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The Effect of Health Beliefs, Depressive Symptoms, and Social Support on Medication Adherence in African Americans with Hypertension

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Hypertension, a leading and modifiable risk factor for the development of cardiovascular disease, continues to remain a public health priority.[1,2] In the United States, hypertension [HTN] is estimated to effect approximately 85.7 million Americans or roughly 46% of the population.[3,4] Hypertension continues to affect both African American men and women disproportionately when compared to Whites or other ethnic minority groups in the United States.[4,5] African American women have the highest prevalence of HTN [46.3%] followed by African American men [45%], when compared to White men [34.5%] and women [32.3%]; however[3,4] with the new HTN guideline change [systolic blood pressure ≥130/80], the prevalence rates are expected to increase. This change estimates the prevalence of HTN between African American men and women to increase to 59% and 56% and white men and women 47% and 41% respectively.[6]

Evidence suggests that African Americans tend to hold a differing set of beliefs surrounding the cause and control dimensions of HTN when compared to other ethnic groups.[7,8] Common themes surrounding HTN beliefs expressed by African Americans include: HTN as a symptomatic illness manifested by headaches, an illness derived by adverse social stressors of discrimination and racism, and the belief that all blacks are diagnosed with high blood pressure [BP].[9–12] These beliefs tend to be in conflict with those of health providers, which further creates obstacles in achieving optimal medication adherence and BP control.

Low to inconsistent adherence practices to prescribed BP medications, discordant health beliefs, depressive symptoms, and lack of social support have each been identified as a contributing factor associated with poor HTN control in both the general population and African Americans;[7,13–17] however, the underlying contributors of stressors that are experienced by African Americans, such as being of minority status and social inequities are what differentiates their high risk for poor HTN control when compared to whites.[17,18] These stressors have been associated with greater depressive symptoms in African Americans; albeit, the link from psychosocial factors to BP medication adherence is not distinctively clear.[13,18] Similar to depressive symptoms, the relationship of social support with medication adherence has yielded inconsistent findings and has been considered a weak correlate of medication adherence in African Americans.[8,19,20]

HTN is also one of the most important components of metabolic syndrome, a cluster of three of the following five health problems: HTN, fasting blood glucose over 100 mg/dl, hyperlipidemia, elevated waist circumference, and reduced high density lipoprotein <40 mg/dL in men and <50 mg/dL in women.[21] The mechanism linking HTN and insulin resistance is not clearly understood,[22] yet it has been suggested that masked HTN [having HTN based on out-of-clinic BP measurements without HTN based on clinic BP measurements] is associated with increased end-organ damage and risk for cardiovascular disease [CVD].[23] Compared to other racial groups, African Americans tend to develop HTN at earlier ages, further increasing the potential for the development of CVD, stroke, kidney disease, heart failure and early mortality.[2,5,24–26]

The research question proposed for this study was “What effect does social support, HTN health beliefs, and depressive symptoms have on HTN medication adherence in a sample of African Americans with metabolic syndrome and HTN as one of the components?” The purpose of this secondary data analysis is to determine the associations among depressive symptoms, hypertension beliefs, social support, and BP medication adherence in middle-age African American adults with a diagnosis of HTN.

Conceptual Model

Components of the Health Belief Model and Social Network/Social Support model were used to guide this secondary data analysis. Elements from both models were incorporated into the original study design. These models provide the framework to conceptualize key constructs associated with medication adherence. Unlike the health belief model, the social network/social support model is not considered a single theory; instead a model used to explain and identify the linkages that may or may not provide social support thus influencing

health behaviors.[27] The HBM is an individual behavioral theory that seeks to explain why people will take action to prevent, screen, or control illness conditions.[28] The individual antecedent factors proposed to be related to medication adherence included age, gender, social support, and socioeconomic status. Individual belief factors of the health belief model that were examined include perceived severity and susceptibility to high BP. Cues to action includes actions or behaviors to reduce high BP susceptibility.

Poor Medication Adherence

Poor adherence to prescribed antihypertensive treatment is a significant patient-related barrier that contributes to worse CVD outcomes in African Americans.[29] Medication nonadherence is defined as the patient's passive failure to follow a prescribed regimen.[30,31] Addressing poor medication adherence is a challenging and daunting task for clinician providers managing HTN amongst other various chronic conditions.[32] Rates of medication nonadherence in the general population is estimated to range anywhere from 9%−37% with an estimated 27%−66% of patients discontinuing their antihypertensive medications after one year.[33,34] It is important to note that numerous studies have shown that when BP lowering medications are taken, they are effective;[35–37] The implications from nonadherence to BP lowering medications are not only fatal to an individuals' health but are also costly. The combined direct [$68 billion] and indirect [$42 billion] cost of HTN in the United States is an estimated $110 billion dollars.[38] This figure includes cost associated with health care services, medications, and missed days from work. Improving medication adherence is argued to yield greater health benefits than any other improvements in medical interventions; however, due to various research studies relating to the causes of medication nonadherence, studies have often yielded contradictory and inconclusive results, thus, adding another layer of complexity into addressing this problem.[39]

Hypertension Illness Beliefs

Discordant health beliefs regarding high BP is a common finding across various ethnic groups.[7] Across various studies, evidence indicates African Americans' beliefs regarding high BP tend to differ quite significantly from that of healthcare providers, which may give credence to the growing HTN disparity.[7,11] Older African Americans frequently conceptualize HTN as a condition that "causes blood to rush to the head due to an intense emotional state" and a disease that thickens the blood due to genetics.[7] Many African Americans attribute their HTN diagnosis as a stress related model of illness stemming from the social hardships in which they are exposed including poverty, pollution, and racism.[11] Unfortunately in the absence of symptoms and the presence of cultural lay models of illness interpretation, management of HTN presents many challenges.[40]

Depressive Symptoms and Social Support

Adverse psychosocial factors serves as another important, yet often unrecognized patient-related barrier in achieving blood pressure control and optimal medication adherence practices. Depressive symptoms are more common in African Americans, other ethnic minority groups, and women.[14] Depression is associated with many chronic diseases and has

been referred as the unrecognized risk factor of both poor medication adherence and CVD.[14,41] Repeated stressors in African Americans related to racial and ethnic discrimination and social inequity, have been associated with increased depressive symptoms, earlier onset of chronic illness, increased risk of CVD, and poor self-ratings of health.[14,42,4344] The coping responses employed by African Americans to manage these adverse stressors have also been shown to have a detrimental effect on health. For instance, African American men that exhibited depressive symptoms were found to consume higher amounts of alcohol and demonstrate poorer antihypertensive medication adherence practices.[45] Likewise, African American women who did not manage their response to adverse stressors had greater depressive symptoms compared to women that demonstrated increased active coping efforts.[14]

Methods

In this cross-sectional study, N=120 African American participants with a current diagnosis of metabolic syndrome, including HTN as one of the components, who reported having a prescribed high BP lowering medication for BP control were analyzed for this study. Secondary data analysis for this study was performed using baseline data from an existing database derived from the META-Health study. META-Health was a collaborative intervention study consisting of an intervention and control arm with multiple aims designed to examine the racial disparities in African Americans with metabolic syndrome at risk for cardiovascular events. Institutional Review Board approval was obtained for the original study prior to any data collection. All participants signed written informed consent forms. Inclusion criteria for the original study included: (a) African American participants with a diagnosis of metabolic syndrome, (b) age 18 and older that met at least 2 clinical indicators of cardiovascular risk criteria (elevated triglycerides ≥ 150mg/dL, waist circumference > 102cm for men or > 88cm for women, high-density lipoprotein cholesterol ≤ 40mg/dL for men and < 50mg/dL for women, (c) fasting blood glucose ≥ 100mg/dL, and (d) on a stable medication regimen for at least 3 months. Participants were recruited from various community practice networks that include a socioeconomically diverse group of predominantly African American patients with an estimated 300,000 patient-visits annually, located in a southeastern metropolitan city.

Measures

Demographic data were collected to describe the sample including gender, age, income, marital status, children, and education. In addition, BP, body mass index, and number of comorbidities were measured. The measures that will be examined were selected based on the theoretical framework underpinning this analysis.

Medication Adherence

The outcome variable is medication adherence, which is measured using the Hill-Bone Compliance to High Blood Pressure Therapy Scale. The scale was formulated for use in a hypertensive African American male population but has been used successfully in both African American men and women with a diagnosis of hypertension.[14,17,46,47] The Hill Bone consists of three subscales including reduced sodium intake, appointment keeping, and

medication taking.[48] This study will only examine the medication taking subscale scores. The total scale has a Cronbach's α of 0.74 and 0.84.[48] Item responses are scored on a 4-point Likert scale ranging from 1–22 with lower scores reflective of better medication adherence behavior.

Beliefs Related to High Blood Pressure in African Americans Scale—HTN beliefs will be measured using 3 subscales from the Beliefs related to High Blood Pressure in African Americans Scale.[49] Of the 7 subscales, the three subscales used for this study include *perceived susceptibility to high blood pressure*, actions to reduce high blood pressure susceptibility, and *perceived seriousness of high blood pressure*. Items are scored on a 5-point Likert scale with higher scores on the Beliefs Related to High Blood Pressure in African Americans subscales indicative of higher perceived susceptibility to HTN, actions to reduce susceptibility to HTN, and perceived seriousness of HTN. The instrument has an acceptable level of reliability with a Cronbach's α level of 0.84 when used in a pilot study of African American participants.[49]

Enhancing Recovery in Coronary Heart Disease Social Support Inventory (ESSI)—Social support was measured using the Enhancing Recovery in Coronary Heart Disease Social Support Inventory; a 7-item self-report survey that measures social support and has been used in a variety of chronic diseases. The tool consists of 4 domains of social support: emotional, instrumental, informational, and appraisal with scores higher than 18 indicative of high social support. [50] The tool has been well validated in cardiac patient populations. [50]

Beck Depression Index—Depression was measured using the Beck Depression Index, a 21-item self report inventory that measures attitudes and symptoms of depression.[51] The Beck Depression Index has been used in a variety of patient populations and has demonstrated a high internal consistency with alpha coefficients ranging from 0.81–0.86.[51] Higher scores reflect greater depressive symptoms. The recommended cut-off score for mild depressive symptoms of the Beck Depression Inventory is 14.[52]

Statistical Analysis

Data were analyzed utilizing Stata/SE version 14.2. Descriptive statistics including percentage and frequency were used to summarize categorical measures and mean, standard deviation, minimum and maximum were used to summarize continuous measures. Bivariate correlations were also used and examined. Logistic regression using odds ratio was used to examine the odds of high BP beliefs, social support and depression on medication adherence. The outcome variable, Adherence, was dichotomized into adherent or non-adherent using cut-point scores from the Hill Bone Compliance to High Blood Pressure Therapy Scale. Adherence was entered into the model along with predictors (high BP beliefs, social support, and depression), in addition to the covariates (age, education, gender, income, insurance, marital status, and number of comorbidities). In addition to the components of metabolic sydnrome, the comorbidity variable was computed by including other self-reported comorbid conditions such as arthritis, asthma, cancer, fasting blood glucose >100 mg/dL, elevated cholesterol, glaucoma, and IBS. Multicollinearity was

examined by checking model statistics, specifically, variance inflation factors. A two-tailed p-value of less than or equal to 0.05 was considered statistically significant.

Results

Participant Characteristics and Demographics

Table. 1 describes the demographic and clinical characteristics of the study sample. The mean [standard deviation] age of the 120 study participants were 49.9 ± [8.6] years with 77% of the study's participants female. The baseline mean [standard deviation] systolic and diastolic BP was 128 ± [14] and 80 ± [10], and 54% of the sample had some other comorbidity in addition to HTN. The majority of the sample was obese [82.5%] and overweight [11%]. The sample was well educated with 72% having a college education; 74% were employed full-time, and 62.5% reported an annual income of $40,000 or more. The mean time since diagnosis (or living) with HTN was 9-years.

Study Measures

Based on the sample mean scores for the Hill Bone (median=11.7, SD=3.5), and using cut-point scores from the Hill Bone, approximately 37.5% (n=45) of the sample was considered non-adherent to their HTN medication. Majority of the sample indicated a relatively high level of social support on the Enhancing Recovery in Coronary Heart Disease Social Support Index with 93% of the participants reporting scores 18 or greater. Using cut-point scores for the BDI-II (median=8.2, SD=8.3), 17.5% (n=21) of the sample had scores greater than 20, well above the recommended cut score of 14, indicating moderate depression. The mean [standard deviation] score for the High Blood Pressure Beliefs subscales were as follow: Perceives susceptibility to high blood pressure 14.3±[4.8], Actions to reduce high blood pressure 15.7±[3.9], and Perceived seriousness of high blood pressure 21±[5.5], indicating a greater perception of the risk associated with HTN and the necessary actions required in order to decrease high BP.

Bivariate Analysis

Table 2. provides the Pearson's Correlation matrix on possible associations of medication adherence. Adherence, the outcome variable, was found to have an inverse correlation with the Hill Bone medication taking scores (r=−0.79, p=<.01). Adherence and comorbidities were positively correlated. A chi-square test of independence was performed to examine the relationship between adherence and comorbidities. The relationship between these two variables were significant, χ^2 (1, N=120)=4.85, p<.05. The HTN beliefs subscale components of perceived susceptibility (r=0.36, p=<.01) and actions to reduce susceptibility and perceived seriousness (r=0.35, p=<.01) were correlated with one another. Age was positively correlated with perceived susceptibility to high BP (r=.32, p=<.01). Depression was inversely associated with social support (r=−0.48, p=<.01); however, there was not a significant relationship with adherence status. Combined Income was positively correlated with social support (r=0.23, p=0.01).

Multivariate Logistic Regression

Table 3. provides the results from the multivariable regression of medication adherence. Comorbidities were the only covariate that remained significant once entered into the regression model with adherence. The odds of adherence with BP medications are 2.63 times greater for persons with multiple comorbidities than someone with less comorbidities in addition to metabolic syndrome. When gender was added to the model, males as the referent group, comorbidities remained significant (β=.95, p=.03). Due to concerns of multicollinearity, confirmed by high Variance Inflation Factors [Table 4.] for each of the three high BP beliefs subscales, each scale was entered into the model separately for its effect on adherence. None of the scales had a significant relationship with adherence. Social support and depressive symptoms were entered both together and separately into the model for their effect on adherence but neither was significant. Covariates including age, gender, year of hypertension diagnosis, and income, were each entered into the model for their effect on medication adherence, but were not associated in this sample.

Discussion

This secondary analysis was conducted to identify the predictors of medication adherence in a population of African American men and women diagnosed with HTN. In this study, majority of the participants reported lower medication adherence scores, indicating better adherence. Prior studies using the Hill Bone Compliance to High Blood Pressure Therapy medication subscale in women reported similar mean scores as reflected in this study.[14,47] Neither of the sociodemographic covariates had a significant effect on adherence; however, majority of the participants were college-educated and employed, which may have had a protective effect in contributing to increased health literacy and improved access to care. This relationship can only be speculated as access to care and health literacy was not measured in the original study or this secondary analysis. A significant, yet, atypical finding in this study was the positive relationship between medication adherence and multiple comorbidities. Having multiple comorbidities has been known to contribute to worse adherence due to issues such as increasing out of pocket prescription cost, complexity of the medication regimen, and distrust of the pharmaceutical and health care system.[5,53–55]

The majority of the participants in this study were predominantly female, college educated, employed, reported annual income of $40,ooo or more, and had high self-reported medication adherence. Characteristics of younger age and female gender have been associated with worse medication adherence behaviors compared to men.[5,55,56] These differences have been attributed to the idea that women may demonstrate lower levels or worse medication adherence due to subordinating their health priorities for more demanding priorities and caregiving roles.[32,57]

Many participants in this study had strong beliefs regarding the dimensions of perceived susceptibility, actions to reduce susceptibility, and perceived seriousness to high blood pressure. Although the relationship between high BP beliefs and adherence was not significant in this study, the impact of belief systems regarding high BP and decision-making has been reported to have an effect on medication adherence.[58,59]

Neither social support nor depression had an effect of medication adherence. The majority of participants in this study reported high rates of social support and lower depressive symptom scores, suggesting their social network system was adequate.

Limitations

This study had a few limitations that need to be acknowledged. Important key factors such as high BP beliefs, depression, and social support did not show statistical significance with medication adherence as other studies have demonstrated; potentially, this could be due to the fact there was not enough variability in the participants' scores for each variable tested. The findings from this study may be limited in generalizability across all African Americans with HTN since the majority of the participants were of higher socioeconomic status and female. Prior adherence studies involving African Americans, tend to be less representative of higher sociodemographic participants;[5,14,56] although gender and education has been considered weak and inconsistent predictors of medication adherence.[54,60] Another limitation is the small sample size and the potential inability to detect a difference. Utilizing self-reported data on the key measures examined in this study is a source of bias and could lead to fear of judgment resulting in an over or under exaggerated response.

Conclusion

African Americans have higher rates of morbidity and mortality as a result of poorly controlled cardiovascular risk factors. The results from this study further add to the existing body of literature surrounding factors that predict hypertension medication adherence among a vulnerable population. This study can provide important and beneficial information regarding the role that multiple comorbidities have in achieving medication adherence. Examining the relationship of multiple comorbidities and their effect on medication adherence in a population that is disproportionately affected by cardiovascular disease is crucial area of focus.

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Bibliography

1. Yoon S, Fryar C, Carroll M. Hypertension prevalence and control among adults: United States, 2011–2014 NCHS data brief, no 220. In: Statistics NCfH, ed. Vol 220 Hyattsville, MD2015.
2. Dave G, Bibeau D, Schulz M, et al. Predictors of Uncontrolled Hypertension in the Stroke Belt. The Journal of Clinical Hypertension. 2013;15(8):562–569. [PubMed: 23889718]
3. Benjamin E, Virani S, Callaway C, et al. Heart Disease and Stroke Statistics-2018 Update: A Report From the American Heart Association. Circulation. 2018;137(6).
4. Whelton P, Carey R, Aronow W, et al. ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. Journal of the American College of Cardiology. 2017.

5. Solomon A, Schoenthaler A, Seixas A, Ogedegbe G, Jean-Louis G, Lai D. Medication Routines and Adherence Among Hypertensive African Americans. The Journal of Clinical Hypertension. 2015;17(9):668–672. [PubMed: 25952495]
6. More than half of all African-Americans have high blood pressure under new diagnostic guidelines [press release]. 11 14th, 2017 2017.
7. Buckley L, Labonville S, Barr J. A Systematic Review of Beliefs About Hypertension and its Treatment Among African Americans. Current Hypertension Reports. 2016;18(7):52–61. [PubMed: 27193774]
8. Lewis LM, Ogedegbe C, Ogedegbe G. Enhancing adherence of antihypertensive regimens in hypertensive African-Americans: current and future prospects. Expert Review of Cardiovascular Therapy. 2012;10(11):1375–1380. [PubMed: 23244358]
9. Kressin NR, Wang F, Long J, et al. Hypertensive Patient's Race, Health Beliefs, Process of Care, and Medication Adherence. Journal of General Internal Medicine. 2007;22:768–774. [PubMed: 17364243]
10. Peters RM, Aroian KJ, Flack JM. African American Culture and Hypertension Prevention. Western Journal of Nursing Research. 2006;28(7):831–863. [PubMed: 17056776]
11. Kronish IM, Leventhal H, Horowitz CR. Understanding Minority Patient's Beliefs About Hypertension to Reduce Gaps in Communication Between Patients and Clinicians. The Journal of Clinical Hypertension. 2012;14(1):38–44. [PubMed: 22235822]
12. Whelton P, Einhorn P, Muntner P, et al. Research Needs to Improve Hypertension Treatment and Control in African Americans. Hypertension. 2016;68:1066–1072. [PubMed: 27620388]
13. Krousel-Wood M, Islam T, Muntner P, et al. Association of Depression with Antihypertensive Medication Adherence in Older Adults: Cross-Sectional and Longitudinal Findings From CoSMO. Annals of Behavioral Medicine. 2010;40(3):248–257. [PubMed: 20703839]
14. Abel WM, Crane PB, McCoy T. Predictors of depression in black women with hypertension. Issues Ment Health Nurs. 2014;35(3):165–174. [PubMed: 24597581]
15. Morris A, Li J, Kroenke K, Bruner-England TE, Young JM, Murray M. Factors Associated with Drug Adherence and Blood Pressure Control in Patients with Hypertension. Pharmacotherapy. 2006;26(4):483–492. [PubMed: 16553506]
16. Flynn SJ, Ameling JM, Hill-Briggs F, et al. Facilitators and barriers to hypertension self-managment in urban African Americans: perspectives of patients and family members. Patient Preference and Adherence. 2013;7:741–749. [PubMed: 23966772]
17. Hill MN, Bone LR, Kim MT, Miller DJ, Dennison C, Levine DM. Barriers to Hypertension Care and Control in Young Urban Black Men. American Journal of Hypertension. 1999;12(10 Pt 1): 951–958. [PubMed: 10560780]
18. Cene' C, Dennison C, Hammond W, Levine DM, Bone LR, Hill MN. Antihypertensive Medication Non-Adherence in Black Men: Direct and Mediating Effects of Depressive Symptoms, Psychosocial Stressors and Substance Use. Journal of Clinical Hypertension (Greenwich). 2013;15(3):201–209.
19. Braverman J, Dedier J. Predictors of Medicaton Adherence for African American Patients Diagnosed with Hypertension. Ethnicity and Disease. 2009;19:396–400. [PubMed: 20073139]
20. Strom J, Egede L. The Impact of Social Support on Outcomes in Adult Patients with Type 2 Diabetes: A Systematic Review. Current Diabetes Report. 2013;12(6):769–781.
21. Aguilar M, Bhuket T, Torres S, Liu B, Wong R. Prevalence of the Metabolic Syndrome in the United States, 2003–2012. JAMA. 2015;313(19):1973–1974. [PubMed: 25988468]
22. Falkner B, Cossrow N. Prevalence of Metabolic Syndrome and Obesity-Associated Hypertension in the Racial Ethnic Minorities of the United States. Current Hypertension Reports. 2014;16(7): 449–463. [PubMed: 24819559]
23. Colantonio L, Anstey DE, Carson A, et al. Metabolic syndrome and masked hypertension among African Americans: The Jackson Heart Study. The Journal of Clinical Hypertension. 2017;19(6): 592–600. [PubMed: 28165190]
24. Flack JM, Sica DA, 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(5):780–800. [PubMed: 20921433]

25. Greer DB, Ostwald SK. Improving Adherence in African American Women With Uncontrolled Hypertension. Journal of Cardiovascular Nursing. 2011;26(1/2).
26. Kirkendoll K, Clark PC, Grossniklaus D, Igho-Pemu P, Mullis R, Dunbar SB. Metabolic syndrome in African Americans: views on making lifestyle changes. J Transcult Nurs. 2010;21(2):104–113. [PubMed: 20220030]
27. Social Networks and Social Support. In: Glanz K, Rimer BK, Viswanath K, eds. Health Behavior and Health Education Theory, Research, and Practice. San Francisco, CA: Jossey-Bass; 2008:192–198.
28. Glanz K, Lewis M, Rimer BK. The Health Belief Model In: Health NIo, ed. Theory at a Glance: A Guide for Health Promotion Practice: Jones & Bartlett Learning; 2002:32–43.
29. Ogedegbe G. Barriers to Optimal Hypertension Control. The Journal of Clinical Hypertension. 2008;10(8):644–645. [PubMed: 18772648]
30. Munger MA, Tassell BWV, Lafleur J. Medication Nonadherence: An Unrecognized Cardiovascular Risk Factor. Medscape General Medicine. 2007;9(3):58.
31. Sherbourne C, Hays RD, Ordway L, DiMatteo MR, Kravitz R. Antecedants of Adherence to Medical Recommendations: Results from the Medical Outcomes Study. Journal of Behavioral Medicine. 1992;15(5):447–468. [PubMed: 1447757]
32. Kountz DS, Kofman E. Improving Medication Routines and Adherence in Hypertensive African Americans: Finding the Needle in the Haystack. The Journal of Clinical Hypertension. 2015;17(9): 673–674. [PubMed: 25952327]
33. Klootwyk JM, Sanoski CA. Medication Adherence and Persistence in Hypertension Management. Journal of Clinical Outcomes Management. 2011;18(8):351–358.
34. Iuga A, McGuire M. Adherence and health care costs. Risk Management and Healthcare Policy. 2014;7:35–44. [PubMed: 24591853]
35. Gwadry-Sridhar FH, Manias E, Lal L, et al. Impact of Interventions on Medication Adherence and Blood Pressure Control in Patients with Essential Hypertension: A Systematic Review by the ISPOR Medication Adherence and Persistence Special Interest Group. Value in Health. 2013;16(5):863–871. [PubMed: 23947982]
36. Parker C, Cunningham C, Carter B, Vander Weg M, Richardson K, Rosenthal G. A Mixed-Method Approach to Evaluate a Pharmacist Intervention for Veterans with Hypertension. Journal of Clinical Hypertension (Greenwich). 2014;16(1):133–140.
37. Svartad B, Kotchen JM, Shireman T, et al. Improving refill adherence and hypertension control in black patients: Wisconsin TEAM trial. Journal of American Pharmacists Association. 2013;53:520–529.
38. American Heart Association. Cardiovascular Disease: A Costly Burden For America-Projections Through 2035. Washington, DC: The American Heart Association Office of Federal Advocacy; 2017.
39. Holmes E, Hughes DA, Morrison V. Predicting Adherence to Medications Using Health Psychology Theories: A Systematic Review of 20 Years of Empirical Research. Value in Health. 2014;17:863–876. [PubMed: 25498782]
40. Lewis LM, Askie P, Randleman S, Shelton-Dunston B. Medication Adherence Beliefs of Community-Dwelling Hypertensive African Americans. Journal of Cardiovascular Nursing. 2010;25(3):199–206. [PubMed: 20386242]
41. Bosworth HB, Oddone EZ. A Model of Psychosocial and Cultural Antecedents of Blood Pressure Control. Journal of the National Medical Association. 2002;94(4):236–248. [PubMed: 11991336]
42. Warren-Findlow J, Issel M. Stress and Coping in African American Women with Chronic Heart Disease: A Cultural Cognitive Coping Model. Journal of Transcultural Nursing. 2010;21(1):45–54. [PubMed: 19826059]
43. Taylor J, Washington O, Artinian N, Lichtenberg P. Parental Stress Among African American Parents and Grandparents. Issues in Mental Health Nursing. 2007;28(4):373–387. [PubMed: 17454289]
44. John Henryism James S. and The Health of African-Americans. Culture, Medicine, and Psychiatry. 1994;18(1):163–182.

45. Kim MJ, Han H-R, Hill MN, Rose L, Roary M. Depression, substance use, adherence behaviors, and blood pressure in urban hypertensive black men. Annals of Behavioral Medicine. 2003;26(1): 24–31. [PubMed: 12867351]
46. Greer DB, Abel WM. Religious/Spiritual Coping In Older African American Women. The Qualitative Report. 2017;22(1):237–260.
47. McDonald M, Pezzin L, Peng T, Feldman P. Understanding the Complexity of Hypertensive African American Home Care Patients: Challenges to Intervention. Ethnicity and Disease. 2009;19(2):148–153. [PubMed: 19537225]
48. Kim MT, Hill MN, Bone LR. Development and Testing of the Hill-Bone Compliance to High Blood Pressure Therapy Scale. Progress in Cardiovascular Nursing. 2000;15(3):90–96. [PubMed: 10951950]
49. Coverson D, Strickland OL. Conceptualization and Development of the Weight Perception and Control Scale. Emory University Nell Hodgson Woodruff School of Nursing 2003.
50. Bucholz E, Strait K, Dereyer R, et al. Effect of Low Perceived Social Support on Health Outcomes in Young Patients with Acute Myocardial Infarction: Results From the Variation in Recovery: Role of Gender on Outcomes of Young AMI Patients (VIRGO) Study. Journal of the American Heart Association. 2014;3(5):1–12.
51. Beck AT, Ward Ch, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. Archives of General Psychiatry. 1961;4:561–571. [PubMed: 13688369]
52. Beck AT, Steer R, Brown G. Beck Depression Inventory. Medical University of South Carolina2015.
53. Mishra S, Gioia D, Childress S, Barnet B, Webster R. Adherence to Medication Regimens among Low-Income Patients with Multiple Comorbid Chronic Conditions. Health & Social Work. 2011;36(4):249–258. [PubMed: 22308877]
54. Kripalani S, Goggins K, Nwosu S, et al. Medication Nonadherence Before Hospitalization for Acute Cardiac Events. Journal of Health Communication. 2015;20(1):30–42.
55. Ho M, Bryson C, Rumsfeld J. Medication Adherence: Its Importance in Cardiovascular Outcomes. Circulation. 2009;119:3028–3035. [PubMed: 19528344]
56. Fongwa MN, Evangelista LS, Hays RD, et al. Adherence treatment factors in hypertensive African American women. Vascular Health and Risk Management. 2008;4(1):157–166. [PubMed: 18629350]
57. Warren-Findlow J, Seymour RB. Prevalence Rates of Hypertension Self-care Activities Among African Americans. Journal of the National Medical Association. 2011;103(6):503–512. [PubMed: 21830634]
58. Grant A, Seixas A, Frederickson K, et al. Effect of Expectation of Care on Adherence to Antihypertensive Medications Among Hypertensive Blacks: Analysis of the Counseling African Americans to Control Hypertension (CAATCH) Trial. The Journal of Clinical Hypertension. 2016;18(7):690–696. [PubMed: 26593105]
59. Fongwa MN, Nandy K, Yang Q, Hays RD. The Facilitators of and Barriers to Adherence to Hypertension Treatment Scale. Journal of Cardiovascular Nursing. 2015;30(6):484–490. [PubMed: 25419942]
60. Krousel-Wood M, Joyce C, Holt E, et al. Predictors of Decline in Medication Adherence. Hypertension. 2009;58:804–810.

Table 1

Characteristics of Study Participants with Hypertension (n=120)

Characteristics	N[%] Or Mean [±] SD	Min	Max
Age	49.9 ± 8.6	19	69
Gender			
Male	27 [22.5]		
Female	93 [77.5]		
Children			
None	20[17]		
1 or More	98[82]		
Education			
HS/GED	14 [12]		
Technical College	18 [16]		
College	84 [72]		
Annual Income			
< $19,000	14 [12]		
$20,000–39,000	31 [26.3]		
$40,000–59,000	26 [22]		
$60,000–79,000	16 [14]		
$>80,000	20 [17]		
Employed			
Full-time	88 [74]		
Part-time	10 [8.4]		
Unemployed	7 [6]		
SBP	128 ± 14	104	163
DBP	80 ± 10	58	113
BMI	36.5 ± 6.7	23	58
18.5–24.9	1		
25–29.9	13[11]		
30 or higher	99[83]		
Baseline Wt. [KG]	102.6±21.3	58	173
Length of HTN dx	1997 ± 8.4	1970	2007
Cholesterol	38 [33.6]	39	767
Glucose	110±31.8	70	232
Comorbidities			
Arthritis	27[24]		
Asthma	17U4.9]		
Cancer	5[4.4]		
Cholesterol	38[33.6]		
Glaucoma	4[3.5]		
IBS	8[7]		
Self-Report Measures			

Characteristics	N[%] Or Mean [±] SD	Min	Max
Depression	8.2±8.3		
Social Support	26.3±5.8	0	43
Hill Bone Scale	11.7±3.5	8	34
BP susceptibility	14.3±4.8	1	22
Actions to reduce HTN	15.7±3.9	6	30
HTN seriousness	21±5.5	8	25
Medication Adherence		11	33
Nonadherent	45[38%]		
Adherent	75[63%]		

Abbreviations: SBP (Systolic Blood Pressure), DBP (Diastolic Blood Pressure), BMI (Body Mass Index), BDI (Beck Depression Index), ESSI (Enhancing Recovery in Coronary Heart Disease Social Support Index), HB (Hill-Bone Medication Scale), BP Susceptibility (Blood Pressure perceived susceptibility), HTN-Hypertension

Table 2

Pearson's Rank Correlation of Study Measures (N=120)

Measures										
	1.Adh	**2.HB**	**3.BPser**	**4.BPact**	**5.BPsus**	**6.BDI**	**7.ESSI**	**8.CMB**	**9.IncmB**	**10.Age**
1	-									
2	**−0.80** *	-								
3	0.12	−0.13	-							
4	0.04	−0.11	0.49 **	-						
5	0.01	−0.03	0.35 **	0.34 *	-					
6	−0.01	0.10	−0.00	−0.03	−0.02	-				
7	0.00	−0.07	−0.15	−0.12	−0.08	−0.48 **	-			
8	**0.02** *	−0.11 *	0.20	0.02	0.14	0.07	−0.09	-		
9	0.00	−0.10	−0.22 *	−0.20	−0.20	−0.05	0.23 *	−0.08	-	
10	0.14	−0.19 *	0.09	0.21	0.32 **	0.09	−0.15	0.13 **	−0.05	-

Abbreviations: Adh-Adhere, HB-Hill Bone, BPser-Blood Pressure Percevied seriousness; BPact-Actions to reduce blood pressure; BPsus-Blood Pressure perceived susceptibility; BDI-Beck Depression Index; ESSI-ENRICHD social support Instrument; CMB-Comorbidity; IncmB-Income Both;

* denotes significant p<.5.

** p<.01

Table 3

Adjusted Odds of High Blood Pressure Beliefs, Depression, and Social Support, Comorbidities, Income, Age, Gender, and Marital Status on Medication Adherence

Adjusted odds					
Variables	**Odds Ratio**	**Standard Error**	**P-value**	**95% Lower**	**95% Upper**
BP Ser	1.05	.05	0.35	.95	1.16
BP Act	1.02	0.7	0.75	.89	1.17
BP Sus	1.01	.06	0.92	.90	1.12
BDI	.99	.03	0.95	.94	1.05
ESSI	1.00	.04	0.97	.92	1.08
CMB *	2.63	1.17	0.03 *	1.09	6.29
IncmB	−.01	.57	0.98	−1.13	1.11
Age	.01	.03	0.74	−.05	.08
Female	.71	.55	0.20	−.37	1.79
Married	.28	.51	0.58	−.72	1.28

Abbreviations: BPser-high blood pressure Perceived seriousness; BPact-Actions to reduce high blood pressure; BPsus- High Blood Pressure perceived susceptibility; BDI-Beck Depression Index; ESSI-ENRICHD social support Instrument; CMB-Comorbidity; Incm-Income;

* denotes significant

Table 4

Variance inflation factors

Variable	VIF	1/VIF
Actions to reducehigh blood pressure	19.49	0.051317
Perceived seriousness of high blood pressure	18.58	0.053807
Perceived susceptibility of high blood pressure	10.82	0.092434