter estimates



Discussion

The results from the statistical analysis of three models testing the effects of psychosocial stress, self-efficacy and spiritual coping on three hypertension self-management behaviors help to illuminate the effects of psychosocial stress, spiritual coping, and self-efficacy on the hypertension self-management behaviors of African American women ages 21 to 64. Although no mediation effects were discovered as hypothesized, there were several relationships among the variables that are particularly useful in elucidating factors influencing African American women's hypertension self-management. Several of the hypotheses were supported by the data that are noteworthy and are discussed next.

Comparing the models, age and depression remained as statistically significant effects on psychosocial stress across models. The relationship between self-efficacy, education and spiritual coping is also statistically significant across each of the models, which is intuitively and empirically reasonable given that self-efficacy measures one's confidence in performing a task and confidence increases with knowledge and skills attainment which are directly influenced by education.[118,210] The statistically significant relationship between self-efficacy and spiritual coping is also reasonable given that spiritual coping has been found to increase one's beliefs in overcoming difficult challenges or experiences.

Both self-efficacy and depression were directly and indirectly associated with psychosocial stress and each of the three self-management behaviors. Higher scores on the depression scale were linked to higher scores on the psychosocial stress scale and lower scores on each of the three hypertension self-management scales. These results suggest a complex interaction between African American women's hypertension self-management behaviors and coexisting mental health conditions that should be treated simultaneously as a good step towards improving African American women's hypertension self-management. However, this challenge

is further increased when other factors are considered including financial stress, care giver burdens, and lack of appropriate social supports as other findings in the study indicate are important facilitators for African American women's adherence to hypertension self-management regimens, which is also what Schulz et al. (2006) propose.

Results from the survey analysis supported the qualitative findings that highlighted psychosocial stress as a barrier to medication adherence, however the same was not true for diet and physical activity behaviors. And, as discovered by Hall, Everett and Hamilton-Mason (2012), although the relationship between stress, poor health management and mental health outcomes have been solidly established among other populations including Caucasian, Latino and Native Americans, the effects of stress on health and mental health as measured in this study by depression, for African American women remains somewhat unclear [59].

Limitations

There are several limitations of this analysis that warrant discussion. One limitation deals with the use of a cross-sectional survey in general which limits the generalizability of the findings. Although recruitment into cross sectional studies may take place over time, all measurements in a cross-sectional study are obtained at a single point in time and does not allow for an assessment of changes over time as with longitudinal studies. Therefore, in this study, like all cross-sectional studies, it is difficult to capture trends in an outcome such as hypertension self-management behaviors—dietary habits, physical activity or medication adherence. What are presented are estimates of prevalence of a behavior. Cross sectional studies are also prone to non-response bias given that participants who are interviewed or who agree to participate in the study may differ from those who do not consent to participate.

Another limitation is that the study did not use a random sampling design but used a purposive sample with a distinct set of eligibility criteria—women aged 21 to 64 with hypertension living in two southeastern states. Therefore, the generalizability of the findings is limited to women who fit these particular characteristics. Additionally, the survey questions related to sensitive topics about health including the depression scale, which carries with it a certain degree of stigma in the African American community. Therefore it is possible that answers to some of the questions may lean toward what is socially desirable.

It is also important to note that all of the data collected were self-reported and cross-sectional. Given the nature of the data, directionality of the examined relationships could not be determined using path modeling. What was possible was identifying relationships among the study variables that shine light into what are reasonable assumptions to test in future studies examining the effects psychosocial stress, depression, self-efficacy, and coping on African American women's hypertension self-management behaviors.

Conclusion

There is persuasive evidence linking the development of hypertension to a complex interaction of risks including age, ethnicity, family history, genetics, behavior, environment, and social factors (e.g., access to health care, insurance status, SES and education).[13,24,33,34] And while age is a risk factor, very little research has been done to examine any important differences that may exist in the way African American women at different life stages or age groups manage their hypertension and the barriers to hypertension management they experience. For example, we have substantial data on hypertension detection, risks, and control responses among older populations (e.g., age 60 and older) but very little research has been published on the

hypertension self-management of women at the lower end of the age spectrum (e.g., early 20s and 30s).

Research on hypertension self-management in the younger population of child-bearing age is worthwhile for several compelling reasons: (1) high blood pressure is 2 to 3 times more common in women taking oral contraceptives; (2) compared to whites, African Americans develop hypertension early in life; and (3) among women aged 18 to 39, the prevalence of hypertension among African American women is nearly three times higher than among white women.[14,74] Building from the existing literature, the age and the psychosocial relationship found across each of the hypertension self-management behavior models in this study may be worth exploring further.

The findings from this study also elucidate the need to untangle the relationship between psychosocial stress and depression, which presents a type of –"what comes first the chicken or the egg" dilemma.[104,211] Previous researchers have argued that a major challenge in stress research is the difficulty in separating the stressful event from the subsequent psychological reaction such as stress, depression and anxiety.[101,104,211] Perhaps the distinction between the two—stress and depression—may not yield much difference in terms of the effect, however what is clear is that the difference should be explored more thoroughly. Recognizing that there is a stigma associated with depression that may not be prevalent in stress appraisal is also a consideration that could very well influence the self-reporting of depression that could be problematic. However, because depression emerged in the qualitative study and was followed by a significant association with psychosocial stress in the quantitative study, attempting to better understand its influence on African American women's healthy behavior could prove worthwhile.

Much remains unknown about the explicit ways that psychosocial stress alters the self-management behaviors of African American women. What is well known is that patients who manage their hypertension tend to have better health outcomes.[71,112,193,194] While the study produces very little new information with regards to diet and physical activity, it does shine some light on important variables that are worth taking note of and further investigation. For example, based on the findings in this study, spiritual coping is statistically associated with self-efficacy in each of the three models—medication adherence, diet, and physical activity. Linking back to the theories guiding this study, Bandura's (1986) Social Cognitive Theory (SCT) and the Transactional Model of Stress and Coping (TMSC)[181,182] it may be worth specifying the model more to include latent variables to more precisely estimate coping response and self-efficacy. A simple definition of self-efficacy is an individual's beliefs about their ability to perform behaviors that bring about a desired outcome. However also important is self-regulation or controlling behavior through self-monitoring, goal-setting, feedback, self-reward, self-instruction and the enlistment of social support.[182] These factors were not considered in the model but may be important to include at least partially in any future studies that build upon the current study.

In addition, the TMSC Model proposes three dimensions of coping responses: (1) problem management or focused coping which are directed at changing the stressful event or situation; (2) emotional regulation which includes efforts directed at changing the way a person thinks or feels about a stressful situation and includes strategies such as enlisting social support, avoidance, denial and venting feelings; and (3) meaning-based coping that induce positive emotion and include positive reinterpretation, acceptance and use of religion and spirituality as coping strategies.[181] The TMSC model predicts that problem-focused coping strategies will be most adaptive for stressors that are changeable, whereas emotional regulation strategies are most

adaptive when the stressor is unchangeable.[181] Therefore, deciding which coping variables to use may also need to factor in whether or not a person views their hypertension levels as manageable.

Overall the study provides results indicating that psychosocial stress does effect hypertension self-management. Specifically, psychosocial stress is negatively associated with medication adherence—the higher the stress score (greater psychosocial stress) the lower the medication adherence score (less adherent), according to the study findings. The psychosocial stress association with medication adherence provides additional support to existing evidence that has identified stress as one factor influencing negative health behaviors and subsequent health outcomes African American women.[71,101,212] The results in this study can be used to help inform future studies seeking to better understand the psychosocial barriers effecting African American women's hypertension self-management.

Discussion

In a 2015 report by the CDC titled, "Health, United States 2015: With Special Feature on Racial and Ethnic Disparities," hypertension among African Americans is singled out as a major contributor to persistent health disparities in America.[213] Hypertension is a primary cause and risk for several leading causes of death in the United States. African American men and women die each year than any other ethnic group from hypertension and hypertension-related illnesses with a conspicuous gender difference.[3,213] The rate of death resulting from hypertension is more than double for African American women (38.6) compared to Caucasian women (14.5).[14]

An individual's self-management behaviors are critical to controlling hypertension and intervening to mitigate the worsening of the condition. The relationship between hypertension self-management and related health outcomes is clear—poor hypertension self-management often leads to poor health outcomes and increased risk for other chronic health conditions including cardiovascular disease, kidney failure and stroke.[3,180] Although the level of awareness about the risks associated with uncontrolled hypertension is similar among African American and Caucasian women, African American women are less likely to adhere to hypertension self-management regimens to control their hypertension.[13,14,24,77] If the US is to realize significant decline in the rates of hypertension-related illnesses and deaths among African American women then it is critically important that we gain a better understanding of the barriers and facilitators of African American women's hypertension self-management behaviors.

Effective self-management of hypertension can substantially reduce the risk of chronic disease and adverse clinical outcomes including morbidity and mortality attributable to end stage

renal disease, stroke, and heart disease.[41,74] However, controlling hypertension once it develops is influenced by the interaction of multiple and complex factors including genetics, preexisting health conditions, age and social determinants.[3,214]

A primary focus of this study was to move beyond knowledge about the epidemiology and treatment of hypertension by gaining a better understanding of the way in which psychosocial stress affects the hypertension self-management behaviors of African American women. The specific objectives were to conduct a mixed-methods study using focus groups and a cross-sectional survey of hypertensive African American women, aged 21 to 64, to contribute to the existing literature on hypertension in three fundamental ways: (1) by assessing through a systematic literature review the depth and scope of existing research on hypertension and African American women with a specific interest in African American women's self-management and identifying where gaps exist that this research study could help fill; (2) by gaining a better qualitative understanding of the stressors that African American women encounter in their daily life experiences and the effects, if any, that psychosocial stress has on their hypertension self-management behaviors; (3) and by examining the dynamic ways in which psychosocial stress attenuates African American women's hypertension self-management behaviors (i.e. physical activity, dietary behaviors, and medication adherence) accounting for multiple social and behavioral factors including socioeconomic status, age, self-efficacy, coping responses, and depression.

The PI also felt that it was important that old and common research habits that treat African American women as a homogenous group and fail to elucidate underlying within-group differences among African American women were not repeated. Historically, within the context of health disparities research, African American women have often been treated as a

homogeneous population when in fact they are a heterogeneous group with different lived experiences influenced in large part by social and cultural factors including SES, social networks, and age.[21,87,89,215,216] Therefore, this study approached the issue from a broader perspective by examining between-group differences by SES and also taking a look at demographic differences between the medication adherent group and those who were non-adherent according to their scores on the medication adherence scale.

Theoretical Framework

Three theories provided the framework for this study's design and analysis: Bandura's (1986) Social Cognitive Theory (SCT), the Transactional Model of Stress and Coping (TMSC)[181,182] was used to guide the design and analytics of the quantitative stage and grounded theory [131] and African American Feminist Epistemology.[132-134]The Grounded theory paradigm also provided a useful tool to analyze the qualitative data by providing a systematic way to induce and conceptualize latent patterns of behaviors and perspectives from individual responses that describe the collective experiences of African American women's hypertension self-management behaviors and the effects of psychosocial stress on those behaviors.[131]

This study was partly based on the premise that African American women's health behaviors are shaped and influenced, not just by their present experiences or contexts but also by dynamic historical contexts that have influenced their lived experiences. Using African American Feminist epistemology, this study examined African American women's hypertension self-management behaviors and their perceptions of the effects of psychosocial stress through the following paradigm: (1) their lived experience as a way of gaining and giving meaning to knowledge and beliefs about their health condition and behavior; and (2) the narratives they use

to describe and explain their experience, knowledge, perceptions and beliefs that represent a shared or collective experience.[132,134]

SCT was chosen because of its consideration of triadic reciprocal determinism, which indicates the mutual influence of environmental, behavioral and individual factors that influence individual and group behaviors and self-efficacy or an individual's beliefs about his or her ability to perform behaviors that bring about a desired outcome.[182] Self-efficacy was selected as the primary SCT variable of interest in this study largely because numerous studies have shown that the performance of many health behaviors is predicted by self-efficacy beliefs including health-promoting physical activity, healthy sexual behavior, and disease management (e.g. diabetes and hypertension).[112,183-185] Among hypertensive African Americans, self-efficacy has been associated with self-report and objective measures of adherence to medication regimens, participation in physical activity and to be a predictor of other health behaviors associated with diet and weight loss.[112] In this study, self-efficacy proved to be much stronger predictor of medication adherence than of the other two self-management behaviors—physical activity and diet.

The third theory that was used was TMSC which provided a framework for evaluating processes of coping with stressful events and the importance given to the management and regulation of stress.[181] This theory is particularly applicable because it takes into consideration the inter-relationship between stress and coping responses and emphasizes the importance of self-regulation which is also a key construct of SCT. According to the TMSC framework, stress does not affect all people equally, but rather, some people live through stressful experiences and manage to cope well or avoid becoming ill as a result of the stress.[181] Coping responses thereby play an integral role in determining the effects of psychosocial stress. The TMSC framework has

several major constructs: (1) environment transactions in which the impact of an external stressor or demand is mediated by the person's appraisal of the stressor and the psychological, social and cultural resources a person has at his or disposal; (2) the appraisal of the stress (primary and secondary); (3) coping efforts aimed at managing or regulating the problem, which mediate the primary and secondary appraisals; and (4) the actual outcomes of the coping process.[181]

Religious practices and spiritual beliefs are ubiquitous coping responses for stressful life events, especially among African American women.[59,187-191] Given the importance and saliency of religion in the lived experience of African American women as a coping mechanism, this study focused primarily on the effects of spiritual coping on African American women's hypertension self-management behaviors and psychosocial stress. However the findings of this study did not show strong support for the spiritual coping variable (which was measured using the items from the Brief Cope scale) as a predictor or mediator of hypertension self-management behaviors. One possible explanation for this unexpected finding is the measurement itself. It may be worthwhile to use a different spiritual coping item that goes beyond the three-item scale to explore more explicit instrumental ways that spirituality is used as a coping mechanism in response to daily life stressors among African Americans.

What Are the Gaps In the Existing Literature?

The study of hypertension has a long and rich history that has mostly focused on its epidemiology and treatment. Due to the extensive research that has been done on hypertension, it is often assumed that there is very little new information to produce on the subject. However, the findings from the systematic review in this study found evidence of gaps in the literature on

understanding the factors that enable or impede the hypertension self-management of African American women.

Specifically, the current review found that although many of the studies included a large percentage of African American women in the study population, there is a scarcity of research studies that: (1) examined hypertension management behaviors of African American women exclusively; and (2) examined the psychosocial factors influencing the self-management, self-care or adherence behaviors of African American women to manage or control hypertension.

The preliminary search of 2700 articles that met the search criteria (published between 1994-2016) that met the search criteria yielded 30 articles that met the inclusion criteria for the systematic review of articles encompassing some aspect of hypertension management among African Americans. The articles included in the systematic review were categorized according six main categories: : (1) studies (n=7 that were primarily descriptive, producing results about hypertension prevalence and predictors of medication adherence among African American women[94-100]; (2) studies (n=6) examining psychosocial and psychological factors that influence hypertension management among African American women such as stress and depression [101-106]; (3) studies (n=4) that discussed the influence and effects of culture and the beliefs among African American women about hypertension, its treatment and management[107-109]; (4) studies (n=7) that primarily examined and reported on facilitators of hypertension control or management among African American women[110-116]; (5), studies (n=3) that primarily identified and reported on barriers to hypertension management among African American women [117-119]; and (6) studies (n=3) that reported on both facilitators of and barriers to hypertension management among African American women.[31,120,121] The primary aims of the systematic review were to examine the existing literature on hypertension that was published over the past

two decades (1994-2014) to: (1) synthesize what is already known about the factors associated with African American women and hypertension management; and (2) highlight gaps in the literature on hypertension management of African American women with particular interest in studies that have examined the psychosocial stress and its influence on self-management or self-care behaviors.

Focusing on the aims of the review, just twelve of the 30 articles included in the review were on studies that specifically targeted African American/black women. The limited number of articles that specifically addressed the hypertension self-management behaviors of African American women doesn't support the notion that nascent studies on hypertension among African American women, including their hypertension self-management behaviors is futile. The findings also provide evidence of a shortcoming in the literature when it comes to studies that don't merely focus on African Americans as a heterogeneous population but that consider the vast differences of African Americans based on gender and other social characteristics including SES.

This findings from the systematic review are also noteworthy in that they shine light on the fact that a preponderance of published studies on hypertension look at the effects of hypertension medications or collect and examine epidemiological data and pay little attention to the triadic reciprocal determinism, which underscores the mutual influence of environmental, behavioral and individual factors that influence individual and group behaviors (as Bandura proposes in SCT). This last point ties cohesively to and supports the main findings from the qualitative and quantitative studies.

What the Study Findings Reveal About the Psychosocial Stress and the Hypertension Self-Management Behaviors of African American Women

The two stages of the study--qualitative study and quantitative stage were conducted concurrently. It was proposed that after data were analyzed from the focus group that there may be evidence of new stressors not identified in the literature that have differential effects based on socioeconomic status. This did not prove to be the case.

Although the argument was made that African American women are not a homogeneous group, the results from this study found that these two groups based on SES had more in common than not. Age and depression, not income and education (the two measures of SES) were in fact the two variables that had statistically significant relationships to the model variables across the three hypertension management models. Based on the findings from the study's quantitative data, medication adherence is statistically significantly associated with education, income, depression, and physical activity. Depression is negatively associated with education and income; the higher the level of education and income the lower the depression score. Self-efficacy is the most robust variable in the overall model and is statistically significant correlations to all but two of the variables: education, income, depression, physical activity, diet, and spiritual coping. Although not statistically significant, the hypothesized association between psychosocial stress and two of the hypertension self-management behaviors –medication adherence and physical activity—was supported. Overall, however there was marginal evidence to suggest unique differences among hypertensive African American women's and their hypertension self-management behaviors based on SES.

In the qualitative study, the most commonly shared barriers to hypertension self-management behaviors among the women across SES groups were time (for exercise and health food preparation), family demands and caregiver roles, and the effects of psychosocial stress.

Caregiver roles and responsibilities stood out as a frequently identified as common barriers to hypertension self-management among participants in both SES groups. Placing the health care of others (e.g. family members) as a priority over one's own self-care was a barrier that the women described repeatedly and with passion or emotion, indicating that this was a major concern.

Stress also resulted in delayed self-care and poor health behaviors that indirectly affected good hypertension management behaviors, mostly by disrupting healthy eating behaviors. This finding supports existing findings that shows stress can lead to poor health outcomes by delaying self-care either by focusing on care giver role and or other stressors.[71]

Important to the underlying aims of the study, stress was identified by both SES groups of hypertensive African American women as a barrier to their hypertension self-management behaviors. Some of the stress effects on hypertension self-management reported by the women in both groups supported the strength or "strong Black woman" hypothesis. In both groups there was a shared perception that managing stress is an important and necessary way to manage hypertension, although most of the women in both groups recognized that this was an area in which they struggled. The response of one participant in the mid-to-high SES group captures the essence of the stress theme and its effect on their hypertension management: "I know stress contributes to everything with me…."

Barriers that differed slightly between the two SES groups were systemic barriers including lack of affordability of medications and healthy foods, which emerged from both SES group discussions, however, was identified more frequently as a barrier among the low-to-mid SES group participants. Family stressors (children and aging or sick parents) and intimate partner (spouses or boyfriends) stressors were commonly cited by women in both groups.

There were several distinct differences between the groups. One difference was in the way that the women managed the stress that in turn effected the management of their hypertension. For example, maladaptive behaviors such as use of controlled substances, alcohol and smoking cigarettes were reported among several of the low-to-mid SES group participants but did not come up in the discussion with the mid-to-high SES group.

Another difference was, women in the mid-to-high SES group identified discrimination most often reported as work related as a stressor that was not identified among the low-SES group. A plausible explanation could be that low-SES women are more likely to be out of the workplace or work in segregated places and positions.

It was encouraging to observe that overall the women knew and were able to easily and accurately cite the medically acceptable hypertension management protocol and expressed an understanding of the severity of poorly controlled or unmanaged hypertension. The women also underscored the side effects from the medications including making them feel bad and weight gain as a barrier to their hypertension management. This finding gives foundational support to the quantitative study which found medication adherence to be the only self-management behavior out of three (medication adherence, diet, and physical activity) to be directly influenced by psychosocial stress (more on this later).

One disquieting finding is that several of the women, particularly in the low-to-mid SES group, described feeling better not taking their hypertension medication than they do when they are taking it as prescribed. This is disconcerting given the fact that failure to adhere to hypertension medication places hypertensive patients at grave risk for worsening the condition or even death.[217]

The women in both groups did however make clear connections to the effects of psychosocial stress on their hypertension self-management behaviors and identified distinct ways that they believed stress affected their hypertension. Feeling depressed and passive responses to the stressors encountered including "just want to be left alone" (social isolation), excessive sleeping and "not doing anything" were common responses to the stressors that women felt were presenting as barriers to their hypertension self-management.

Findings from the quantitative study provide strong support of a relationship between psychosocial stress and depression as well as hypertension self-management behaviors among African American women. In the quantitative study, depression was the most robust variable—correlated with psychosocial stress and each of the three self-management behaviors.

Implications

The findings from this study have implications for health care providers, community and population health including researchers and community-based health program providers. For health care providers and physicians, the findings linking medication adherence to psychosocial stress can be useful in helping to better guide hypertensive African American women on how to maintain their medication regimen by identifying and seeking help, if needed, to minimize the negative effects of stressors and ensuing psychosocial stress that can prohibit medication adherence. Noticing the demographic differences between the two medication adherent and non-adherent groups can also be instructive. For example, based on the findings from this study, the medication adherent group has several unique characteristics: younger, less educated, lower incomes single and have less time diagnosed with hypertension. These findings are helpful to interventionist i.e. community and population health practitioners in better identifying and

assisting populations at greater risk for non-medication compliance as well as tailoring messages to reach the target population.

Although not identified a priori, there were several recommendations that the women gave that they felt could better assist them and other African American women in being more successful in managing their hypertension. These recommendations included providing instruction on about how to prevent and successfully control hypertension as a routine part of physical examinations for African American women even if they are not diagnosed with the condition; providing resources and education on stress-management that takes into consideration the "real things" many African American women encounter in their daily life experiences including being single heads of households, often managing work and education or multiple jobs; and being primary care givers to other family members including fictive kin (close friends); and improving doctor-patient communication with doctor's being more sensitive to individual patient needs and experiences and not treating all African American women as a homogeneous group.

Future interventions can be designed with these recommendations based on the first-hand experiences and perspectives of hypertensive African American women in mind.

Also worth noting is the frequency in which women in both groups reported feeling depressed as a common response to stress that also often gets in the way of their hypertension management. Both groups identified better incorporation of mental health counseling and supports into routine health protocols as a way to facilitate better hypertension management. There are compelling and consistent research findings that establish a link between stress, depression and cardiovascular disease through multiple and complex pathways.[145-147] The findings from this study provide additional evidence suggesting a link between stress, depression, and hypertension that is worth exploring further. The study findings also highlights the importance of physicians addressing the

effects stress can have especially when combined with depression on African American women's hypertension management and related health outcomes. It also may be worthwhile to screen for stress and depression as well as physical symptomology as a part of the routine primary care for treating high blood pressure in African American women.

While education alone does not result in predictable changes in behavior, the women agreed that more practical education on how to manage their hypertension through healthy diets and physical activity can prove beneficial. Some of the suggestions ranged from a doctor giving a list of actual nutritionist to refer patients, having personal cooks prepare foods and nutrition class, to simply having times to check in with the doctor to specifically discuss how they are managing the nutrition and physical activity part of their regimen.

Although African American women are less likely than Whites to enroll in clinical trials testing the effects of hypertension medications, it is important that they do so.[148,149] It is clear from the responses of this sample of hypertensive African American women that the side effects from their medications are a major barrier to hypertension medication adherence. The data from this study suggests that side effects may contribute to African American women's reluctance to participate in clinical trials if the clinical trials are testing blood pressure medicines; further research is needed to explore this assumption. Developing better ways and information about how to allay some of the side effects from hypertension medications may be worth exploring further. For example, instead of simply stating the side effects, providers can give more guidance on how to offset or respond to the side effects without patients having to stop taking the medication as prescribed.

Conclusion

Overall the findings from this study provide quantitative and qualitative evidence, albeit not groundbreaking, that stress indeed has some effect on the hypertension self-management behaviors of African American women. A systematic review of the literature supports the assertion that there are conspicuous gaps in the existing health literature on African American women's hypertension self-management in general and psychosocial stress effects in particular. While not all the pathways hypothesized in the quantitative study models were significant in each model, none of the estimates were the inverse in directionality to that hypothesized. This provides support that each concept in the proposed model lends some explanatory power and does not detract from understanding the relationship between psychosocial stress and the three hypertension self-management behaviors as proposed or the mediator and exogenous variables that were also tested in the model. It is therefore proposed that this is a good model from which to build and refine in search of greater understanding of the effects of stress on African American women's hypertension self-management behaviors.

This study contributes to the existing literature by providing empirical evidence of the effects of psychosocial stress on medication adherence behavior of hypertensive African American women ages 21 to 64. Knowledge gained from the proposed study can have significant utility in the development of health interventions designed to improve medication adherence among this hypertension high-risk population.

The medication adherence finding and using the conceptual model to build upon in search of greater understanding of how to improve African American women's hypertension self-management behaviors may be the greatest contribution to the existing literature and medical as well as community and population health fields.

References

1. Glover M, Greenlund K, Ayala C, Croft J. Racial/Ethnic Disparities in Prevalence, Treatment, and Control of Hypertension--United States, 1999-2002. In: Prevention CfDCa, ed. *Mortality and Morbidity Weekly Report.* Vol 54. Atlanta, GA2005:7-9.
2. CDC. Number of deaths from 10 leading causes--National Vital Statistics System, United States, 2010. *Morbidity and Mortality Weekly Report.* 2013;62(8):155-156.
3. Go A, Mozaffarian D, Roger V, et al. Heart Disease and Stroke Statistics- 2014 Update A Report From the American Heart Association. *Circulation.* 2014;129(3):E28-E292.
4. Go A, Mozaffarian D, Roger V, et al. Heart Disease and Stroke Statistics—2013 Update: A Report From the American Heart Association. *Circulation.* 2013;127(1):e6-e245.
5. CDC. Morbidity and Mortality Weekly Report: CDC Health Disparities and Inequalities Report--US 2013. In: US Department of Health and Human Services CfDCaP, ed. Vol 62: Center for Surveillance, Epidemiology and Laboratory Services; 2013.
6. CDC. Fact Sheet: Take Control of Your Heart: It's All in the ABCs. National Center for Chronic Disease Prevention and Health Promotion, Division for Heart Disease and Stroke Prevention; 2014.
7. Saunders E. Managing hypertension in African-American patients. *J Clin Hypertens (Greenwich).* 2004;6(4 Suppl 1):19-25.
8. Wyatt SB, Akylbekova EL, Wofford MR, et al. Prevalence, awareness, treatment, and control of hypertension in the Jackson Heart Study. *Hypertension.* 2008;51(3):650-656.
9. Fiscella K, Holt K. Racial disparity in hypertension control: tallying the death toll. *Ann Fam Med.* 2008;6(6):497-502.
10. Lackland D. Racial Differences in Hypertension: Implications for High Blood Pressure Management. *American Journal of the Medical Sciences.* 2014;348(2):135-138.
11. Lewis LM. Factors Associated With Medication Adherence in Hypertensive Blacks A Review of the Literature. *Journal of Cardiovascular Nursing.* 2012;27(3):208-219.
12. Sica D. Hypertension and End-Organ Disease in African Americans: Case Presentations. *Journal of Clinical Hypertension.* 2004;6:48-53.
13. Douglas J. Clinical Guidelines for the Treatment of Hypertension in African Americans. *American Journal of Cardiovascular Drugs.* 2005;5(1):1-6.
14. Roger V, Go A, Lloyd-Jones D, et al. Heart Disease and Stroke Statistics-2012 Update: A Report from the American Heart Association. *Circulation.* 2012;January 3(10):e68-e96.
15. Kochanek K, Xu J, Murphy S, Minino A, Kung H. Deaths: Final Data for 2009. *National Vital Statistics Reports.* 2011;60(3):1-10.
16. Flack J, Sica D, Bakris G, et al. Management of High Blood Pressure in Blacks: An Update of the International Society on Hypertension in Blacks Consensus Statement. *Hypertension.* 2010;56:780-800.
17. Olives C, Myerson R, Mokdad AH, Murray CJ, Lim SS. Prevalence, awareness, treatment, and control of hypertension in United States counties, 2001-2009. *PLoS One.* 2013;8(4):e60308.
18. Miniño A. Death in the United States, 2011: Data Brief. In: Statistics NCfH, ed. Vol 115. Hyattsville, MD2013.
19. James C, Thomas M, Lillie-Blanton M, Garfield R. *Key Facts: Race, Ethnicity & Medical Care.* Menlo Park, CA: Kaiser Family Foundation;2007.

20. CDC, NCI. *United States Cancer Statistics: 1999–2007 Incidence and Mortality Web-based Report*. In: U.S. Department of Health and Human Services CfDCaPaNCI, ed. Atlanta, GA2010.
21. Arriola K, Borba C, Thompson W. The Health Status of Black Women. *Black Women, Gender and Families.* 2007;1(2):1-23.
22. Arias E. National Vital Statistics Report: United States Life Tables, 2010. In: Services UDoHaH, ed. Vol 63: CDC, National Center of Health Statistics; 2014.
23. Arias E, Curtin L, Wei R, Anderson R. National Vital Statistics Reports: U.S. Decennial Life Tables for 1999-2001, United States Life Tables. In: Services USDoHaH, ed. Vol 57: CDC, National Center for Health Statistics; 2008.
24. Hertz R, Unger A, Cornell J, Saunders E. Racial disparities in hypertension prevalence, awareness, and management. *Archives of Internal Medicine.* 2005;165(October):2098-2104.
25. Department of Health and Human Services. 2008 Physical Activity Guidelines for Americans. In: Services USDoHaH, ed. Washington, DC2008.
26. Yoon S, Burt V, Louis T, Carroll M. Hypertension among adults in the U.S., 2009-2010. In: NCHS, ed. Vol Data Brief 107. Hyattsville, MD: National Center for Health Statistics; 2012.
27. Wexler R, Elton T, Pleister A, Feldman D. Barriers to blood pressure control as reported by African American patients. *J Natl Med Assoc.* 2009;101(6):597-603.
28. Price EG, Cooper LA. Hypertension in African Americans: strategies to help achieve blood pressure goals. *Consultant (00107069).* 2003;43(11):1330.
29. Douglas JG, Ferdinand KC, Bakris GL, Sowers JR. Barriers to blood pressure control in African Americans. Overcoming obstacles is challenging, but target goals can be attained. *Postgrad Med.* 2002;112(4):51-52, 55, 59-62 passim.
30. Martins D, Norris K. Hypertension treatment in African Americans: physiology is less important than sociology. *Cleve Clin J Med.* 2004;71(9):735-743.
31. Fongwa M, Evangelista L, Hays R, et al. Adherence treatment factors in hypertensive African American women. *Vascular Health and Risk Management.* 2008;4(1):157-166.
32. Douglas JG, Bakris GL, Epstein M, et al. Management of high blood pressure in African Americans: consensus statement of the Hypertension in African Americans Working Group of the International Society on Hypertension in Blacks. *Archives of Internal Medicine.* 2003;163(5):525-541.
33. Cozier Y, Palmer J, Horton N, Fredman L, Wise L, Rosenberg L. Relation between neighborhood median housing value and hypertension risk among black women in the United States. *Am J Public Health.* 2007;97(4):718.
34. Bell A, Adair L, Popkin B. Understanding the role of mediating risk factors and proxy effects in the association between socio-economic status and untreated hypertension. *Social science & medicine (1982).* 2004;59(2):275.
35. Spruill T. Chronic Psychosocial Stress and Hypertension. *Current Hypertension Reports.* 2010;12:10-16.
36. Arnold S, Smolderen K, Buchanan D, Li Y, Spertus J. Perceived Stress in Myocardial Infarction:Long-Term Mortality and Health Status Outcomes: Long-Term Mortality and Health Status Outcomes. *Journal of the American College of Cardiology.* 2012;60(18):1756-1763.

37. Brezinka V, Kittel F. Psychosocial factors of coronary heart disease in women: A review. *Social Science & Medicine.*42(10):1351-1365.
38. Rotheram-Borus M, Ingram B, Swendeman D, Lee A. Adoptions of Self-Management Interventions for Prevention and Care. *Primary Care: Clinics in Office Practice.* 2012;39:649-660.
39. Swendeman D, Ingram B, Rotheram-Borus M. Common Elements in Self-Management of HIV and other Chronic Illnesses: An Intergrative Framework. *AIDS Care.* 2009;21(10):1321-1334.
40. Jerant A, von Friederichs-Fitzwater M, Moore M. Patients' Perceived Barriers to Active Self-Management of Chronic Conditions. *Patient Education Counseling.* 2005;57:300-307.
41. Lorig K, Sobel D, Ritter P, Laurent D, Hobbs M. Effect of a Self-Management Program on Patients with Chronic Disease. *Effective Clinical Practice.* 2001;4(6):256-262.
42. Farrell K, Wicks MN, Martin JC. Chronic Disease Self-Management Improved with Enhanced Self-Efficacy. *Clinical Nursing Research.* 2004;13(4):289-308.
43. Bodenheimer T, Lorig K, Holman H, Grumbach K. Patient self-management of chronic disease in primary care. *JAMA: the journal of the American Medical Association.* 2002;288(19):2469-2475.
44. Warren-Findlow J, Seymour RB, Brunner Huber LR. The association between self-efficacy and hypertension self-care activities among African American adults. *J Community Health.* 2012;37(1):15-24.
45. Polzer R. African Americans and diabetes: spiritual role of the health care provider in self-management. *Research in nursing & health.* 2007;30(2):164.
46. Koch T, Jenkin P, Kralik D. Chronic illness self-management: locating the 'self'. *Journal of Advanced Nursing.* 2004;48(5):484-492.
47. Chobanian A, Bakris G, Black H, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Journal of the American Medical Association.* 2003;289(19):2560-2572.
48. Pabst S, Brand M, Wolf O. Stress and decision making: A few minutes make all the difference. *Behavioural Brain Research.* 2013;250(0):39-45.
49. Tryon M, Carter C, DeCant R, Laugero K. Chronic Stress Exposure May Affect the Brain's Response to High Calorie Food Cues and Predispose to Obesogenic Eating Habits. *Physiology & Behavior.* 2013;120:232-242.
50. Cohen S, Janicki-Deverts D, Miller G. Psychological stress and disease. *JAMA: the journal of the American Medical Association.* 2007;298(14):1685-1687.
51. Pearlin L. The Life Course and the Stress Process: Some Conceptual Comparisons. *Journals of Gerontology Series B: Psychological Sciences and Social Sciences.* 2010;65B(2):207-215.
52. Lovallo W. *Stress & Health.* 2nd ed. Thousand Oaks, CA: Sage Publications; 2005.
53. McEwen B. Brain on stress: How the social environment gets under the skin. *Proceedings of the National Academy of Sciences.* 2012;109(Supplement 2):17180-17185.
54. Gillespie CF, Bradley B, Mercer K, et al. Trauma Exposure and stress-related disorders in inner city primary care. *General Hospital Psychiatry.* 2009;31:505-514.
55. Massey D. *Categorically Unequal: The American Stratification System.* New York, NY: Russell Sage Foundation; 2007.

56. James S, Schulz A, van Olphen J. Social Capital, Poverty, and Community Health: An Exploration of Linkages. In: Saegert S, Thompson J, Warren M, eds. *Social Capital and Poor Communities*. New York, NY: Russell Sage Foundation; 2001:165-188.
57. Seng J, Lopez W, Sperlich M, Hamama L, Reed Meldrum C. Marginalized identities, discrimination burden, and mental health: Empirical exploration of an interpersonal-level approach to modeling intersectionality. *Social Science & Medicine.* 2012;75(12):2437-2445.
58. Albert MA, Cozier Y, Ridker PM, et al. Perceptions of race/ethnic discrimination in relation to mortality among Black women: results from the Black Women's Health Study. *Archives of internal medicine.*170(10):896.
59. Hall J, Everett J, Hamilton-Mason J. Black women talk about workplace stress and how they cope. *Journal of black studies.* 2012;43(2):207.
60. Patillo ME. Sweet mothers and gang bangers: m anaging crime in a black middle-class neighborhood. *Soc Forces.* 1998;76(3):747-774.
61. DeNavas-Walt C, Proctor B, Smith J. Income, Poverty, and Health Insurance Coverage in the United States: 2011. In: Bureau UC, ed. Washington, DC2012.
62. Bassuk EL, Dawson R, Perloff J, Weinreb L. Post-traumatic stress disorder in extremely poor women: implications for health care clinicians. *J Am Med Womens Assoc.* 2001;56(2):79-85.
63. Browning C, Cagney K, Iveniuk J. Neighborhood stressors and cardiovascular health: Crime and C-reactive protein. *Social Science & Medicine.* 2012;75(7):1271-1279.
64. Amirkhan J, Amirkhan H. Stress Overload: A New Approach to the Assessment of Stress. *Am J Community Psychol.* 2012;49(1):55-71.
65. Starcke K, Brand M. Decision making under stress: A selective review. *Neuroscience and Biobehavioral Reviews.* 2012;36(4):1228-1248.
66. Cox T, Zunker C, Wingo B, Jefferson W, Ard D. Stressful Life Events and Behavior Change: A Qualitative Examination of African American Women's Participation in a Weight Loss Program. *Qualitative Report.* 2011;16(3):622-634.
67. Turner R, Avison W. Status Variations in Stress Exposure: Implications for the Interpretation of Research on Race, Socioeconomic Status, and Gender. *J Health Soc Behav.* 2003;44(4):488-505.
68. Geronimus A, Hicken M, Keene D, Bound J. " Weathering" and age patterns of allostatic load scores among blacks and whites in the United States. *American journal of public health.* 2006;96(5):826.
69. McEwen B, Seeman T. Protective and damaging effects of mediators of stress: elaborating and testing the concepts of allostasis and allostatic load. *Annals of the New York Academy of Sciences.* 1999;896(1):30-47.
70. Warren-Findlow J. Weathering: Stress and Heart Disease in African American Women Living in Chicago. *Qualitative Health Research.* 2006;16:221-237.
71. Black A, Woods-Giscombe C. Applying the Stress and 'Strength' Hypothesis to Black Women's Breast Cancer Screening Delays. *Stress and Health.* 2012;28:389-396.
72. NHLBI. Your Guide to Lowering Blood Pressure. In: US Department of Health and Human Services NIoH, ed. Bethesda, MD: National Heart, Lung, and Blood Institute; 2012.

73. Crowley M, Grubber J, Olsen M, Bosworth H. Factors Associated with Non-Adherence to Three Hypertension Self- Management Behaviors: Preliminary Data for a New Instrument. *J GEN INTERN MED.* 2012;28(1):99-106.
74. Cutler J, Sorlie P, Wolz M, Thom T, Fields L, Roccella E. Trends in hypertension prevalence, awareness, treatment and control rates in United States adults between 1988-194 and 1999-2004. *Hypertension.* 2008;52(818-827).
75. Sica DA, Douglas JG. The African American Study of Kidney Disease and Hypertension (AASK): new findings. *J Clin Hypertens (Greenwich).* 2001;3(4):244-251.
76. Centers for Disease Control and Prevention. Racial/Ethnic Disparities in Awareness, Treatment, and Control of Hypertension-United States, 2003-2010. In: Services DoHaH, ed. Vol 62. May 10, 2013 ed2013:351-355.
77. Crowley M, Grubber J, Olsen M, et al. Factors Associated with Non-Adherence to Three Hypertension Self- Management Behaviors: Preliminary Data for a New Instrument. *J GEN INTERN MED.*28(1):99-106.
78. Volpp KG. The Counseling African Americans to Control Hypertension study and ways to enhance the next wave of behavioral interventions. *Circulation.* Vol 129. United States2014:2002-2004.
79. Spencer A, Jablonski R, Loeb SJ. Hypertensive African American women and the DASH diet. *Nurse Pract.* 2012;37(2):41-46.
80. Svetkey LP, Erlinger TP, Vollmer WM, et al. Effect of lifestyle modifications on blood pressure by race, sex, hypertension status, and age. *J Hum Hypertens.* 2005;19(1):21-31.
81. Warren-Findlow J, Seymour RB. Prevalence rates of hypertension self-care activities among African Americans. *J Natl Med Assoc.* 2011;103(6):503-512.
82. Dickson M, Plauschinat CA. Racial differences in medication compliance and healthcare utilization among hypertensive Medicaid recipients: fixed-dose vs free-combination treatment. *Ethn Dis.* 2008;18(2):204-209.
83. Dickson M, Plauschinat C. Racial differences in medication compliance and healthcare utilization among hypertensive Medicaid recipients: fixed-dose vs. free-combination treatment. *Ethnicity & Disease.* 2008;18(2):204-209.
84. Guo F, He D, Zhang W, Walton R. Trends in Prevalence, Awareness, Management, and Control of Hypertension Among United States Adults, 1999 to 2010. *Journal of the American College of Cardiology.* 2012;60(7):599-606.
85. Rowe J. Voices From the Inside: African American Women's Perspectives on Healthy Lifestyles. *Health Education & Behavior.* 2010;37(6):789-800.
86. Befort C, Thomas J, Daley C, Rhode P, Ahluwalia J. Perceptions and Beliefs About Body Size, Weight, and Weight Loss Among Obese African American Women: A Qualitative Inquiry. *Health Education & Behavior.* 2008;35(3):410-426.
87. Ford C, Harawa N. A new conceptualization of ethnicity for social epidemiologic and health equity research. *Social Science & Medicine.* 2010;71(2):251-258.
88. Goosby B, Caldwell C, Bellatorre A, Jackson J. Ethnic Differences in Family Stress Processes Among African- Americans and Black Caribbeans. *J Afr Am St.* 2012;16(3):406-422.
89. Centers for Disease Control and Prevention. Health Disparities and Inequalities Report--United States, 2011. In: Centers for Disease Control and Prevention UDoHaHS, ed. Vol MMWR 2011. Atlanta, GA2011:1-8.

90. Oertelt-Prigione S, Parole R, Preibner R, Regitz-Zagrosek V. Analysis of sex and gender-specific research reveals a common increase in publications and marked differences between disciplines. *BMC Medicine.* 2010;8(70):1-10.
91. Gutierrez J, Ramirez G, Rundek T, Sacco R. Statin therapy in the prevention of recurrent cardiovascular events: A sex-based meta-analysis. *Archives of Internal Medicine.* 2012;172(12):909-919.
92. Clayton J, Collins F. NIH to balance sex in cell and animal studies. *Nature.* 2014;509(7500). http://www.nature.com/news/policy-nih-to-balance-sex-in-cell-and-animal-studies-1.15195.
93. Bambra C. Real world reviews: a beginner's guide to undertaking systematic reviews of public health policy interventions. *J Epidemiol Community Health.* 2011;65(1):14-19.
94. Richardson M, Waring M, Wang M, et al. Weight-based discrimination and medication adherence among low-income African Americans with hypertension: how much of the association is mediated by self-efficacy? *Ethn Dis.* 2014;24(2):162-168.
95. Braverman J, Dedier J. Predictors of medication adherence for African American patients diagnosed with hypertension. *Ethn Dis.* 2009;19(4):396-400.
96. Warren-Findlow J, Seymour R. Prevalence rates of hypertension self-care activities among African Americans. *Journal of the National Medical Association.* 2011;103(6):503-512.
97. Solomon A, Schoenthaler A, Seixas A, Ogedegbe G, Jean-Louis G, Lai D. Medication Routines and Adherence Among Hypertensive African Americans. *J Clin Hypertens (Greenwich).* 2015;17(9):668-672.
98. Sampson U, Edwards T, Jahangir E, et al. Factors associated with the prevalence of hypertension in the southeastern United States: insights from 69,211 blacks and whites in the Southern Community Cohort Study. *Circ Cardiovasc Qual Outcomes.* 2014;7(1):33-54.
99. Martin M, Person S, Kratt P, et al. Relationship of health behavior theories with self-efficacy among insufficiently active hypertensive African-American women. *Patient Educ Couns.* 2008;72(1):137-145.
100. Martin M, Prayer-Patterson H, Pratt P, Kim Y, Person S. Characteristics of insufficiently active hypertensive black women who volunteer to be in a physical activity promotion intervention: An application of social cognitive theory and the transtheoretical model. *Ethnnicity & Disease.* 2007;17(Autumn):604-610.
101. Artinian N, Washington O, Flack J, Hockman E, Jen K. Depression, stress, and blood pressure in urban African-American women. *Prog Cardiovasc Nurs.* 2006;21(2):68-75.
102. Konerman M, Weeks KR, Shands JR, et al. Short Form (SF-36) Health Survey measures are associated with decreased adherence among urban African Americans with severe, poorly controlled hypertension. *Journal of Clinical Hypertension.* 2011;13(5):385-390.
103. Jones J, Tucker C, Herman K. Stress and nutrition among African American women with hypertension. *Am J Health Behav.* 2009;33(6):661-672.
104. Abel W, Crane P, McCoy T. Predictors of depression in black women with hypertension. *Issues Ment Health Nurs.* 2014;35(3):165-174.
105. Webb M, Gonzalez L. The burden of hypertension: mental representations of African American women. *Issues Ment Health Nursing.* 2006;27(3):249-271.

106. Ford C, Sims M, Higginbotham J, et al. Psychosocial Factors Are Associated With Blood Pressure Progression Among African Americans in the Jackson Heart Study. *Am J Hypertens.* 2016.
107. Lewis L. Medication adherence and spiritual perspectives among african american older women with hypertension. A qualitative study. *Journal of gerontological nursing.* 2011;37(6):34-41.
108. Hekler E, Lambert J, Leventhal E, Leventhal H, Jahn E, Contrada R. Commonsense illness beliefs, adherence behaviors, and hypertension control among African Americans. *Journal of Behavioral Medicine.* 2008;31(5):391-400.
109. Buckley L, Labonville S, Barr J. A Systematic Review of Beliefs About Hypertension and Its Treatment Among African Americans. *Current Hypertension Reports.* 2016;18(52):1-9.
110. Morris AB, Li J, Kroenke K, Bruner-England TE, Young JM, Murray MD. Factors associated with drug adherence and blood pressure control in patients with hypertension. *Pharmacotherapy.* 2006;26(4):483.
111. Ogedegbe G, Boutin-Foster C, Wells M, et al. A randomized controlled trial of positive-affect intervention and medication adherence in hypertensive african americans. *Archives of Internal Medicine.* 2012;172(4):322-326.
112. Warren-Findlow J, Seymour R, Brunner Huber L. The Association Between Self-Efficacy and Hypertension Self-Care Activities Among African American Adults. *Journal of Community Health.* 2012;37:15-24.
113. Rodriguez F, Christopher L, Johnson C, Wang Y, Foody J. Love your heart: a pilot community-based intervention to improve the cardiovascular health of African American women. *Ethn Dis.* 2012;22(4):416-421.
114. Rucker-Whitaker C, Basu S, Kravitz G, Bushnell M, de Leon C. A Pilot Study of Self-Management in African Americans with Common Chronic Conditions. *Ethnicity & Disease.* 2007;17(Autumn):611-616.
115. Greer D, Ostwald S. Improving adherence in African American women with uncontrolled hypertension. *J Cardiovasc Nurs.* 2015;30(4):311-318.
116. Fongwa MN, Evangelista LS, Doering LV. Adherence to treatment factors in hypertensive African American women. *J Cardiovasc Nurs.* 2006;21(3):201-207.
117. Cuffee Y, Hargraves J, Rosal M, et al. Reported racial discrimination, trust in physicians, and medication adherence among inner-city African Americans with hypertension. *Am J Public Health.* 2013;103(11):e55-62.
118. Mansyur C, Pavlik V, Hyman D, Taylor W, Goodrick G. Self-efficacy and barriers to multiple behavior change in low-income African Americans with hypertension. *J Behav Med.* 2013;36(1):75-85.
119. Ford C, Kim M, Dancy B. Perceptions of Hypertension and Contributing Personal and Environmental Factors Among Rural Southern African American Women. *Ethnicity & Disease.* 2009;19(Autumn).
120. Ogedegbe G, Harrison M, Robbins L, Mancuso CA, Allegrante JP. Barriers and facilitators of medication adherence in hypertensive African Americans: a qualitative study. *Ethn Dis.* 2004;14(1):3-12.
121. Flynn S, Ameling J, Hill-Briggs F, et al. Facilitators and Barriers to Hypertension Self-Management in Urban African Americans: Perspectives of Patients and Family Members. *Patient Preference and Adherence.* 2013;7:741-749.

122. Houston TK, Allison JJ, Sussman M, et al. Culturally appropriate storytelling to improve blood pressure: a randomized trial. *Ann Intern Med.* 2011;154(2):77-84.
123. Schneider R, Alexander C, Staggers F, et al. A randomized controlled trial of stress reduction in African Americans treated for hypertension for over one year. *American Journal of Hypertension.* 2005;18(1):88-98.
124. Will J, Yoon P. Preventable Hospitalizations for Hypertension: Establishing a Baseline for Monitoring Racial Differences in Rates. *Preventing Chronic Disease.* 2013;10:E24.
125. Hutchinson J, Warren-Findlow J, Dlin M, Tapp H, Kuhn L. The Association Between Health Literacy and Diet Adherence Among Primary Care Patients With Hypertension. *Journal of Health Disparities Research and Practice.* 2014;7(2):109-126.
126. Peters RM, Benkert R, Butler K, Brunelle N. Provider adherence to JNC 7 guidelines and blood pressure outcomes in African Americans. *Journal of Clinical Outcomes Management.* 2007;14(1):32-40.
127. Senteio C, Veinot T. Trying to Make Things Right: Adherence Work in High-Poverty African American Neighborhoods. *Qualitative Health Research.* 2014;24(12):1745-1756.
128. Woods-Giscombé C. Superwoman Schema: African American Women's Views on Stress, Strength, and Health. *Qualitative Health Research.* 2010;20:668-683.
129. Fitzgibbon M, Tussing-humphreys L, Porter J, Martin I, Odoms-young A, Sharp L. Weight loss and African– American women: a systematic review of the behavioural weight loss intervention literature. *Obesity Reviews.* 2012;13(3):193-213.
130. Rodriguez F, Christopher L, Johnson CE, Wang Y, Foody JM. Love your heart: a pilot community-based intervention to improve the cardiovascular health of African American women. *Ethn Dis.* 2012;22(4):416-421.
131. Creswell J. *Qualitative Inquiry & Research Design: Choosing Among Five Approaches.* 3rd ed. Thousand Oaks, CA: Sage; 2013.
132. Hill-Collins P. *Black Feminist Thought.* 2nd ed. New York: Routledge Classics; 2009.
133. Beauboeuf-Lafontant T. Strong and Large Black Women? Exploring Relationships between Deviant Womanhood and Weight. *Gender and Society.* 2003;17(1):111-121.
134. Sanders H, Scott T. A GROUNDED THEORY STUDY OF THE PROCESS USED TO NEGOTIATE CONDOM U SE AMONG AFRICAN-AMERICAN WOMEN: REVIEW OF THE LITERATURE. *Journal of Cultural Diversity.* 2015;22(1):23-29.
135. Teddlie C, Tashakkori A. *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences.* Sage Publications Inc; 2009.
136. Teddlie C, Yu F. Mixed methods sampling a typology with examples. *Journal of mixed methods research.* 2007;1(1):77-100.
137. Kemper E, Stringfield S, Teddlie C. *Mixed methods sampling strategies in social science research.* Thousand Oaks, California: Sage; 2003.
138. Sifanek S, Neaigus A. The ethnographic accessing, sampling and screening of hidden populations: Heroin sniffers in New York City. *Addiction Research and Theory.* 2001;9(6):519-543.
139. Yanek L, Becker D, Moy T, Gittelsohn J, Koffman D. Project Joy: Faith Based Cardiovascular Health Promotion for African American Women. *Public Health Reports.* 2001;116:68-81.
140. Yancey A, Ortega A, Kumanyika S. Effective Recruitment and Retention of Minority Research Participants. *Annual Reviews Public Health.* 2006;27:1-28.

141. Hatchett B, Holmes K, Duran D, Davis C. African Americans and research participation: The recruitment process. *Journal of Black Studies.* 2000:664-675.
142. Kitamura S, Hashimoto H, Segawa Y, Kurihara N. Vinegar Enhanced the Anti-hypertensive Effect of Saccharina Japonica Intake in Rats With 2-kidney, 1-clip Renovascular Hypertension. *Hypertension.* 2013;62(3).
143. Brown C, Segal R. The effects of health and treatment perceptions on the use of prescribed medication and home remedies among African American and white American hypertensives. *Social Science & Medicine.* 1996;43(6):903-917.
144. Ferdinand KC, Saunders E. Hypertension-related morbidity and mortality in African Americans--why we need to do better. *J Clin Hypertens (Greenwich).* 2006;8(1 Suppl 1):21-30.
145. Carrington C. Clinical depression in African American women: Diagnoses, treatment, and research. *Journal of Clinical Psychology.* 2006;62(7):779-791.
146. Archibald P, Dobson-Sydnor K, Daniels K, Bronner Y. Explaining African- Americans' Depressive Symptoms: a Stress-Distress and Coping Perspective. *Journal of Health Psychology.* 2013.
147. Lombard J. Depression, psychological stress, vascular dysfunction, and cardiovascular disease: thinking outside the barrel. *Journal of Applied Physiology.* 2010;108(5):1025-1026.
148. Mak W, Law R, Alvidrez J, Pérez-Stable E. Gender and Ethnic Diversity in NIMH-funded Clinical Trials: Review of a Decade of Published Research. *Administration and Policy in Mental Health and Mental Health Services Research.* 2007;34(6):497-503.
149. Mouton C, Harris S, Rovi S, Solorzano P, Johnson M. Barriers to black women's participation in cancer clinical trials. *Journal of the National Medical Association.* 1997;89(11):721.
150. Wells A, Zebrack B. Psychosocial Barriers Contributing to the Under-Representation of Racial/Ethnic Minorities in Cancer Clinical Trials. *Social Work in Health Care.* 2007;46(2):1-14.
151. Fouad M. Enrollment of Minorities in Clinical Trials: Did We Overcome the Barriers? *Contemporary Clinical Trials.* 2009;30:103-104.
152. Branson R, Davis K, Butler K. African Americans' participation in clinical research: importance, barriers, and solutions. *The American Journal of Surgery.* 2005;193(1):32-39.
153. Mosavel M, Oakar C. Perspectives on Focus Group Participation and Remuneration. *Ethics & Behavior.* 2009;19(4):341-349.
154. Russell K, Maraj M, Wilson L, Shedd-Steele R, Champion V. Barriers to recruiting urban African American women into research studies in community settings. *Applied Nursing Research.* 2006;21(2):90-97.
155. Mosavel M, Simon C, van Stade D, Buchbinder M. Community-based participatory research (CBPR) in South Africa: Engaging multiple constituents to shape the research question. *Social Science & Medicine.* 2005;61(12):2577-2587.
156. Braithwait R, Cockwill S, O'Neill M, Rebane D. Insider Participatory Action Research in Disadvantaged Post-Industrial Areas: The Experiences of Community Members as They Become Community-Based Action Researchers. *Action Research.* 2007;5(1):61-74.
157. Minkler M, Baden A. Impacts of CBPR on academic researchers, research quality and methodology, and power relations. In: Minkler M, Wallerstein N, eds. *Community-based*

Participatory Research for Health: From Process to Outcomes. Second ed. San Francisco, CA: Jossey-Bass; 2008:243-261.
158. Oakes J, Rossi P. The measurement of SES in health research: current practice and steps toward a new approach. *Social science & medicine.* 2003;56(4):769-784.
159. Shavers V. Measurement of socioeconomic status in health disparities research. *Journal of the National Medical Association.* 2007;99(9):1013.
160. Kidd P, Parshall M. Getting the focus and the group: enhancing analytical rigor in focus group research. *Qualitative health research.* 2000;10(3):293-308.
161. Groleau D, Zelkowitz P, Cabral I. Enhancing Generalizability: Moving From an Intimate to a Political Voice. Vol 192009:416-426.
162. Wood R, Della-Monica N. Psychosocial factors influencing breast cancer risk appraisal among older women. *Qualitative Health Research.* 2011;21(6):783-795.
163. Yoon S, Gu Q, Nwankwo T, Wright J, Hong Y, Burt V. Trends in Blood Pressure Among Adults With Hypertension: United States, 2003 to 2012. *Hypertension.* 2015;65(1):54-61.
164. Ong K, Tso A, Lam K, Cheung B. Gender Difference in Blood Pressure Control and Cardiovascular Risk Factors in Americans with Diagnosed Hypertension. *Hypertension.* 2008;51:1142-1148.
165. Mozaffarian D, Benjamin E, Go A, et al. Heart Disease and Stroke Statistics—2015 Update: A Report From the American Heart Association. *Circulation.* 2015;131(4):e29-e322.
166. Mozaffarian D, Benjamin E, Go A, et al. Heart Disease and Stroke Statistics—2016 Update: A Report From the American Heart Association. *Circulation.* 2016;133(4):e38-e360.
167. Krousel-Wood M, Muntner P, Islam T, Morisky D, Webber L. Barriers to and determinants of medication adherence in hypertension management: perspective of the cohort study of medication adherence among older adults. *Medical Clinics of North America.* 2009;93(3):753-769.
168. Ogden C, Carroll M, Kit B, Flegal K. Prevalence of Obesity in the U.S. 2009-2010. In: Statistics NCfH, ed. Vol 82. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; 2012.
169. Ogden C. Disparities in obesity prevalence in the United States: black women at risk. *The American journal of clinical nutrition.* 2009;89(4):1001-1002.
170. Levi J, Segal L, Rayburn J, Martin A. The State of Obesity, Special Report: Racial and Ethnic Disparities in Obesity, Obesity Prevention in Black Communities. *The State of Obesity* 2014; http://stateofobesity.org/disparities/blacks/. Accessed October 20, 2015.
171. Fleury J, Lee S, Lee M. The Social Ecological Model and Physical Activity in African American Women. *Am J Community Psychol.* 2006;37(1):129-140.
172. Rohm YD, Voorhees C. Personal, social, and environmental correlates of physical activity in urban African-American women. *American Journal of Preventive Medicine.* 2003;25(3):38-44.
173. Fitzgibbon M, Tussing-Humphreys L, Porter J, Martin I, Odoms-Young A, Sharp L. Weight loss and African–American women: a systematic review of the behavioural weight loss intervention literature. *Obesity Reviews.* 2012;13(3):193-213.
174. Macleod J, Davey Smith G. Psychosocial factors and public health: a suitable case for treatment? *Journal of Epidemiology and Community Health.* 2003;57(8):565-570.

175. Thoits P. Stress and Health Major Findings and Policy Implications. *Journal of Health and Social Behavior.* 2010;51(1 suppl):S41-S53.
176. Schneiderman N, Ironson G, Siegel S. Stress and health: psychological, behavioral, and biological determinants. *Annual Review of Clinical Psychology.* 2005;1:607.
177. Black AR, Woods-Giscombe C. Applying the Stress and 'Strength' Hypothesis to Black Women's Breast Cancer Screening Delays. *Stress and Health.* 2012;28:389-396.
178. Becker A, Israel B, Schulz A, et al. Age differences in health effects of stressors and perceived control among urban African American women. *Bulletin of the New York Academy of Medicine.* 2005;82(1):122-141.
179. Abel W, Barksdale D. Freedom of choice and adherence to the health regimen for African Americans with hypertension. *ANS Adv Nurs Sci.* 2012;35(4):E1-8.
180. Brennan T, Spettell C, Villagra V, et al. Disease management to promote blood pressure control among African Americans. *Population Health Management.* 2010;13(2):65-72.
181. Glanz K, Schwartz M. Stress, Coping, and Health Behavior. In: Glanz K, Rimer B, Viswanath K, eds. *Health Behavior and Health Education: Theory, Research, and Practice*. 4th ed. San Francisco, CA: Jossey-Bass; 2008:211-236.
182. McAlister A, Perry C, Parcel G. How Individuals, Environments, and Health Behaviors Interact: Social Cognitive Theory. In: Glanz K, Rimer B, Viswanath K, eds. *Health Behavior and Health Education: Theory, Research, and Practice*. 4th ed. San Francisco, CA: Jossey-Bass; 2008:167-188.
183. Quinn M, Guion W. A Faith-Based and Cultural Approach to Promoting Self-Efficacy and Regular Exercise in Older African American Women. *Gerontology & Geriatrics Education.* 2010;31(1):1-18.
184. Clark N, Dodge J. Exploring Self-Efficacy as a Predictor of Disease Management. *Health Education & Behavior.* 1999;26(1):72-89.
185. Farrell K, Wicks M, Martin J. Chronic Disease Self-Management Improved with Enhanced Self-Efficacy. *Clinical Nursing Research.* 2004;13:289-308.
186. Sahgal N, Smith G. *A Religious Portrait of African Americans.* Washington, DC: Pew Research Center;2009.
187. Mattis J. Religion and Spirituality in the Meaning–Making and Coping Experiences of African American Women: A Qualitative Analysis. *Psychology of Women Quarterly.* 2002;26(4):309-321.
188. Holt C, Schulz E, Caplan L, Blake V, Southward V, Buckner A. Assessing the Role of Spirituality in Coping Among African Americans Diagnosed with Cancer. *Journal of Religion and Health.* 2012;51(2):507-521.
189. Ellison C, Musick M, Henderson A. Balm in Gilead: Racism, religious involvement, and psychological distress among African-American adults. *J Sci Stud Relig.* 2008;47(2):291-309.
190. Giger J, Appel S, Davidhizar R, Davis C. Church and spirituality in the lives of the African American community. *Journal of Transcultural Nursing.* 2008;19(4):375-383.
191. Musgrave C, Allen C, Allen G. Spirituality and health for women of color. *American Journal of Public Health.* 2002;92(4):557-560.
192. Leak A, Hu J, King C. Symptom Distress, Spirituality, and Quality of Life in African American Breast Cancer Survivors. *Cancer nursing.* 2008;31(1):E15-E21 10.1097/1001.NCC.0000305681.0000306143.0000305670.

193. Maitra S. Can patient self- management explain the health gradient? Goldman and Smith's “Can patient self- management help explain the SES health gradient?” (2002) revisited. *Social Science & Medicine.* 2012;70(6):802-812.
194. Borzecki AM, Kader B, Berlowitz DR. The epidemiology and management of severe hypertension. *Journal of Human Hypertension.*24(1):9-18.
195. Kim S, Egerter S, Cubbin C, Takahashi E, Braveman P. Potential Implications of Missing Income Data in Population-Based Surveys: An Example from a Postpartum Survey in California. *Public Health Reports (1974-).* 2007;122(6):753-763.
196. Phillips G, Wise L, Rich-Edwards J, Stampfer M, Rosenberg L. Income incongruity, relative household income, and preterm birth in the Black Women's Health Study. *Social Science & Medicine.* 2009;68(12):2122-2128.
197. Thomas J, Jones G, Scarinci I, Mehan D, Brantley P. The utility of the CES-D as a depression screening measure among low-income women attending primary care clinics. *International journal of psychiatry in medicine.* 2001;31(1):25-40.
198. Ross C, Mirowsky J. Explaining the Social Patterns of Depression Control and Problem-Solving or Support and Talking? *Journal of Health and Social Behavior.* 1989;30(2):206-219.
199. Kim M, Hill M, Bone L, Levine D. Development and testing of the Hill-Bone Compliance to High Blood Pressure Therapy Scale. *Prog Cardiovasc Nurs.* 2000;15(3):90-96.
200. Lavsa S, Holzworth A, Ansani N. Selection of a validated scale for measuring medication adherence. *J. Am. Pharm. Assoc.* Vol 512011:90-94.
201. Clarke P, Fiebig D, Gerdtham U. Optimal recall length in survey design. *Journal of Health Economics.* 2008;27(5):1275-1284.
202. Czaja R, Blair J. *Designing Surveys: A Guide to Decisions and Procedures.* 2nd ed. Thousand Oaks, CA: Pine Forge Press 2005.
203. Cohen S, Kamarck T, Mermelstein R. A Global Measure of Perceived Stress. *Journal of Health and Social Behavior.* 1983;24(4):385-396.
204. Kragelou C. A Systematic Review of Studies Using the Brief COPE: Religious Coping in Factor Analyses. *Religions.* 2011;2(3):216-246.
205. Weston R, Gore P. A Brief Guide to Structural Equation Modeling. *The Counseling Psychologist.* 2006;34(5):719-751.
206. Muthen L, Muthen B. MPlus Statistical Analysis with Latent Variables User's Guide. Seventh ed. Los Angeles, CA: Muthen & Muthen; 1998-2012.
207. Iacobucci D. Structural equations modeling: Fit Indices, sample size, and advanced topics. *Journal of Consumer Psychology.* 2010;20(1):90-98.
208. Burkhauser R, Cawley J. Beyond BMI: the value of more accurate measures of fatness and obesity in social science research. *Journal of health economics.* 2008;27(2):519-529.
209. Rothman K. BMI-related errors in the measurement of obesity. *International journal of obesity.* 2008;32:S56-S59.
210. Davis L. Exercise and dietary behaviors in African American elders: stages of change in efficacy expectancies. *Abnf j.* 2000;11(3):56-58.
211. Rao K. Recent research in stress, coping and women's health. *Current Opinion in Psychiatry.* 2009;22:188-193.
212. Black Women's Health Study. Studying Stress in the BWHS. *Black Women's Health Study Newsletter.* 2013;July.

213. National Center for Health Statistics. Health, United States 2015: With special feature on racial and ethnic disparities. In: Services UDoHaH, ed. Hyattsville, MD: Centers for Disease Control and Prevention; 2016.
214. Sica D. Nondrug Interventions for the Treatment of Hypertension: Varying Effect. *J Clin Hypertens.* 2012;14(1):3-4.
215. Neal-Barnett A, Stadulis R, Payne M, et al. In the company of my sisters: Sister circles as an anxiety intervention for professional African American women. *Journal of Affective Disorders.* 2010;129(1):213-218.
216. Rucker-Whitaker C, Flynn K, Kravitz G, Eaton C, Calvin J, Powell L. Understanding African-American participation in a behavioral intervention: Results from focus groups. *Contemporary Clinical Trials.* 2006;27(3):274-286.
217. Dave G, Bibeau D, Schulz M, et al. Predictors of uncontrolled hypertension in the Stroke Belt. *J Clin Hypertens (Greenwich).* 2013;15(8):562-569.

Appendices

Summary of systematic review articles included in study

Focus group guide and questions

Quantitative survey instrument

Participant Consent form

List of article submissions

[i] Although, generally, literature reviews that include published articles exceeding 10 years is considered outdated, the time span between 1994 to 2016 was covered in this review to attempt to get a clear sense of the breadth of research that has been conducted on hypertension among African Americans in the US.