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Physical Activity Behaviors of Prehypertensive and Stage I Hypertensive African American Women

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by

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ABSTRACT

Physical Activity Behaviors of Prehypertensive and Stage I Hypertensive African American Women

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The purpose of this study was to describe the physical activity (PA) behaviors and PA biomarkers of prehypertensive and stage I hypertensive African American women (AAW) and to examine the relationships between PA and personal factors and selected behavior-specific influences (perceived barriers to and interpersonal support for PA). Pender's Health Promotion Model was the conceptual framework for the study.

A cross sectional design and convenience sample were used. Personal factors examined were: systolic and diastolic blood pressure [BP], body mass index [BMI], and waist circumference. Other variables measured were: International Physical Activity Questionnaire, 400 meter walk test, Borg perceived exertion rating, Exercise Barriers scales, and Family and Friend Positive and Negative Support for PA. Women (n=47) were, on average, 49 (+14; 23-71) years of age, single, not working or retired, had some college education, annual incomes < $20,000, obese, and had a waist circumference of 39 inches. Spearman correlations were used to examine relationships among the variables; and effect sizes were used to interpret the correlations obtained (small = 0.10, medium = 0.30, and large = 0.50).

The activity domain where the greatest amount of effort (MET min/week) was spent was in work-related activity (M=1791+3042.6), household activity (M=588.4+180), leisure-time activity (M=583.3+198), and transportation activity (487.6+882). BP was not consistently related to PA behaviors or biomarkers. Greater BMI was related to greater work and leisure time activity, less transportation and household activity, more time to complete the 400-meter walk test, and a greater perceived exertion. Greater waist circumference was related to less

transportation and household activity, longer time needed for the 400 meter walk test, and a significantly greater rating of perceived exertion ($\rho = .40$, $p=.012$). More barriers to exercise and barriers unique to African American women (sweating, hair maintenance) were associated with less work-related, transportation, and household activity. Greater family and friend support for PA were associated with more work-related, leisure time, and household activity. Future research in African American women needs to focus on BMI, waist circumference, barriers to PA, and family and friend support for PA as important variables associated with PA in this population.

CHAPTER I

INTRODUCTION

African American women (AAW) are increasingly less physically active than all other groups of women in spite of the known health benefits of regular physical activity (Mozaffarian, et al., 2015). In 2014, 65 percent of adult women of African American descent did not meet the recommended 150 minutes of weekly moderate intensity physical activity (Mozaffarian, et al., 2015). In addition, overweight and obesity rates have increased to epidemic proportions particularly among AA women (United States Department of Health and Human Services [USDHHS], 2008a) as 82% are either overweight or obese (USDHHS, 2010a; Mozaffarian, et al., 2015). The combined effects of low levels of physical activity, overweight and obesity are major contributors to the higher rates of high blood pressure (Mozaffarian, et al., 2015; Zhang & Li, 2011), cardiovascular disease, and stroke among African American women (Centers for Disease Control [CDC], 2009b; Mozaffarian, et al., 2015; USDHHS, 2010b).

In response to this public health concern, an interdisciplinary team of researchers who recognized the need for more aggressive measures to address current public health issues developed two themes for the National Institute of Nursing Research (NINR) Roadmap. They include changing lifestyle behaviors for better health and reducing health disparities. Promoting lifestyle behavior change and health equity is at the forefront of NINR research objectives (NIH, 2006). The NINR works to increase research knowledge to reduce poor health outcomes associated with chronic illness and disease, particularly among African Americans who are disproportionately affected (NIH, 2006).

Eliminating health disparities, achieving health equity, and improving the health of all groups are among the goals of Healthy People 2020 (HP 2020; USDHHS, 2011a). Three health initiatives have been identified as significant areas of emphasis where action must be taken to achieve better health outcomes. Specific focus areas are heart disease and stroke (prehypertension, hypertension), physical activity, and weight status (overweight and obesity)

(UDHHS, 2011a). Six priority health objectives specific to these areas of public health concern include: a) increasing overall cardiovascular health; b) reducing stroke deaths; c) increasing the proportion of adults with prehypertension who meet the recommended guidelines (e.g., for a body mass index (BMI) ≤ 29.9 kg/m^{2}and physical activity); d) increasing the proportion of adults who engage in aerobic activity of moderate intensity for 150 or more than 300 minutes weekly or 75 or more than 150 minutes weekly of vigorous intensity; e) increasing the proportion of adults who are at a healthy weight and; f) reducing the number of individuals who are obese (USDHHS, 2011a). Addressing those factors that negatively influence health enhances positive health outcomes. Therefore, understanding the multiple factors that might influence health is the first step toward prevention of disease and illness (NINR, 2011). A better understanding of physical activity and weight status in prehypertensive and stage I hypertensive African American women may contribute to that first step.

The Seventh Report of the Joint National Committee (JNC 7) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure defines prehypertension as a systolic blood pressure (SBP) of 120-139 mm Hg or a diastolic blood pressure (DBP) of 80-89 mm Hg (Chobanian et al., 2003) untreated and being told on two occasions by a healthcare provider they are not hypertensive (Mozaffarian et al., 2015). Estimates of the prevalence of prehypertension based upon data from the Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study from 2003 to 2007 revealed prehypertension increased with age for both African Americans and Caucasians with the greatest increases among those 60+ years of age (Glasser, Judd, Basile, Lackland, Halanych, Cushman, et al., 2011). The National Health and Nutrition Examination Surveys (NHANES) from 2005 to 2006 revealed African Americans are more likely to be hypertensive (41%) as compared to Caucasians (28%) and Hispanics (22%) (Ostchega, Yoon, Hughes, & Louis, 2008). The prevalence of prehypertension was highest among African American women (69.1%, n=787) as compared to Caucasian women in the REGARDS Study

(62.0%, n=1990) (Glasser, et al., 2011). Since JNC 7 guidelines, no studies were found describing the physical activity behaviors of prehypertensive African American women.

High blood pressure is defined as a SBP ≥ 140 mmHg or DBP ≥ 90 mmHg, if the individual is taking antihypertensive medication, and was told on 2 or more occasions by a healthcare provider they were hypertensive (Mozaffarian et al., 2015). The prevalence of HBP for AAW 2009 to 2012 was 46.1 % and 30.1% for Caucasian women (Mozaffarian et al., 2015). Equally significant is that fewer African American women have blood pressure levels that are controlled (55.9%) versus Caucasian women (58.7%) (Mozaffarian et al., 2015).

Lifestyle modification (e.g., routine physical activity, maintaining a healthy weight) is recommended by JNC 7 for prevention, treatment and control of prehypertension, stage I hypertension and eliminating risk factors for both cardiovascular disease and stroke (Chobanian et al., 2003). Individuals of all ages who adopt a healthy lifestyle can improve blood pressure significantly (Mozaffarian et al., 2015; Egan, Lackland, & Jones, 2010). However, little descriptive data are available identifying the specific physical activity behaviors of prehypertensive and stage I hypertensive African American women and those factors (e.g., barriers and interpersonal (social) support) most influential for health behavior change (Griffin, Wilson, Wilcox, Buck, & Ainsworth, 2008).

Purpose

The purpose of this study was to describe the physical activity behaviors of prehypertensive and stage I hypertensive African American women and to examine the relationships between selected behavior specific influences (perceived barriers and interpersonal support from family and friends) derived from the Health Promotion Model (HPM) and the PA behavioral markers and biomarkers (Pender, Murdaugh, & Parsons, 2014). No studies were found that examined the influence of these constructs to engaging in health promoting behaviors among prehypertensive and stage I hypertensive African American women. Therefore, the proposed

study will address the following specific aims and research questions among prehypertensive and stage I hypertensive African American women ages 19 years and older:

Aim 1: To describe the physical activity behaviors and Physical functioning:

Aim 1a: What are the levels of self-reported weekly physical activity (PA), moderate intensity or greater, in each of the following domains: leisure time, household activity, work-related activity, transportation related activity, and total PA?

Aim 1b: What are the levels of Physical functioning (400 M Walk Test and rating of perceived exertion)?

Aim 2: To examine the relationships among personal factors and PA behavioral markers and Physical functioning.

Aim 2a: What are the relationships between personal factors (systolic and diastolic BP, BMI and waist circumference) and PA behavioral markers?

Aim 2b: What are the relationships between personal factors (systolic and diastolic BP, BMI and waist circumference) and Physical functioning (400 meter walk test, rating of perceived exertion)?

Aim 3: To determine the relationships between behavior specific influences (perceived barriers and interpersonal influences [family and friend positive and negative support]) and PA behavioral markers and Physical functioning.

Aim 3a. What are the relationships between perceived barriers to PA and Family and Friend Positive and Negative Support for PA and PA behavior markers?

Aim 3b. What are the relationships between perceived barriers to PA and Family and Friend Positive and Negative Support for PA and Physical functioning?

Aim 4: To examine the relationships among the physical activity self-reported PA behavioral measures and Physical functioning.

Aim 4a. What are the relationships between self-reported PA behavioral markers and Physical functioning?

Significance

African Americans residing in the United States have higher than normal blood pressure worldwide (Mozzafarian, et al., 2015). In 2013, African American women surpassed African American men in the prevalence of high blood pressure (47.0% versus 42.6%, respectively) (Go, et al., 2013).

Although African-American women make up 6.8% of all women in the United States (United States Census Bureau, 2005), mortality rates for African-American women are higher than any other racial or ethnic group for nearly every major cause of death (The Office of Minority Health, 2009; Mozaffarian, et al., 2015). African Americans are at greatest risk for cardiovascular disease and stroke due to higher than normal blood pressure than any group regardless of geographic location (Lloyd-Jones et al., 2010). For African American women, the prevalence of HTN is higher than their Caucasian counterparts (46.1% versus 30.1%) (Go et al., 2013), and occurs at an earlier age (Go, et al., 2013), as does their risk for both cerebrovascular disease (Mozaffarian et al., 2015) and stroke (Mozaffarian et al., 2015; Lloyd-Jones et al., 2010). African American women are 3 times more likely to die than Caucasian women before the age of 60 from heart disease or stroke (Go et al., 2013; CDC, 2009) as a result of higher than normal blood pressure, low levels of physical activity, and overweight or obesity status. Individuals with prehypertension alone are 1.65 times more likely to have one or more risk factors (e.g., physical inactivity, overweight/obesity, age, sex, ethnicity, lower education, and socioeconomic status) compared to those who are normotensive for development of high blood pressure (Mozaffarian et al., 2015). The impact of these risk factors for African American women will be discussed in the following paragraphs.

Physical Activity

Physical activity can substantially reduce the risk for developing or dying from chronic disease and illness (CDC, 2011a). However, only 20.9% of U.S. adults (Go et al., 2013) are routinely physically active (i.e., met the 2008 federal PA guidelines for aerobic and strengthening

activity) and 32% of the adult population is not physically active at all (USDHHS, 2008b). Women in particular, engage in less physical activity after the age of 25 with steady decreases as their age increases (USDHHS, 2010c). In 2006, the number of women who reported regular physical activity aged 18-44 years was 32.4%, for those from 45 to 54 years 29.5%, and 55-64 years 26.3% (USDHHS, 2007b). The combined effect of physical inactivity and higher than normal blood pressure greatly increase morbidity and mortality rates among AA women (Mosca et al., 2011). Although high blood pressure may be a modifiable risk factor particularly with increased physical activity, AA women continue to engage in insufficient levels of physical activity (NHLBI, 2009; Mozaffarian et al., 2015). In fact, some AA women believe they receive enough physical activity indirectly when cooking and cleaning (Eyler et al., 1998). Cohen, Matthews, Signorello, Schulundt, Blot, and Buchowski (2013) report women in lower socioeconomic groups are more likely to be physically activity by walking for transportation and household activities and less likely to engage in leisure time physical activity. Until these PA behaviors are appropriately addressed, the prevalence of high blood pressure can be expected to continue to rise among this group of women with its associated illness and disease.

Prehypertension

Increases in blood pressure occur with advancing age (Chobanian et al., 2003). Selassie, et al. (2011) found African Americans develop high blood pressure 365 days before Caucasians of the same age (626 versus 992 days, $p<000.1$). For African American women, this trend occurs at an earlier age as compared to their Caucasian counterparts (Mozaffarian et al., 2015; Selassie, et al., 2011). Greenlund, Croft, and Mensah (2004) found 37% of African American women aged 20 to 30 years are prehypertensive as compared to 32% of Caucasian women of the same age. The rates of prehypertension are highest in African American women aged 45 and 55 and after the age of 55 prehypertension progresses to stage I (140-159 or 90-99 mmHg) hypertension and if not effectively treated to stage II ($\leq$ 160 or $\leq$ 100 mmHg) hypertension (Chobanian et al., 2003). In fact, African American women aged 55 to 64 years have been found to have blood pressure levels

nearly three times higher than AA women 25 to 34 years of age (Winkleby et al., 1998). These findings are particularly concerning when known is that adults with prehypertension have a 1.5 to 2 fold increased risk for a cardiovascular event as compared to individuals who are normotensive (Go et al., 2013).

Research has determined that age-related increases in arterial stiffness and systolic BP are not definitive (Kokkinos, 2014). Increased daily physical activity that leads to improvements in cardiorespiratory fitness can reduce and even reverse the risk for development of high blood pressure (Kokkinos, 2014). Despite these findings, there continues to be steady trend of higher than normal BP among AA women at all ages. This necessitates a greater understanding of health promoting behaviors such as physical activity to prevent progression to hypertension.

Hypertension

In 2009, death rates with hypertension as the primary contributing cause were 38.3 per 100,000 for AA women as compared to 14.4 per 100,000 for Caucasian women (Go, et al., 2013). This may be attributed largely to the earlier onset and later detection of higher than normal blood pressure among AA women (Williams, 2009). Hypertension is a significant risk factor for development of cardiovascular disease (Mozaffarian et al., 2015). Previous studies have shown, that the risk for developing cardiovascular disease doubles with each increment of a 20 mmHg increase in SBP and 10 mmHg increase in DBP beginning at a blood pressure level of 115/75 mmHg (Chobanian et al., 2003; Lewington, Clarke, Quizilbash, Peto, & Collins, 2002).

The economic burden of hypertensive related disease and illness is remarkable. For AA women, medical care visits due to hypertension is 85% higher than Caucasian women (Go et al., 2013). In 2010, the estimated cost of high blood pressure alone was $93.5 billion (Heidenreich, Trogdon, Khavjo, Bulter, Dracup, Ezekowitz, et al., 2011), highlighting the problem of this chronic and often deadly disease.

Cardiovascular disease

Nearly 80% of the U.S. population has some form of cardiovascular disease, including hypertension and stroke (Go et al., 2013). In 2010, nearly 1 in 3 women had some form of CVD (Mozaffarian et al., 2015). Cardiovascular disease is a prominent complication of HTN and is the number one killer of women (Mozaffarian et al., 2015). The risk of CVD death in women is1 in 2 (51%) and in the U.S. alone, more women die each year of CVD than the next 5 leading causes of death (Mozaffarian et al., 2015). The prevalence of cardiovascular disease in African American women is 48.9 % as compared to 32.4 % in Caucasian women (Mozaffarian et al., 2015) and the overall death rates due to cardiovascular disease in 2010 for African American women was 566 per 100,000 and 419 per 100,000 for Caucasian women (Coulter, 2011). The American Heart Association estimated annual direct and indirect cost for CVD in 2011 was $320.1 billion and by 2030 total direct costs are projected to reach $918 billion (Heidenreich et al., 2011; Mozaffarian et al., 2015).

Stroke

African American race is a significant risk factor for all cause mortality from stroke (CDC, 2012; Lloyd-Jones et al., 2010; Mozaffarian et al., 2015). In 2011, death rates for AA women were 47.0 per 100,000 compared to 36.2 per 100,000 in Caucasian women (Mozaffarian et al., 2015). Stroke is the third leading cause of death in the United States (Mozaffarian et al., 2015) and in 2003, 61% of stroke deaths in the U.S. were women (Lloyd-Jones et al., 2010). In 2006, 4.1 % of AA women and 3.2 % of Caucasian women had a stroke (Go et al., 2013). For both younger and middle aged African American women, the 1-year stroke survival rate is lower compared to Caucasian women of the same age (Qureshi et al., 2006). High blood pressure is the number one risk factor for stroke (CDC, 2012). Hypertension occurs at an earlier age for African American women (Chemla, Plamann, Abastado, & Nitenberg, 2006; NHLBI, 2006; Psaty et al. 2006; Lloyd-Jones et al., 2010; Wang & Wang, 2004) increasing their risk for first time stroke (Qureshi et al., 2006) and recurrent stroke (Kopunek et al., 2007). When coupled with

uncontrolled risk factors and first time stroke, cardiovascular death rates double (Qureshi, Suri, Kirmani, & Divani, 2004). The American Heart Association (2011) reports a total estimated direct and indirect cost for heart disease and stroke to be $268 billion due to a 27% increase in the total number of cardiovascular procedures associated largely with a high prevalence of disease risk factors.

Overweight and Obesity

The number of individuals overweight or obese has reached epidemic proportions (CDC, 2009b). Nearly 70 percent of U.S. adults have a BMI of 25.0 to 29.9 kg/m² (overweight) or greater than 30.0 kg/m² (obese) (Ogden, Carroll, Kit, & Flegal, 2014). African American women are particularly at risk for overweight or obesity due to a combination of genetic, metabolic, behavioral, environmental, cultural, and socioeconomic influences (USDHHS, 2008b). The number of African American women described as overweight (BMI ≥ 25) has reached 78.2 % (95% CI 74.5-81.9%) and those obese (BMI ≥ 30) are 49.6 % (95% CI 45.5-53.7 %) (Flegal, Carroll, Ogden, & Curtin, 2010).

Risk for premature death increases significantly with excess body weight due largely to cardiovascular disease (Flegal, Graubard, Williamson, & Gail, 2007). Obesity alone increases the risk of an early death by 50% to 100% when compared to individuals at a healthy weight (USDHHS, 2001). The high rates of overweight and obesity is a direct result of an imbalance between excess calorie consumption and inadequate levels of physical activity (USDHHS, 2011b) and is a major contributing risk factor for development of prehypertension and progression to hypertension (American Obesity Association [AOA], 2005; CDC, 2009b; Egan, Lackland, & Jones, 2010).

The economic consequences of overweight and obesity related disease and illness are staggering. In 2008, medical costs associated with obesity in the United States were an estimated $147 billion (Finkelstein, Trogdon, Cohen, & Dietz, 2009) and in 2003, costs totaled $454

million in Nebraska alone (CDC, 2011a). These costs are not likely to decline since the number of U.S. adults overweight or obese continues to rise (CDC, 2010).

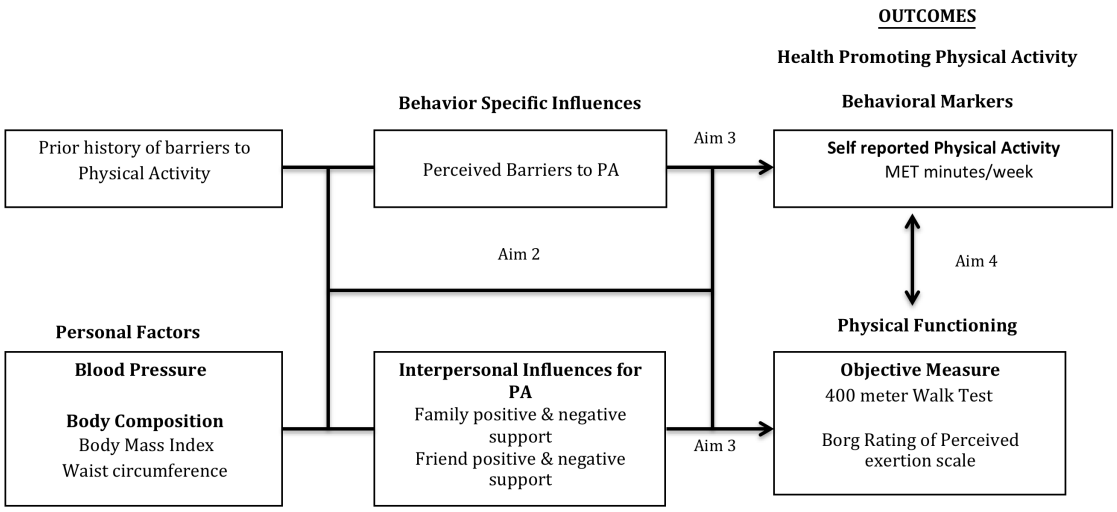
Conceptual Framework

The Health Promotion Model is a theory driven model that integrates constructs from the social cognitive theory and expectancy-value theory (Pender, Murdaugh, & Parsons, 2014) to predict health-promoting behavior. This conceptual framework has been adapted to guide the current study (Figure 1). The adapted model proposes a relationship between personal factors and PA behavioral and biomarkers (Aim 2). Specifically, a SBP and DBP < 120/80 mmHg, normal BMI (between 18.5 to 24.9 kg/m2), and a waist circumference < 35 inches (Cornier, Despres, Davis, Grossniklaus, Klein, Lamarche, et al., 2011) may be associated with greater levels of PA and physical fitness. Physical activity is known to have many positive health benefits including lowering blood pressure, helping maintain a normal weight, reducing risk of several chronic diseases (i.e., coronary heart disease, stroke, cancer, etc.), reducing risk of mortality, and many more (Mozaffarian et al., 2015; USDHHS, 2008b). Thus, it is anticipated that an inverse relationship will be found between blood pressure, BMI, and waist circumference, and PA levels (weekly PA minutes > moderate intensity and METS) and PA biomarkers. The model also proposes that the behavior specific influences of perceived barriers to physical activity and perceived family and friend positive and negative support for physical activity may impact self-reported physical activity and PA biomarkers (Aim 3). Perceived barriers to PA, such as not enough time, inconvenience, or lack of transportation, have been one of the strongest and most consistent correlates of lower physical activity levels across studies (CDC, 2011e; 2011f) and thus they are a major obstacle to individuals being more active. In addition, there are unique barriers to PA in African American women, including sweating during exercise and an expensive hairstyle that is difficult and costly to maintain, that has received minimal study in this population. Thus, is expected that there will be an inverse relationship between barriers to PA and

physical activity levels and physical fitness. It is anticipated that positive support for PA from family members and friends will be positively related to physical activity levels and physical fitness because it will provide the women with messages of encouragement to exercise regularly, positive comments about appearance, and someone to potentially exercise with them. In contrast, negative support for PA from family members and friends will be negatively related to physical activity levels and PA biomarkers because the negative support will be perceived as complaints, criticism, or disapproval for their spending time being physically active. The final relationship in the model is the proposed positive relationship between the physical activity behavioral markers and the physical activity biomarker (Aim 4). A positive relationship is expected between these concepts because as individuals are more active, their overall health improves (Mozaffarian et al., 2015; CDC, 2009b).

Only one research study using a sample of African American women was located in the literature with the Health Promotion Model as the conceptual framework (Edmonds, 2010). This study examined interpersonal influences and physical activity in a sample of college-educated African American women and will be discussed in Chapter 2. No research studies were located using a sample of prehypertensive and stage I hypertensive African American women with the HPM as its study framework. The literature providing empirical support for perceived barriers to and perceived interpersonal support for physical activity is addressed in Chapter 2.

Figure 1. The relationship between behavior specific influences and physical activity behaviors of Prehypertensive and Stage I hypertensive African American women
*Note: Aim 1 is not represented in this model because it is a descriptive aim.



Assumptions

The proposed study is based upon several assumptions. Women are knowledgeable and have the ability to answer questions about physical activity behaviors. African American women can adequately evaluate their barriers and interpersonal support for physical activity. Self-report questionnaires are appropriate for measuring attitudes, beliefs, perceptions, and reporting behaviors in adults (Polit & Beck, 2004).

CHAPTER II

REVIEW OF THE LITERATURE

Individuals who are especially vulnerable for development of hypertension are those who are prehypertensive, African American, overweight or obese, have a family history of high blood pressure, and are physically inactive (Mozaffarian et al., 2015; Selassie, et al., 2011). This review of the literature will describe the influence of physical activity on systolic and diastolic blood pressure, cardiovascular disease, and overweight and obesity. The literature pertaining to the behavior specific constructs of perceived barriers to and interpersonal support from family and friends for physical activity among African American women is discussed. A summary follows the literature review.

Influence of Physical Activity on Prehypertension and Hypertension

Research studies have determined that physical activity has a positive effect on lowering both systolic and diastolic blood pressure (Eckel et al., 2013). Articles of comprehensive literature reviews on physical activity and treatment of hypertension conclude that physical activity can lower systolic blood pressure at an average of 11 mm Hg and 8 mm Hg for diastolic blood pressure for all races/ethnicities (Hagberg, Park, & Brown, 2000; Oberg, 2007). The American Heart Association's guidelines for prevention of heart disease in women recommends moderate intensity physical activity for a minimum of 30 minutes preferably all days of the week for treatment of prehypertension and hypertension (Heyward & Gibson, 2014; Mosca, Banka, Benjamin et al., 2007; Smith, Allen, Blair et al., 2006).

Disproportionate rates of higher than normal blood pressure are seen in racial and ethnic minorities. In 2009, death rates due to high blood pressure were 38.3 per 100,000 for African American women and 14.4 per 100,000 for Caucasian women (Go et al., 2013). Racial disparities are also seen in the control of blood pressure with odds of control 27% lower in African Americans as compared to Caucasian (Go et al., 2013).

The economic burden due to high blood pressure is immense. The direct and indirect cost of high blood pressure for 2009 is $51.0 billion (Go et al., 2013). By 2030, this number is expected to rise to $343 billion (Go et al., 2013) further increasing the burden on an already crippled financial system.

Although previous studies examining physical activity behaviors using a prehypertensive sample have been conducted (Kokkinos et al., 2006; Padilla, Wallace & Saejong, 2005; Park, Rink, & Wallace, 2006), few studies have been conducted using a cohort of prehypertensive and stage I hypertensive African American women. Those studies are discussed below.

The Black Women's Health Study (BWHS, 2009) is a longitudinal descriptive study that began in 1995 to examine the health of Black women. Nearly 60,000 Black women were enrolled in the study ranging in age from 21 to 69 years. Funding provided by the National Institutes of Health (NIH) allowed researchers to develop questionnaires providing information on behavioral factors that influence both health and disease (e.g., physical activity, diet, and hypertensive status). Online questionnaires are completed by subscribers of Essence magazine (a Black women's magazine) every two years gathering new information regarding many common illnesses and diseases that disproportionately affect Black women (hypertension, cardiovascular disease, diabetes, and several forms of cancer) (BWHS, 2009). Findings of several of these studies are discussed in this literature review.

Adams-Campbell et al. (2000) described the physical activity levels of women enrolled in the Black Women's Health study. Women were asked how many hours each week was spent in walking for exercise, in moderate activity (e.g., housework, gardening, bowling), and in strenuous activity (e.g., basketball, swimming, running, aerobics). A total of 64,101 women provided physical activity data used for the analysis. Median levels of energy expenditure were calculated and used to determine the weekly physical activity levels of the women (energy expenditures were not included in the article). Multivariate analysis was used to predict physical activity. The median age of participants was 38 years with nearly 25% of the sample reporting a diagnosis of

hypertension. Based upon body mass index, more than 40% of the women were overweight or obese. Most of the women reported spending an hour or less each week walking for exercise (57%), 18% engaged in moderate intensity activity and surprising 61% engaged in strenuous physical activity. Nineteen percent of the women reported no walking for exercise, 2% reported no moderate intensity activity, and 34% no strenuous activity. Women who engaged in walking for exercise were generally older (odds ratio 1.01) and had been vigorous exercisers in high school (OR 1.59). For those who engaged in moderate intensity activity, activity increased with age (OR 1.01) and in hours per week (≥ 10 hours per week). Strenuous exercise in high school was strongly positively associated with moderate and strenuous intensity exercise as adults (OR 2.18 and 2.37 respectively). As age (OR 0.97) and body mass index (OR 0.96) increased, weekly strenuous activity decreased. Women diagnosed with cardiovascular disease (23.4%) engaged in fewer weekly hours of strenuous physical activity (OR 0.83). These findings suggest that women, who participated in physical activity during high school or at an earlier age, are more likely to continue with some level of exercise later in life.

Cozier, Palmer, and Rosenberg (2006) presented findings from the Black Women's Health study on the relationship of physical activity to risk for hypertension. Physical activity was described as the number of weekly hours of walking (moderate intensity) and vigorous activity. During 1995-2003, 5,528 women were diagnosed with hypertension. However, women who engaged in vigorous intensity physical activity routinely were less likely to be diagnosed with hypertension. The incidence rate ratio using Cox proportional hazard models for a diagnosis of hypertension, were 0.90, 0.80, 0.73, 0.63, and 0.60 for <1, 1-2, 2-4, 5-6, and 7+ hours per week, respectively.

In a different descriptive study, Hsia et al. (2007) examined the prevalence of prehypertension and the risk for stroke and cardiovascular disease in 60,785 African American (n=6222), Caucasian (n=49,386), Hispanic (n=2599), American Indian (n=256), and Asian (n=1469) postmenopausal women (*M*=62.8±7.0 years) enrolled in the Women's Health Initiative

study. At baseline, 32% of African American women were prehypertensive (which may be due to the findings that AA women become hypertensive at an earlier age) compared to 40% of Caucasian women, 43% of Hispanic women, 39 % of American Indian women, and 40% of Asian women. Eighty-seven percent of those prehypertensive were unaware of this classification. Researchers also found that as the women's age and body mass index increased, so did their systolic and diastolic blood pressure. Adjusted hazard ratios for prehypertensive women were 1.58 (95% CI 1.12 to 2.21) for cardiovascular death, and 1.93 (95% CI 1.49 to 2.50) for any cardiovascular event (including stroke). In postmenopausal women, prehypertension was strongly associated with increased risk of cardiovascular death, heart failure, and stroke for all racial/ethnicities in the study.

Gu, Burt, Paulose-Ram, Yoon, and Gillum (2008) examined mortality data to determine if high blood pressure is an independent risk factor for cardiovascular disease mortality and if age, sex, and race/ethnicity modified the relationship. Thirty one percent of the sample was prehypertensive and 24% hypertensive. Nearly 70% of participants were Caucasian, 11% were African American, and 19% Mexican American. African Americans were more likely to be hypertensive and sedentary. Regardless of blood pressure status, cardiovascular disease mortality rates increased with age and were highest among African American women. Hypertensive African Americans had a 4.6 fold increased CVD mortality risk. A greater risk for cardiovascular disease was found beginning with blood pressures in the prehypertensive range and for individuals aged 18 to 64 years. Physical inactivity was associated with a 68% cardiovascular disease mortality risk among hypertensives and individuals < 65 years had a 4 fold increased risk for death due to cardiovascular disease even when BP was controlled. The greater cardiovascular disease mortality risk found in the African American population is believed to be due earlier onset and severity of hypertension, poorly controlled blood pressure, and less access to health care.

These studies exemplify the influence of physical activity behavior on blood pressure. However, none examine the specific types of physical activity prehypertensive and stage I hypertensive African American women most often engage in. The proposed dissertation study will attempt to provide this vital information.

Influence of Physical Activity on Cardiovascular Disease

Physical activity reduces the risk of dying prematurely from cardiovascular disease (Kokkinos, 2014). Individuals who are inactive are twice as likely to develop cardiovascular disease as compared to those regularly active (Kokkinos, 2014). Physical inactivity independently significantly increases the risk for cardiovascular disease. In contrast, regular physical activity significantly decreases the risk for cardiovascular disease (Lee, 2010; Shiroma & Lee, 2010).

Adams-Campbell et al. (2000) found African American women diagnosed with cardiovascular disease (23.4%) in the Black Women's Health study engaged in the least number of hours weekly of moderate to vigorous intensity physical activity. However, with regular physical activity prevention of CVD is possible through modifications of other disease risk factors such as high blood pressure and overweight or obesity (Mosca et al., 2011).

Bell, Lutsey, Windham, and Folsom (2013) examined the relationship between physical activity and CVD among African Americans in the Atherosclerosis Risk in Communities (ARIC) study, a 21 year longitudinal study. More than 50% of the sample (N=3,707 men and women) was African American women. Physical activity levels (poor, intermediate, recommended) were significantly and inversely associated with cardiovascular disease events (i.e., increases in blood pressure, stroke) regardless of obesity and hypertensive status. Those individuals engaging in the higher levels of physical activity (intermediate, recommended) experienced decreases in cardiovascular risk factors (e.g., blood pressure, obesity). Even small amounts of physical activity were shown to be beneficial in CVD risk reduction (Bell et al., 2013).

Ethnic minorities are disproportionately affected by early death from cardiovascular disease (Mozaffarain et al., 2015). Okin, Kjeldsen, Julius, Dahlof, and Devereaux (2012) found African

Americans (n=533; 46.3% were AA women) with high blood pressure have a 98% increased risk for sudden cardiac death. Over a 5-year follow up, African Americans had a two-fold greater risk of sudden cardiac death when compared to non-African Americans.

The economic costs of cardiovascular disease are staggering. In 2010, the direct cost of cardiovascular disease for was $444 billion (USDHHS, 2011). With a growing number of individuals diagnosed with cardiovascular disease, this number is expected to increase (USDHHS, 2011).

These studies findings well establish the risk for cardiovascular disease with physical inactivity, obesity, and high blood pressure. However, the strength of the relationship between physical activity and cardiovascular disease were not addressed.

Influence of Physical Activity on Overweight and Obesity

Overweight and obesity are significant risk factors for development of higher than normal blood pressure (Abraham, Kazman, Zeno, & Deuster, 2013). Body Mass Index (BMI) measures overweight and obesity status by estimating body fat from height and weight (kilograms per meter squared) (NIDDK, 2008; NHLBI, 1998a/b). It is also used to determine risk for certain disease and illnesses (e.g., cardiovascular disease). Individuals categorized as overweight have a BMI of 25.0 to 29.9 kg/m^2, obesity is estimated at a BMI $\geq$ 30.0 kg/m^2, and extreme obesity a BMI $\geq$ 40.0 kg/m^2 (NHLBI, 2005). African American women are more likely to be overweight or obese (Jensen et al., 2013) and physically inactive than women of other races/ethnicities (CDC, 2011d). They also have a higher prevalence of abdominal obesity (Bell, McIntyre, & Hadley, 2014) than Caucasian women (Li, Ford, McGuire, & Mokdad, 2007); all are independent predictors of disease risk and a marker for development of cardiovascular disease (Bell et al., 2014; CDC, 2010; Boggs et al., 2011).

For all women, waist circumferences $\geq$ 35 inches (88 centimeters) increases their risk for cardiovascular disease as compared to women with smaller waist measures (NIDDK, 2008). A

recent study has shown that African American women with a waist circumference 35 inches or higher have an increased death rate by 50% as compared to African American women with circumferences less than 35 inches (Boggs et al., 2011). By 2020, an estimated 70% of African American women will be obese and 90% will have abdominal obesity (Boggs et al., 2011).

A 2004 study by Okosun et al. (2004) found the risk for development of high blood pressure could be decreased with prevention of abdominal obesity. The authors analyzed data from the 1999 to 2000 U.S. National Health and Nutrition Examination Surveys (NHANES) on racial/ethnic differences of prehypetensive adults of which 1975 were women. Abdominal obesity was defined as a waist circumference ≥ 35 inches for women and prehypertension as having a systolic BP of 120 -139 mmHg and a diastolic blood pressure of 80-89 mmHg. Nearly 72% percent of African American women had a waist circumference ≥ 35 inches, few exercised routinely, and the number of African American women with prehypertension exceeded that of all other races including men (Okosun et al., 2004).

In 2009, the Center for Disease Control analyzed 2006-2008 survey data from the Behavioral Risk Factor Surveillance System (BRFSS) on the prevalence of obesity among different ethnic/racial populations. A higher prevalence of obesity among African Americans was found as compared to all other adult groups residing in the U.S. and in most states (Pan et al., 2009). The Midwestern region of the United States had the second highest prevalence for obesity (36.3%) with the highest reportedly in the South (36.9%) that was only slightly higher than that of Midwesterners.

Ogden, Lamb, Carroll, and Flegal (2010) examined obesity and socioeconomic data from the National Health and Nutrition Examination Survey (2005-2008). Findings were the prevalence of obesity among African American women (54.7%) was greater than all other racial/ethnic groups regardless of gender. African American women with lower incomes and less education were more likely to be obese (Ogden et al., 2010).

Cozier, Palmer, and Rosenberg's (2005) findings from the Black Women's Health study for risk of hypertension and its association with body mass index were similar. Researchers found a significant relationship between BMI and risk of hypertension and nearly 3,500 women from 1997 to 2001 reporting a diagnosis of hypertension by their healthcare provider. Regardless of socioeconomic status, a high BMI increased the risk of hypertension among African American women.

Conn, Phillips, Ruppar, and Chase (2012) analyzed data from 77 physical activity studies yielding a sample size of 21,151. These exercise sessions typically occurred for 40 minutes, three times a week for 11 weeks. More than half of those studies included in the analysis were composed of samples that were entirely African American and another 15 studies were over 50% African American. Subjects were primarily African American, female, overweight or obese. Findings were short term improvements in fitness levels and reductions in body measures (i.e., overall body weight, BMI, percent body fat) is possible among minority groups (e.g., African Americans, Hispanics, Native Americans) residing in the United States with supervised exercise (Conn et al., 2012). Despite the influence of socioeconomic status on health outcomes, most of the studies did not include data on SES in their findings.

Meta-analysis have confirmed significant reductions in body weight are possible through physical activity that is dose specific (Conn, Hafdahl, Phillips, Ruppar, & Chase, 2014). Rosenberg, Kipping-Ruane, Boggs, and Palmer (2013) examined the relationship between vigorous physical activity and brisk walking to obesity status (BMI $\geq$ 30) among AA women aged $\leq$ 40 years (N=20,259) in the Black Women's Health Study. The hours/week ($\geq$7) of vigorous physical activity was inversely related to obesity. Overall body weight decreased for normal weight, overweight, and obese categories baseline to year 14 when vigorous intensity levels of physical activity increased (Incidence Rate Ratio (IRR) was 0.77 for $\geq$ 7 hours/week of vigorous exercise relative to little or no exercise) regardless of education ($\leq$12 years, IRR was 0.75; 13-15 years, IRR was 0.75; $\geq$16 years, IRR was 0.78).

This remained true across all levels of education. Increase hours/week engaged in brisk walking did not result in decreases in body weight except for women in the obese category. The IRR for obesity incidence and walking for transport at a brisk pace relative to little or no exercise was <1.0. This was true regardless of education for women in the obese category only.

Genkinger, Jehn, Sapun, Mabry, and Young (2006) found moderate or greater intensity activity was significantly lower for overweight and obese African American women. Total weekly hours spent engaged in leisure time physical activity was greater for overweight women as compared to women in the obese category. Calculation of BMI revealed 89% of participants were overweight or obese.

Many obesity-related diseases (e.g., high blood pressure and cardiovascular disease) can be prevented and treated effectively by engaging in routine physical activity to reduce excess body weight (Lee, Djousse, Sesso, Wang, & Buring, 2010). One mechanism by which this can occur is through adoption of behavioral strategies (e.g., overcoming barriers and interpersonal support) that encourage physical activity (Jensen et al., 2014). Research has shown that "behavioral and environmental factors are large contributors to overweight and obesity and provide the greatest opportunity for actions and interventions designed for prevention and treatment" (USDHHS, 2001). The following paragraphs will discuss the influence of perceived barriers to physical activity and interpersonal support (family, friends, and negative) on physical activity behavior.

Health Promotion Model: Perceived Barriers to and Perceived Interpersonal Support for Physical Activity

Many studies have been conducted using Pender's Health Promotion Model as the conceptual framework. Pender et al. (2010) found that 79% of studies using the HPM as the study framework provided empirical support for the significance of barriers as a contributing factor for health promoting behavior and 57% provided empirical support for interpersonal influences (social support) as a contributing factor for health promoting behavior. These studies looked at various health promoting behaviors, not just physical activity.

A review of the literature for those studies that did focus on physical activity yielded 52 studies from 2000 to 2011. However, only 17 were peer reviewed research articles and only one of the 17 used a sample of African American women. Of the 52 studies using the HPM as its conceptual model, most of the studies used a quantitative research design and were primarily cross-sectional. Participants ranged in age from adolescence (13 to 18 years) to old age (65+ years), were male and female, and resided in several different countries (United States, Taiwan, Jordan, Brazil, Iran, Korea, Columbia, and Thailand). Twenty-three of the 52 studies were dissertation studies.

In a descriptive correlational study using the HPM as the study model, Edmonds (2010) found no significant differences between college educated African American women (N=167) of normal weight, overweight, or obese on specific health promoting behaviors (e.g., nutrition, physical activity, interpersonal relations) ($F(2,163) = .854$, $p>.05$). The women ranged in age from 22 to 86 years (M=47, SD=15.04). The 52-item Health-Promoting Lifestyle Profile II (HPLP-II) was used to assess health-promoting behaviors. The 4-point Likert scale contains six subscales: health responsibility, nutrition, physical activity, stress management, interpersonal relations, and spiritual growth. A total score and individual subscale scores were calculated (HPLP-II scores were not provided in the article). Positive body image (β=.36, $p<.05$) and low levels of stress (β=-.26, $p<.05$) were the strongest predictors of health promoting behavior explaining a significant proportion of the variance (19.2% and 5.6%, $p<.05$, respectively). The remaining variance (75%) was believed to be influenced by factors other than those included in the study. Edmonds (2010) suggests that culturally sensitive research involving AA women should assess the influence of race, gender, and class to be effective at eliminating health disparities. Prior related behavior (e.g., PA, nutrition) and personal factors (e.g., weight status and stress) as described in Pender's model influenced participant cognitions, affect, and health behavior. Behavior specific cognitions and affect were the primary motivators for health

promoting behaviors. The author concluded that AA women with a positive body image and fewer stressors were more likely to engage in health promoting behavior (Edmonds, 2010).

The Health Promotion Model was the conceptual framework used in a spiritual based physical activity study of 27 older African American women (aged ≥60) (Anderson & Pullen, 2013). Participants with fewer barriers to PA increased time spent engaged in physical activity and showed improvements in 6-minute walk test scores (Anderson & Pullen, 2013).

Many of the studies discussed in the barriers and interpersonal support sections of this review do not use the HPM as its conceptual framework. To best describe the current state of the literature of these variables among African American women, only those studies using a study population of African American women will be discussed in this section of the review.

Perceived Barriers

Perceived barriers are cognitive variables that negatively influence participation in health promoting behavior (Pender, Murdaugh, & Parsons, 2014) and contribute significantly to low levels of physical activity (Joseph, Ainsworth, Keller, & Dodgson, 2015). For every 4% increase in perceived barriers to PA, body mass index increases by one (Casagrande, Whitt-Glover, Lancaster, Odoms-Young & Gary, 2009). Fewer perceived barriers are associated with greater levels of physical activity among African American women (Fox, Mann, Ramos, Kleinman, & Horowitz, 2012). To develop effective physical activity interventions, it is important to recognize what barriers influence activity levels. Several studies have identified barriers to PA most often mentioned by AAW to include lack of time, family and occupational responsibilities (Gletsu & Tovin, 2010; Miller & Marolen, 2012), fatigue, illness, costs, lack of transportation (Joseph, et al., 2015; Rimmer, Hsieh, Graham, Gerber, & Stanley, 2010), sweating, hair care and management (Gathers & Mahan, 2014; Im et al., 2012; Versey, 2014); and little or no family or friend support for PA (Gletsu & Tovin, 2010). Many of the studies located in the literature describing perceived barriers to physical activity also assessed other variables found significant for behavior change (e.g., interpersonal support for physical activity). Therefore, some studies in

this section of the literature review will include a discussion of perceived barriers and those behavior-influencing variables.

A review of the literature of perceived barriers to physical activity of African American women resulted in a total of 22 studies published from 2007 to 2014. Most of the studies found were quantitative (intervention) studies (*n*=15) others were qualitative (*n*=17, focus groups, 3 reviews), or descriptive (*n*=11). Only the qualitative and descriptive studies will be discussed in this review.

Five barriers to physical activity were most commonly mentioned in the qualitative studies. They included time constraints, family/job responsibilities, fatigue, and lack of motivation. In all of the studies, time and family/work obligations were cited as barriers. For example, Bopp, et al. (2007) in their examination of perceived barriers to physical activity in a sample of 20 hypertensive African American women, time and family/work commitments were cited as barriers. However, inconvenience (e.g., no convenient place to exercise) was ranked highest among barriers, followed by adverseness of physical activity (i.e., lack of enjoyment for physical activity). Zunker, Cox, Wingo, Knight, Jefferson, and Ard (2008) also found in their study of barriers to PA of African American (n= 13) and Hispanic (n=1) women included fatigue, social obligations, fear of vigorous intensity physical activity, and concern for appearance in workout clothing.

Thomas, Moseley, Stallings, Nichols-English, and Wagner (2008) examined perceived barriers of 30 obese African American (n=17) and Caucasian (n=13) women. Several barriers unique to African American women were a lack of transportation to and from an exercise facility, inability to find attractive exercise clothing, satisfaction with larger body size, and not wanting to engage in activity that would cause sweating or messing up their hair. The latter was of particular concern if PA was to occur during the workweek. Versey (2014) reviewed the literature on the issue of hair hygiene as a major barrier to engaging in routine physical activity for African American women. The author suggests rationale for this unique barrier to PA is due to a lack of

models routinely engaging in PA in their community, and hair care and maintenance is considered a significant part of self-worth, value, and identity. Time constraints to maintaining hairstyles and the costs associated with maintaining a particular style further inhibit physical activity behavior.

Miller, Marolen, and Beech (2010) examined PA barriers of 31 rural, diabetic (Type 2) African American women. The lack of availability of childcare and household duties were barriers to physical activity cited with time constraints and family/work obligations. Miller and Marolen (2012) assessed perceived barriers to physical activity in 11 urban African American women with Type 2 diabetes. A lack of time to engage in physical activity due to multiple demands (work, home, and family) was a common theme of focus groups. Not having someone to exercise with was also considered a barrier to being physically active.

A lack of motivation for becoming more physically active was mentioned as a barrier in five of the studies (Bopp et al., 2007; Miller et al., 2010; Miller et al., 2012; Pekmezi et al., 2013; Sebastiao, Ibe-Lamberts, Bobitt, Schwingel, & Chodzko-Zajko, 2014). Costs associated with being active and fatigue was cited as barriers in two of the five studies (Siddiqi, Tiro, & Shuval, 2011; Bopp et al., 2007; Zunker et al., 2008).

In a recent review article of African American women and physical activity, Gletsu and Tovin (2010) described several perceived barriers to physical activity in 6 qualitative studies. Five of the studies were focus groups and one was an open-ended interview. Barriers mentioned most often were time related demands, family/work responsibilities, childcare, costs, and a lack of social support for physical activity. Barriers least often cited were lack of enjoyment of physical activity, not motivated, poor weather, not enough space to exercise in the home, and a poor understanding of how to exercise. Only two of the studies used self-reported data to confirm focus group findings. Siddiqi, Tiro, and Shuval (2011) reviewed 29 qualitative studies that focused on barriers and enablers to physical activity among African American adults. In their analysis, lack of time and motivation, and a lack of knowledge of adequate daily physical activity

for health benefits were the primary barriers. Hair care/maintenance, lack of childcare, family and job responsibilities, cost, neighborhood safety, lack of facilities and outdoor spaces to exercise, were also mentioned as barriers. Specific barriers among African American adults ≥ 50 years were fatigue, disease/illness, and environmental obstructions such as crime and violence. These same barriers were reported by African American women (N=7) in Sebastiao, Ibe-Lamberts, Bobitt, Schwingel, and Chodzko-Zajko (2014) qualitative study of physical activity behaviors of older African American women (aged ≥ 65). Also reported, as barriers to PA were poor weather conditions, cracked sidewalks, and musculoskeletal issues. The dissertation study will further expand analysis of perceived barriers to physical activity among prehypertensive and stage I hypertensive African American women by including a self-reported questionnaire on barriers exclusive to African American women.

In the six descriptive studies, time, costs, motivation, fatigue, and a lack of family/friend support for PA were the most commonly stated barriers to physical activity.

Martin, Prayor-Patterson, Kratt, Kim, and Person (2007) also examined barriers to physical activity among a cohort (N=61) of insufficiently active hypertensive African American women. The barrier most commonly reported was inconvenience (a lack of convenient places to exercise), followed by adverseness of activity (e.g., “Exercise is boring”), costs associated with PA (e.g., gym membership), concerns with being overweight, and little social support for physical activity. Kirchhoff et al. (2008) investigated strategies to improve maintenance of physical activity among 19 African American women. Benefits and barriers to physical activity were examined using self-reported data (only barriers will be discussed). Work commitment was the barrier most often cited; longer traveling time to and from work was the second most often mentioned. Poor weather conditions also served as a barrier with participants reporting less physical activity during winter months. Fatigue and costs associated with physical activity were also stated barriers. Few of the women reported family obligations as a barrier to PA except those who cared for a sick or elderly family member.

Rimmer et al. (2010) examined 33 obese (*Mean* BMI=49.1 kg/m^2) AA women at baseline in a study of barrier removal to increase physical activity levels. Costs of an exercise program (66.7%), lack of transportation (48.5%), unknown location of neighborhood fitness centers (45.5%), and lack of neighborhood fitness facilities (45.5%) were the most common environmental barriers. Personal barriers cited were pain (63.6%), don't know how to exercise (45.5%), health issues (39.4%), don't know where to exercise (39.4%), and fatigue (36.4%). However, time a commonly cited barrier to PA was a barrier for only 15.0% of participants.

In a recent study, Komar-Samardzija, Braun, Keithley, and Quinn (2012) described barriers to physical activity of 50 urban African American women with Type 2 diabetes. Those participants with high environmental barriers (traffic, lack of sidewalks, unattended dogs, safety from crime, poorly lighted streets at night, few places to exercise) engaged in less physical activity (r=-.389, p=.005). Environmental barriers that were the most significant predictors for physical inactivity and accounted for most of the variance (15%) were safety concerns, lack of availability and accessible exercise facilities. Participants were primarily middle aged or older (40+years), were single (never married, separated, divorced, or widowed), overweight or obese, employed full-time with incomes ranging from <$10,000 to > $150,000 annually. For each of these studies, several different tools were used to measure perceived barriers to physical activity.

Gathers and Mahan (2014) found hair care concerns were a significant barrier to engaging in physical activity in a sample of African American women. Two hundred African American women aged 21 to 83 completed the Hair Care Assessment survey. Forty-five percent of the sample stated they did not exercise for fear of "messing up" their hair. This was a surprising finding in that 4 out of 5 African American women are overweight or obese. When asked about weight loss efforts, 22% stated hair concerns and maintenance prohibited maintaining a healthy weight.

In summary, many of the perceived barriers discussed in this review of the literature were the same as in previous studies (Bopp et al., 2007; Nies, Vollman, & Cook, 1999; Wilcox et al., 2000; Young, Gittelsohn, Charleston, Felix-Aaron, & Appel, 2001). Although the type and number of barriers differed across studies, lack of time and family and work obligations were cited most often. The dissertation study will expand upon knowledge gained from these studies by examining perceived barriers to physical activity among prehypertensive and stage I hypertensive African American women. No studies have looked at the influence of perceived barriers to PA on systolic and diastolic blood pressure in a sample of prehypertensive or stage I hypertensive African American women. The proposed dissertation study will inform this event.

Lifestyle modification is currently the recommended treatment for prehypertension and hypertension. Barriers to physical activity have a direct effect on activity levels. Although these studies address barriers to physical activity for African American women none address culturally specific barriers to prehypertensive and stage I hypertensive African American women as will the proposed dissertation study. Identifying the perceived barriers to physical activity common among prehypertensive and stage I hypertensive African American women is significant for development of future interventions effective at increasing physical activity levels and is a potential means to achieving optimal health.

Interpersonal Support

Interpersonal (social) support is a significant determinant for health promoting behaviors (Pender et al., 2010; Sallis, Grossman, Pinski, Patterson, & Nader, 1987). Several studies have provided evidence of an association between social support and participation in physical activity particularly among women (Eyler, Vest, Sanderson, Wilbur, Matson-Koffman, Evenson, et al., 2002; Molloy, Dixon, Hamer, & Sniehotta, 2010; Sallis et al., 1987). Research suggests that individual's in a socially supportive environment are more likely to have better health outcomes (Gottlieb, 1987; Hamilton, 2008). A growing number of studies have examined determinants that are thought to increase social support for physical activity from family and friends (Gletsu &

Tovin, 2010; Kahn, Ramsey, Brownson, Heath, Howze, Powell et al., 2002; Wendel-Vos, Droomers, Kremers, Brug, & van Lenthe, 2007) among males and females, young, middle, and older aged adults (Gleeson-Kreig, 2008; Gletsu & Tovin, 2010). Social support for physical activity from family and friends has been consistently associated with engaging in routine physical activity (CDC, 2010). However, few studies have examined family and friend support for physical activity among African American women.

Social support has been discussed in the literature using several different conceptual and operational definitions. Caplan and Killealea (1976) conceptualized social support, as a mechanism by which an individual achieves desired goals. It is when the actual receipt of support from interpersonal relationships is deemed adequate that behavior change occurs (Gottlieb, 1987; Hamilton, 2008).

Although many conceptualizations of social support include multiple dimensions (i.e., informational support, esteem support, emotional support, and tangible aid), the focus in this study is on family and friend support as defined by Sallis et al. (1987). Family support was defined as emotional and tangible assistance for exercise provided by individuals living in the same household and friend support as emotional and tangible assistance for exercise provided by those living outside the household to include friends, acquaintances, coworkers or family not living with the participant. The third component of family and friend support that will be examined in this study is negative support. Negative support, whether provided by family or friends, is defined as complaints or criticism about engaging in regular exercise. This section of the literature review will provide a synthesis of the current state of the science in relation to family and friend support for physical activity among diverse populations.

The majority of earlier studies examining social support for physical activity in African American women were qualitative in nature (Felton, Boyd, Bartoces, & Tavakoli, 2002; Nies et al., 1999; Thomas et al., 2009). In these studies, overall, women reported that family and friend support were important for engaging in physical activity (Nies et al., 1999; Thomas et al., 2009).

Nies et al. (1999) and Peterson & Cheng (2011) found that family and friend support was a major facilitator of physical activity. Nies et al. (1999) also found that family and friend participation provided a supportive network for physical activity and created a safe environment in which the women were more likely to engage in outdoor activity (e.g., walking for exercise). Thomas et al. (2009), in focus groups with overweight or obese African American women, found that supportive behaviors believed to foster increased physical activity included having someone to exercise with, avoidance of negative support (e.g., criticism) and increased positive support (e.g., encouragement) from family member or friends. Felton et al. (2002) found that 85% of African American women believed family and friends would be "proud" of their being more physically active, 74% were encouraged by family and friends to be physically active, and 55% had family or friends who were physically active. In contrast, 36% reported disapproval of family and friends for their spending time being physically active. Gletsu and Tovin (2010) examined nine qualitative studies of physical activity among urban African American women and found that social support from family for physical activity and having a friend to exercise with were found to be significant determinants across these qualitative studies. The proposed study will extend these earlier studies by using a quantitative approach to examine family and friend support for PA among prehypertensive and stage I hypertensive African American women.

In descriptive studies, the relationship between social support and physical activity is less consistent than in qualitative studies. Eyler et al. (1999) conducted a descriptive analysis of the types of social support most significant for increasing physical activity in a sample of 2912 ethnically diverse women (768 Caucasian, 745 African American, 738 American Indian/Alaskan Native, and 660 Hispanic) 40 to 49 years of age. A modified population specific version of Sallis' Social support for exercise from family and friends scale was used to assess available support (Sallis et al., 1987). High family social support scores were found for Hispanic women (57.8%), followed by American Indian/Alaskan Native women (52.3%), African American women (47.5%), and Caucasian women (41.6%). High friend support scores were found for Hispanic

women (49.2%), followed by African American women (48.4%), American Indian/Alaskan Native women (45.8%), and Caucasian women (39.1%). Overall, friend support for physical activity was greater than family support for physical activity among African American women. Kim, McEwen, Kieffer, Herman, and Piette (2008) found higher family and friend support scores were associated with increased physical activity (e.g., walking, leisure-time) in a diverse sample of women (N=227; 71% Caucasian, 5% Hispanic, 13% Asian/Pacific Islander, 7% African American, 3% Native American, and 2% other) with a history of gestational diabetes. Social support was assessed using Sallis' (1987) Social Support (family and friend) for Exercise scale. Among all races, moderate levels of friend (9.9 ±4.9, range 5 to 25) and family (28.5 ±10.6, range 12 to 60) social support for physical activity were reported. Family social support scores were highest for Native American women (37.5 ±11.7), followed by Hispanic (33.4±12.6), Asian (31.9±10.2), African American (27.7±14.8), Caucasian (27.7±9.7), and Other women (21.8±9.9). Friend support was higher for Native American (12.7±5.1), African American (11.6±5.4), Asian (11.6±5.0), Hispanic (10.5±6.3), Caucasian (9.3±4.6), and Other (9.0±3.2) women. African American women had greater friend support than family support for physical activity. Friend support was positively associated with physical activity for hours spent walking (4 hours weekly); whereas family support was greater for vigorous leisure time physical activity for at least 20 minutes. In prior literature, African American women had greater friend support than family support for PA (Eyler et al., 1999).

In contrast, other investigators did not find a significant relationship between family and friend SS and physical activity (Gleeson-Kreig, 2008; Martin et al., 2007). In a sample of 58 Caucasian men and women with Type 2 diabetes, family and friend support for physical activity was low for both men and women (Gleeson-Kreig, 2008) that may have contributed to the lack of a significant relationship between family and friend support and physical activity. Similarly, in a cohort of 61 hypertensive African American women (aged 40 to 65 years), Martin et al. (2007)

found little available social support for physical activity from family (M=18.66 ± 9.60) or friends (M=17.39 ± 9.28) as measured by Sallis' Social Support for Exercise scale.

Findings in studies of the specific types of social support for health behavior change have been inconsistent. Sharma, Sargent, and Stacy (2005) found emotional support followed by instrumental, informational, and appraisal support, respectively, was the most significant type of social support for physical activity among 240 African American women in Nebraska aged 18 to 78 years. Sallis et al.'s (1987) Social Support for Exercise survey was used to assess family and friend support. Only friend support for physical activity was significantly associated with total minutes of physical activity (p=0.001); how friend support influenced physical activity and why family support did not influence physical activity was not discussed in the article. Aggarwal, Liao, and Mosca (2008) examined the role of instrumental and emotional support for physical activity in reduction of cardiovascular disease risk factors in a racially/ethnically diverse sample (N=501) of men and women 20 to 79 years of age. Instrumental and emotional support was measured using the Enhancing Recovery in Coronary Heart Disease Patients (ENRICHD) Social Support Inventory (ESSI). Findings by race were not provided in the article. Twelve percent of participants reported low emotional support and 48% low instrumental support for PA. The proposed study will go further by increasing knowledge in relation to sources of support most significant for increasing physical activity levels among prehypertensive and stage I hypertensive African American women.

Social support received can be positive or negative. Positive forms of social support can enhance likelihood of goal achievement, whereas negative support can impede or block goal achievement (Gottlieb, 1987). The belief that positive support for physical activity from family would facilitate increased activity, as would having a "buddy" to exercise has repeatedly been common themes found during focus groups with African American women (Gletsu & Tovin, 2010; Nies et al., 1999; Peterson & Cheng, 2011; Thomas et al., 2009). In contrast, several studies have reported negative support for physical activity in the form of a lack of

encouragement for physical activity and little or no family or peer support (Felton et al., 2002; Martin et al., 2007; Thomas et al., 2009). This study will assess positive and negative forms of social support for physical activity from both family and friends as reported by prehypertensive and stage I hypertensive African American women.

Review studies have consistently identified social support as a major facilitator of physical activity among men and women (Eyler et al., 2002; Gletsu & Tovin, 2010; Trost, Owen, Bauman, Sallis, & Brown, 2002; Wendel-Vos et al., 2007). Perceived interpersonal support for physical activity and the availability of support have been significantly associated with increases in overall activity across all populations (Wendel-Vos et al., 2007).

Trost et al. (2002) reviewed 38 primarily cross-sectional studies to establish specific determinants for participation in physical activity among racially/ethnically diverse adults. Individuals with higher levels of physical activity reported more available or perceived social support for physical activity and were more likely to meet the recommended physical activity guidelines. Many of these studies included examination of determinants known to be associated with physical activity but in previously understudied minority populations. Findings were similar for these groups as in those studied extensively in the literature (e.g., Caucasian women). However, more study is needed targeting at risk populations. The proposed study will examine behavior specific influences (i.e., interpersonal support for physical activity) among at risk African American women, a group that continues to be understudied.

In summary, only 20 descriptive (n=10), qualitative (n=8), and intervention (n=2) studies were found that investigated family and friend support for physical activity in diverse populations. Sixteen of these 20 studies found a relationship for family and/or friend support and physical activity (Eyler et al., 1999; Felton et al., 2002; Harvey & Alexander, 2012; Kim et al., 2008; Komar-Samardzija, Braun, Keithley, & Quinn, 2012; Martin et al., 2007; Nies et al., 1999; Peterson & Cheng, 2011; Sharma et al., 2005; Thomas et al., 2009) and one found no relationship with family or friend support and physical activity (Gleeson-Kreig, 2008). One study found a

significant relationship between religious social support and social support for physical activity (Debnam, Holt, Clarks, Roth, & Southward, 2012). No study was located reporting family social support only as most significant for engaging in physical activity; however, one found a relationship with friend social support only and physical activity (Sharma et al., 2005) and five reported a relationship with both family and friend social support and physical activity (Nies et al., 1999; Eyler et al., 1999; Harvey & Alexander, 2012; Kim et al., 2008; Thomas et al., 2009; Peterson & Cheng, 2011). Explanations for these findings were not provided in either study; researchers cautioned interpretation is limited to the sample studied. Many of these studies used different measures to assess social support and included a sample of primarily middle and older aged African American women. Only 2 studies located measured the type of support for physical activity (Aggarwal et al., 2008; Sharma et al., 2005). Further, measures of family support and friend support were not clearly defined in the studies. For the current study, family support will be measured as individuals living in the same household and friend support as those living outside the household to include relatives, church members, neighborhood and community contacts.

This proposed study will examine the relationships among friend and family support and exercise in African American women; but it will also extend Eyler et al.'s study by focusing on the relationships between negative family and friend support for exercise. As in the Gleeson-Kreig (2008) study described above, the type of support (e.g., emotional, tangible, instrumental) for physical activity most influential for improving physical activity outcomes was not addressed nor did the researchers provide a possible explanation for their findings.

Although prior qualitative studies have found that both family and friend support are important for facilitating exercise in African American women, few studies (if any) have examined the unique contributions of family versus friend support in relation to physical activity. In addition, few prior studies examined the effects of positive and negative support on exercise behavior.

Summary

Health disparities have been well documented in the development of cardiovascular disease as a sequelae of high blood pressure. The causes of disparities are multifaceted that include factors such as race, socioeconomic status, poor access to health care, social and environmental issues. African American women suffer in disproportionate rates from each of these factors; thereby, increasing their vulnerability in development of hypertension and related illness and disease. Increases in systolic and diastolic blood pressure act synergistically with obesity and physical inactivity increasing their risk for development of cardiovascular disease.

Physical activity is a significant component of cardiovascular disease prevention, treatment and control and is a major component of lifestyle modification for reducing higher than normal blood pressure. Previous research has demonstrated that routine physical activity reduces both morbidity and mortality associated with cardiovascular disease, higher than normal blood pressure, and obesity among African American women. Several studies have noted specific barriers to physical activity and available support for physical activity among African American women and have proposed some promising conceptualizations of the physical activity behaviors of African American women. However, little is known about the specific physical activity behaviors engaged in by prehypertensive and stage I hypertensive AA women.

African American women are less physically active (Heyward and Gibson, 2014), increasingly overweight or obese (Ogden et al., 2010; Flegal et al., 2012), and are more likely to have higher than normal blood pressures than most other races of women (Go et al., 2013). However, no studies have developed strategies to address the specific barriers and support needs for increasing physical activity of prehypertensive and stage I hypertensive African American women and its integration into their lifestyle for long term adaptation. To inform a future physical activity intervention study, this pilot will offer insight into the barriers to physical activity and interpersonal support needs for physical activity among prehypertensive and stage I hypertensive

African American women, an area where there is a paucity of information. The Health Promotion Model guided this study, both the preliminary study and the dissertation study, in the investigation of these constructs.

CHAPTER III

DESIGN AND METHODS

This chapter includes a discussion of a preliminary study and the methods used for the dissertation study including the: design, sample, setting, measurements, procedures, human subject's activities, and data analysis.

Preliminary Study

The purpose of this study was to determine the feasibility of recruiting and enrolling prehypertensive African American women residing in Omaha, Nebraska and the feasibility of collecting selected behavioral influences in a community setting. The purpose of the study was: 1) to describe participant demographics, health history, and the physical measures of height, weight, BMI, blood pressure, heart rate, and waist circumference; 2) to describe PA behavioral markers and biomarkers (400 meter walk test), and 3) to examine behavior-specific influences (barriers to and social support for PA).

Participants were recruited from community health centers, churches, word of mouth (snowballing), and fliers posted in North Omaha where residents are primarily African American and female. Participants came into the research office at the Butler-Gast YMCA in North Omaha one time to complete questionnaires by paper and pencil, and the measures of physical activity behavioral and biomarkers. Assessments were conducted by the applicant in an enclosed room of the YMCA in North Omaha to maintain participant privacy.

Findings indicated that recruitment of prehypertensive African American women was feasible, but may be difficult. The PI made contact with 30 women, 12 of whom were screened over 6-weeks, 7 meeting eligibility criteria with 5 being assessed. This finding is not unlike other studies that utilized similar recruitment strategies in study of women of African American descent (Banks-Wallace, Enyart, and Johnson, 2004; Staffileno & Coke, 2006; Wilbur et al., 2006). Reactive recruitment strategies appeared to be most successful in recruiting and enrolling women in this study (n=5) resulting in an efficiency ratio of 23% (number of women found eligible

divided by the number contacted) and 41.7% (number of women assessed divided by the number of women screened for eligibility), respectively.

For the larger study, increasing the number of sites in the community to speak with potential participants (Charles Drew Health Center, clinics, Urban League, The Office of Minority Affairs, beauty supply stores, daycares, and beauty/barber shops), increasing utilization of networking contacts (African American female public health nurses), attendance at health fairs at area churches and in the community, and more frequent face to face screenings in the community would yield greater numbers of potential participants for enrollment in the study.

Three out of five participants were late for the scheduled assessments despite email and/or telephone reminders prior to the assessment date and two re-scheduled their assessment times due to other commitments. One potential strategy for reminding participants about the assessment date is printing the study and contact information in bold letters on brightly colored paper and given to the women to serve as reminders. The majority of the women requested a 5:00 pm appointment time during the week. However, the multi-purpose room at the YMCA where the assessments were completed had previously scheduled exercise classes held Monday through Friday from 5:30 to 6:30 pm and again at 7:15 pm (Saturday and Sunday the room was available after 12:30 pm). Upon the request of YMCA administrators, all assessments were to be scheduled during times prior to or after exercise classes held in the multi-purpose room. This limited the times available to participants to come in to complete the assessments. Therefore, additional and/or alternate assessment sites were identified (e.g., UNMC's Multi-cultural center or the Women's Center in North Omaha) to avoid assessment delays and increase the number of dates and times available to schedule appointments. The time taken to conduct the assessments averaged from 30 to 45 minutes in length. This time depended largely upon walk times and the amount of time taken to complete the surveys. None of the women assessed required physician approval.

In relation to the survey questionnaires tested, the Exercise Barriers Scale and the Social Support Scales were used to measure the behavior-specific influences. Participants reported moderate levels of barriers to exercise and moderate levels of support for exercise from family and friends. These scales were also used in the dissertation study. The Behavioral Risk Factor Surveillance System (BRFSS) 2011 questionnaire was used to measure PA. The majority of weekly activity minutes were spent engaged in moderate intensity activities as compared to vigorous intensity activities (M 325.0; SD = 0.71 versus M 60.0, SD = 0.45). Because this questionnaire does not capture physical activity in a variety of specific behavioral domains (e.g., work activity, household activity), it was decided to replace the BRFSS with the International Physical Activity Questionnaire (IPAQ) for the dissertation study (Booth, 2000; www.ipaq.se). The average number of seconds taken to complete the 400-meter walk test was less for the second walk test versus the first walk test (245.30 versus 254.00 seconds) and may be attributed largely to learning effects. Although the women were able to perform the second walk test in a more timely manner the second time, because of the additional time required for the test, and to reduce participant burden while including an objective measure of physical fitness in the dissertation, it was decided to have participants complete one 400-meter walk test.

Finally, because of recent literature findings that cost and time constraints to maintain hair styles in African American women are major barriers to exercise, six additional barrier items were added to the barriers tool. They are, “Exercise makes me sweat”, “I do not exercise because it messes up my hairstyle”, I do not exercise very hard because I am concerned about messing up my hair”, “I do not have a lot of time to style my hair after exercise”, “There are no easy ways to maintain my hairstyle after exercise”, “Women who exercise often do not have attractive hair”.

Dissertation Study Methods

Design

A descriptive correlational design was used to examine the health promoting influences of perceived barriers and interpersonal support from family and friends on physical activity

behavioral markers and biomarkers and to assess for relationships between physical activity behavioral and biomarkers with personal factors (systolic and diastolic blood pressure, BMI, and waist circumference) in African American women. This type of design is used when examining relationships that exist in a given situation (Burns, Grove, & Grey, 2012).

Sample

A convenience sample of prehypertensive and stage I hypertensive African American women was used. Potential participants met the following inclusion criteria: 1) African American race/ethnicity; 2) female; 3) blood pressure fell within the prehypertensive range (systolic blood pressure 120 to 139 mmHg or diastolic blood pressure 80 to 89 mmHg) or stage I hypertensive range (systolic blood pressure 140 to 159 mmHg or diastolic blood pressure 90 to 99 mmHg; 4) ≥19 years of age; 5) a BMI ≤ 50 kg/m2; and 6) answered "no" to all questions on the Physical Activity Readiness-Questionnaire (PAR-Q) or obtained physician approval to participate in the physical activity assessment. The one exception to all "yes" responses on the PAR-Q was that women could be taking blood pressure medication and still be in the study. The age requirement for eligibility was wide-ranging (≥ 19 years of age) to best capture a sample of prehypertensive and stage I hypertensive African American women. The exclusion criterion was if the woman self-reported that she was pregnant.

Sample Size

A medium effect size of 0.3 for correlations (Cohen, 1988) was used in the power analysis to estimate the sample size. The power analysis was conducted using the G*Power 3 statistical program resulting in a total sample size of 47 participants. Two-sided alpha was set at .05 and power at .80 for Pearson correlations (Burns, et al., 2012). The PI planned to recruit and consent 58 women to ensure assessment of the targeted sample size of 47 participants.

Sample and Setting

The PI pursued multiple sites (N = 25 sites) for recruitment in North Omaha where residents are primarily African American. Recruitment took place at the UNMC research office in

North Omaha, community health centers (Senior Citizens), clinics (Charles Drew Health Cener/Omaha Housing Authority), the Urban League, beauty shops, and churches in North Omaha. Multiple recruitment strategies were used to obtain the target sample size (e.g., face to face, word of mouth, snowballing, posting flyers). Participants were approached one-on-one in their recruitment site and informed about the study. If they expressed interest in the study, they were taken to a private area of the center and were provided with informed consent and pre-screening activities. The PI conducted assessments in a private room to maintain participant privacy.

Pre-screening. Potential participants were first pre-screened and were required to meet the inclusion and exclusion criteria outlined above.

Screening. Individuals that called the telephone number or email address provided on the research fliers were pre-screened by phone to determine eligibility (Appendix A-1). To assess for readiness to engage in physical activity, the Physical Activity Readiness Questionnaire (PAR-Q) was administered (Appendix A-1, A-2). If a woman answered "yes" to any of the seven items on the PAR-Q, was not eligible for participation until physician approval was obtained. The PI provided these women with a medical clearance document to be signed by their primary care physicians before being allowed to participate (Appendix A-3). If pre-screening eligibility was met and/or physician clearance obtained, an assessment date was scheduled to determine if the potential participant was prehypertensive or stage I hypertensive. Once hypertensive status was confirmed (prior to data collection), those individuals were invited to participate in the study and data gathered. Assessment dates and times were scheduled in person or by phone at times convenient for the participant to complete survey questionnaires and the physical assessments.

If found eligible to participate in the study, the PI reviewed the consent form with the potential participant and any questions about the study were addressed. Eligible participants received a $10 stipend at the completion of the assessments. Those individuals meeting inclusion criteria signed and dated the informed consent approved by the University of Nebraska Medical

Center's Institutional Review Board prior to beginning the assessments in a separate area to maintain privacy. IRB approval for this study was obtained at the University of Nebraska Medical Center.

Instruments

Demographic data

Participants completed questionnaires assessing personal information (Appendix B-1) and a brief health history (Appendix B-2). Questions asked included their marital status, level of education, income and specific or potential health problems (e.g., diabetes or high blood sugar).

Personal Factors

Resting heart rate was assessed by palpation method for 60 seconds following 5 to 10 minutes of sitting. Participants were instructed to sit without moving or speaking with hands facing down on their laps and feet flat on the floor (Appendix B-4). Systolic and diastolic blood pressure were measured using a latex free aneroid sphygmomanometer (Prosphyg 760-11ABK Adult, Prosphyg 775-12XN Large Adult) and standardized ausculatory methods (American College of Sports Medicine [ACSM], 2006; Heyward & Gibson, 2014). To obtain an accurate measure of blood pressure, the women were instructed to avoid caffeine, physical activity, and smoking for at least 30 minutes prior to the assessments. The upper arm circumference of individuals pre-screened and study participants were measured in centimeters. To avoid measurement error (over- or under-estimation), the appropriate cuff size (small adult, adult, or large adult) was used to accurately measure blood pressure (Heyward & Gibson, 2014; Perloff et al., 1993; Pickering, 2005; Prineas, 1991; Williams, 2009). The blood pressure value used for analysis was the average of two measures taken at rest (Appendix B-4).

Waist circumference to assess participant risk for cardiovascular disease (Lemieux, Prud'homme, Bouchard, Tremblay, & Despres, 1996) was measured in centimeters (Appendix B-5). A tape measure was placed horizontally around the abdomen at the iliac crest without

compressing the skin. Measures were taken at the end of normal expiration until two readings were within 0.5 cm (National Institutes of Health [NIH], 2000).

Physical Functioning

An objective of PA was the 400-meter long distance corridor walk test. Participants were asked to walk 400 meters as fast as they comfortably (briskly) could maintain and were timed with use of a stopwatch. The women began each lap at the 'start' line, walked 20 meters in a straight line pivoting at the 20-meter marker (tape was used to indicate the pivot point) then returned to the 'start' position. To reduce the risk for injury, the women began with a self-paced 40-meter warm up walk. A post-walk heart rate was taken immediately after completion of the 400-meter walk for a 15 second count. High test-retest reproducibility (ICC = 0.95) has been found for the 400-meter walk test (Pettee Gabriel et al., 2010). Participants completed one walk test as an objective measure of physical activity. For safety, the women were instructed to stop the test if she felt she was unable to continue the walk test (Appendix B-6).

To assess intensity levels of the walk test, perceived exertion was estimated using Borg's Perceived Exertion Scale (Appendix B-6). Immediately after completing the walk test, participants were asked to rate on a scale of 6 ("no exertion at all") to 20 ("maximal exertion") how difficult they felt the work of completing the walk was. The women were instructed to combine all sensations of stress, effort, and fatigue when rating their exertion (Borg, 1998).

Behavioral Outcomes

Physical Activity Behavioral Markers

The International Physical Activity Questionnaire (IPAQ) provided a comprehensive assessment of physical activity and was deemed to be appropriate for African American women (Wolin, Heil, Askew, Matthews, & Bennett, 2008; Wolin, Fagin, Ufere, Tuchman, & Bennett, 2010) (see Appendix B-10). The 27-item questionnaire (long form) asks questions regarding time spent being physically active in the last 7 days. An example is "During the last 7 days, on how many days did you do moderate activities like carrying light loads, sweeping, washing windows,

scrubbing floors and sweeping inside your home for at least 10 minutes?" and "How much time [hours per day and minutes per day] did you usually spend on one of those days doing moderate physical activities inside your home" (Craig, Ainsworth, Booth, Pratt, Sjostrom, et al., 2000).

The IPAQ assesses physical activity over four PA domains and total physical activity (Craig, et al., 2000). These include leisure time PA, domestic activity (e.g., household and yard), work-related activity, and transportation related activity. In each of these domains, walking, moderate, and vigorous intensity activities are assessed allowing researchers to determine domain specific activity and a total activity score in terms of duration or minutes per week. Physical activity intensity can be calculated as the Metabolic Equivalent Task or MET minutes per week. The assigned MET values for walking, moderate, and vigorous activity can be found in Table 1. These were the MET values used to calculate MET minutes/week in each domain of PA.

Table 1.

MET Values Assigned to each Self-reported Physical Activity Domain

Activity domain	Self-reported pace	MET estimate
Work-related activity	Vigorous intensity	8.0
	Moderate intensity	4.0
	Walking	3.3
Transportation	Walking	3.3
	Bicycling	6.0
Housework	Vigorous yardwork	5.5
	Moderate yardwork	4.0
	Moderate household activity	3.0
Leisure-time activity	Walking	3.3
	Moderate activities	4.0
	Vigorous activities	8.0

Note. MET values identified for use of the IPAQ.

Reliability and validity has been established for the IPAQ using a diverse, 12-country sample of predominantly middle-aged men and women. Test-retest reliability (Spearman correlation coefficient) for the long IPAQ questionnaires was 0.80 (0.96 for the USA) indicating good repeatability. Criterion validity of the IPAQ against accelerometers (worn for 7 days) for the

long form (pooled) was 0.33 (95% CI 0.26 – 0.39) indicating fair to moderate validity (Craig et al., 2003).

Exercise Barriers Scale

Perceived barriers for physical activity was conceptualized as anything that impedes taking action and operationalized using the 14-item Exercise Barriers Scale (Sechrist, Walker, & Pender, 1987). The instrument measures perceived barriers to exercise with a 4-point Likert scale ranging from 4 (strongly agree) to 1 (strongly disagree). Scores for the barriers scale ranges from 14 to 56 (low barriers to high barriers). An example of a barriers question is, "Exercise tires me". The scale developers have established validity and reliability for the measurement tool. Internal consistency estimated by Cronbach's alpha is 0.86 for the 14-item barriers scale and test-retest reliability was 0.77 (Appendix B-8). For a new measurement tool, a reliability of .70 is considered adequate (Burns et al., 2012). For the dissertation study, six new physical activity barrier items were added, based upon the literature, to capture physical activity barriers specific to African American women (Appendix B-8). The six new barrier questions include, "Exercise makes me sweat", "I do not exercise because it messes up my hairstyle", "I do not exercise very hard because I am concerned about messing up my hair", "I do not have a lot of time to style my hair after exercise", "There are no easy ways to maintain my hairstyle after exercise", and "My hair style is more important than my exercise". Participants responded using the 4-point Likert scale for the Exercise Barriers Scale with higher scores denoting greater perceived barriers to PA.

Social Support for Exercise

Social support for physical activity from family and friends was assessed using the surveys developed by Sallis et al. (1987) and adapted for this study (see Appendix B-9). Four variables were generated to measure social support for PA: 1) family positive support; 2) friend positive support; 3) family negative support, and 4) friend negative support. The instruments measuring positive aspects of social support were Family Support for Exercise Habits Scale and the Friend Support for Exercise Habits Scale (Sallis et al., 1987). The Family Support for

Exercise Scale is a 10-item scale that measures the family's participation and involvement in exercise. Example items are: "exercised with me," and "gave me encouragement to stick with my exercise program." Because we were interested in determining if the amount of support for physical activity is greater from family or friends, the scale was adapted in this study to include the same items to measure support from friends as well. Thus, there were 10 items measuring the frequency of social support for exercise from both family and from friends. Items are measured on a 5-point Likert scale from 1 (none) to 5 (very often). Scores are summed and total scores can range from 10 to 50 with higher scores denoting greater frequency of social support for exercise. For this study, family was defined as anyone living in the same household as the study participant. Friends were defined as friends, acquaintances, coworkers or family not living in the same household as the participant. Adequate construct validity, test-retest reliability (range, r=0.55-0.86) and internal consistency reliability for family (0.76) and friends (0.69) have been established by the developers of the scale (Calfas, Sallis, Oldenburg, & French, 1997; Sallis et al., 1987). Walker, Hertzog, Boeckner, and Hageman (2006) found that Cronbach alphas were satisfactory for the family (0.90) and friend (0.91) scales in a sample of older women.

Negative or problematic support for exercise was also examined to determine how unsupportive comments are related to PA behavior. In Sallis' (1987) original measure, there were only two items that measured negative support (got angry at me for exercising and criticized me or made fun of me for exercising). Thus, five additional negative items were added to the survey based on the literature review (see questions 3, 7, 9-11, 13 and 20). An example of a new negative support item is, "During the past 3 months, my family or friends became annoyed when I didn't accept their advice about exercising". Thus, there were 7 items measuring the frequency of negative social support for exercise from both family and from friends. Items were measured on a 5-point Likert scale from 1 (none) to 5 (very often). Scores were summed and total scores can range from 7 to 35 with higher scores denoting greater frequency of negative support for

exercise. Cronbach alphas for all four scales were computed to determine the reliability of these new subscales (see results chapter).

Procedures

Study outcome measures (physical activity behavioral markers and biomarkers) were administered by the PI in the following order at the various sites:

1) Height (inches)
2) Weight (pounds)
3) BMI (kg/m^2)
4) Waist circumference (inches)
5) Resting Heart Rate (beats per minute)
6) Blood pressure (systolic/diastolic in mmHg)
7) Survey questionnaires - Personal data form, Brief health history, Prior Barriers to Physical Activity, Exercise Barriers Scale, Social Support for Exercise Survey, International Physical Activity Questionnaire
8) 400 meter Walk Test (seconds)
9) Borg rate of perceived exertion scale

Women eligible for participation who failed to come into the research community site following 3 attempts by the PI to contact her by phone or email were not enrolled in the study.

Data Analysis

The IBM SPSS statistical package (v. 22) was used to analyze the data. Prior to conducting the data analysis, data were examined for normality and outliers. If outliers were identified, data were inspected for data entry errors or extreme values from unusual cases. If data were non-normal, transformations of the data were explored. Because transformations did not resolve the normality issues, non-parametric statistics (Spearman's correlations) were used to analyze the data. The level of significance for the study was $p < .05$. However, because of the small sample size, effect sizes (ES) were also used to aid in interpreting the correlations obtained. The effect sizes that were used are the same as the ones used for interpreting Pearson correlations: small = 0.10, medium = 0.30, and large = 0.50 (Cohen, 1992).

The plan for data analysis for each aim was as follows. The purpose of aim 1 was to describe the PA behaviors and PA biomarkers of African American women. Measures of central tendency, both means and standard deviations and medians and interquartile ranges, were used to

describe the PA behaviors (work-related activity, transportation activity, leisure-time activity, household activity, and total time across all domains) and PA biomarkers (400 meter walk test and rating of perceived exertion) of this sample.

The purpose of aim 2 was to examine the relationships among personal factors (systolic and diastolic BP, BMI and waist circumference) and PA behavioral markers (4 domains of PA and total PA) and PA biomarkers (400 m WT and RPE). Spearman correlations were used to examine the relationships among the variables and effect sizes (ES) were used to aid in interpreting the correlations obtained.

The purpose of aim 3 was to examine the relationships between behavior specific influences (perceived barriers and interpersonal influences [family and friend positive and negative social support]) and PA behavioral markers and biomarkers. Similarly as for aim 2, Spearman correlations were used to examine the relationships among the variables. Also, ES were used to aid in interpreting the correlations obtained.

The purpose of aim 4 was to examine the relationships between self-reported PA behavioral markers (4 domains of activity and total activity) and PA biomarkers (400 m WT and RPE). Spearman correlations were used to examine the relationships among the variables and ES were used to aid in interpreting the correlations obtained.

Human Subjects

The proposed research study presents minimal risk to participants (use of survey and physical assessments) and therefore, falls under the expedited category. Institutional Review Board approval was obtained for the study (see Appendix D-2). All data obtained were recorded using random numbers to avoid identification of human subjects directly or indirectly. Research data and participants' personal information was stored in a locked cabinet at Clarkson College with access available to the PI only. All data gathered were specifically for use for this research study. The information provided from implementation of this study will be published in aggregate

form in scientific journals and presented at scientific meetings with the personal identities of participants kept confidential.

Risks to the subjects were considered no minimal; that is, the probability of harm is not greater than that ordinarily encountered in daily life or during the performance of routine physical testing. Participants were able to take breaks during the assessments as necessary. Potential benefits to the subject with implementation of this proposed study was a physical assessment at no charge, knowledge of their current health status, and an increased awareness of healthy living for cardiovascular disease prevention including higher than normal blood pressure. Knowledge gained from the proposed study provided preliminary data for development of effective interventions to reduce risk for development of cardiovascular disease and progression to stage I or stage II hypertension among African American women. This pilot study increased nursing knowledge regarding physical activity behaviors among women, specifically prehypertensive and stage I hypertension African Americans in whom little is known regarding lifestyle behaviors engaged in specifically for reducing higher than normal blood pressure.

The benefits of the proposed study to participants and nursing knowledge outweighed potential risks by providing significant health information to the participant and insight into the physical activity behaviors of African American women.

Chapter IV

RESULTS

This chapter summarizes the descriptive characteristics of the sample including the demographic characteristics, health history and prior barriers to PA, and the main study variables (blood pressure, 400 meter walk test, barriers to PA, social support for PA) including the reliability of the study measures for these women. This is followed by the results of the study in relation to each of the study aims.

The demographic characteristics of the sample can be found in Table 2. There were 47 African American women who comprised the final sample for this study. The average age of the participants was 49 years (SD = 14.04), ranging from 23 to 71 years of age. The majority of the participants were single (n=33, 70%), unemployed or retired (n=27, 57%), had annual incomes <$20,000 (n=34, 72%), and had attended some college or were college graduates (n=24, 51%). Although the majority of the sample was single, they lived with other persons (M = 2.2, SD = 1.5) identified as a husband/partner or other family members (n=25, 53%).

The characteristics of the participants' blood pressure, BMI, and other physiological study variables can be found in Table 3. The average BMI was 32.2 kg/m^2 which places them in the obese category. Average waist circumference was 39.2 inches. The average systolic/diastolic blood pressure was 136/86. The blood pressure for the majority of the women (55%) fell into the Stage I hypertensive range (140-159/90-99); the blood pressure for the remaining women (45%) fell into the prehypertensive range (120-139/80-89). Although all of the women in this study were either prehypertensive or hypertensive based on BP readings, only 36% percent (n=17) of the women had actually been diagnosed with hypertension. The majority of the diagnosed women (n=14, 82%) reported taking blood pressure medication but less than half of these women could recall the name of medication taken. Because there was disagreement between the

diagnosis of hypertension and the actual BP readings, further comparison was done between those with and without the diagnosis of high BP.

Table 2.

Demographic Characteristics of the African American Female Sample (N = 47)

Characteristic	Mean (SD, Range)
Age (in years)	49 (14, 23-71)
# of people living in household	2.2 (1.5, 1-7)
	N (%)
Current marital status	
Married/partnered	14 (30%)
Single/divorced/widowed	33 (70%)
Living arrangements	
Live with others (husband, family)	25 (53%)
Live alone	22 (47%)
Work status	
Yes	20 (43%)
No (retired or unemployed)	27 (57%)
Income	
< $10,000	25 (53%)
$10,000-19,999	9 (19%)
$20,000-40,000	7 (15%)
> $40,000	6 (13%)
Education	
< High School	15 (32%)
High School graduate	8 (17%)
Some college	16 (34%)
College graduate or higher	8 (17%)

Table 3.

Descriptive Statistics of Blood Pressure and other Main Study Variables (N=47)

Variable	Mean (SD, Range)
Systolic BP	136.0 (11.9, 114-158)
Diastolic BP	86.0 (7.6, 70-99)
Resting heart rate	66 (7.6, 58-98)
Weight (lbs)	186.0 (46.7, 99-302)
BMI	32.2 (8.1, 17-50)
Waist Circumference (inches)	39.2 (6.5, 25-50)
	Frequency (%)
Women diagnosed with hypertension	17 (36%)
Of those women diagnosed, how many were taking BP medication	14 (82%)
Blood pressure levels by auscultation	
Women with prehypertension (120-139/80-89 mmHg)	21 (45%)
Women with Stage I Hypertension (140-159/90-99)	26 (55%)
BMI Weight category	
Normal (18.5-24.9)	6 (13%)
Overweight (BMI = 25-29.9)	13 (28%)
Obese (BMI $\geq$ 30)	28 (60%)

There was a significant difference between women's BP level based on auscultation and the actual diagnosis of hypertension (χ^2 [df = 1] = 4.821, p = .028) (see Table 4). Of those women with prehypertensive BP readings (n=21), 19% were diagnosed with hypertension and 81% had not yet been diagnosed with hypertension. Overall, only 14 (67%) with prehypertension had been told by a health care professional that they had higher than normal blood pressure. Of those with Stage I hypertension BP readings (n=26), 50% had been diagnosed and 50% had not been diagnosed. Overall, 18 (69%) with stage I hypertension had been told by a health care professional that they had higher than normal blood pressure.

Table 4.

Comparison of Women Diagnosed with Hypertension vs. Actual Blood Pressure Levels by Auscultation

	BP readings by Auscultation		
	Prehypertension range 120-139/80-89 mmHg	Stage I hypertension range 140-159/90-99 mmHg	
Diagnosis of hypertension	Frequency (%)	Frequency (%)	Total Frequency
No	17 (81%)	13 (50%)	30
Yes	4 (19%)	13 (50%)	17
Total Frequency	21	26	47

The health history of the sample can be found in Table 5. The table depicts those women who responded with a "yes" for having been told by a physician or other healthcare professional that they have the health problem or potential health problem. It is important to note that a "yes" response does not confirm an actual diagnosis of the health problem. The average number of self-reported health problems was 3.2 (SD = 1.5, Range 1 – 8). The majority of the women responded that they had been told by a physician or other professional that they have: higher than normal blood pressure (n=32, 68%), were overweight or obese (n=27, 57%), had arthritis (n=15, 32%), or had diabetes (n=11, 23%). Few reported a history of coronary heart disease (n=3, 6%), stroke (n=2, 4%), or heart attack (n=1, 2%).

Table 5.

Health History of African American Women in Rank Order of Occurrence (N=47)

Variable	N (%)
High blood pressure	32 (68%)
Overweight/obese	27 (57%)
Arthritis	15 (32%)
Diabetes	11 (23%)
Asthma	10 (21%)
Coronary heart disease	3 (6%)
Stroke	2 (4%)
Broken hip	2 (4%)
Breast cancer	2 (4%)
Cancer of the colon or bowel	2 (4%)
Heart attack	1 (2%)

Note. Yes responses do not confirm an actual diagnosis of the health problem. Women were asked if they had ever been told by a physician or other healthcare professional that they have the health problem or potential health problem.

Women were also asked about their prior history of barriers (Appendix B-3) that may have contributed to being less physically active or not active at all as an adult (see Table 6). The primary barriers to PA in the past for these women were being too tired (n=24, 51%), lack of time (n=23, 49%), lack of motivation (n=21, 45%), job (n=15, 32%) and family responsibilities (n=14, 30%), and pain/discomfort with exercise (30%).

Table 6.

Past Barriers to PA in African American women (N=47)

Variable	Frequency (%)
Too tired	24 (51%)
No time	23 (49%)
Not motivated	21 (45%)
Job responsibilities	15 (32%)
Family responsibilities	14 (30%)
Pain/discomfort with exercise	14 (30%)
Increased body weight	11 (23%)
Costs	10 (21%)
Sweating	10 (21%)
Not interested in exercising	8 (17%)
Hair care/maintenance	8 (17%)
Illness/disease	8 (17%)
No support from family or friends	7 (15%)
Do not enjoy exercise	7 (15%)
Happy with current weight	7 (15%)
No safe place to exercise	3 (6%)
Child care not available	2 (4%)

The descriptive statistics and reliabilities for the main study variables of barriers to PA and social support for PA variables can be found in Table 7. All of the scales demonstrated acceptable internal consistency reliabilities (Cronbach alphas > .70) in this sample. On average, women reported moderate levels of barriers to PA. Moderate levels of barriers to PA were found for the Exercise Barriers Scale (e.g., lack of time, fatigue) as well as for the new 6-item barriers to PA scale developed for this study (e.g., sweating, maintain hairstyle) with items unique to African American women. Family and friend support for exercise was minimal with mean scores of 18-19 out of a total possible range of 10-50. Likewise, family and friend negative support for exercise was also low with mean scores of 8-9 out of a total possible range of 7-35.

Table 7.

Descriptive Statistics of Barriers to PA and Social Support for PA

Variable	Mean (SD, Range)	Total possible Range	Cronbach's alpha reliability
Barriers to PA (14 items)	28.3 (6.2, 14-43)	14 - 56	0.85
PA Barriers unique to African American women (6 items)	11.7 (3.3, 6-19)	4 - 24	0.82
Family Support Scale for PA (10 items)	18.7 (7.6, 10-33)	10 - 50	0.89
Family Negative Support for PA (7 items)	8.6 (2.9, 7-21)	7 - 35	0.77
Friend Social Support for PA (10 items)	18.6 (8.4, 10-36)	10 - 50	0.89
Friend Negative Support for PA (7 items)	8.7 (3.2, 7-21)	7 - 35	0.76

PA = Physical Activity

Because 6 additional barrier items were developed for this study and are unique to African American women, these specific items were examined in more detail (see Table 8). Scores for "agree" and "strongly agree" were combined to get a percentage of women who perceived that this was a barrier for PA. "Exercise makes me sweat" was the major barrier reported for the vast majority of women in this study (72%). The remaining barriers addressed specific hair care/maintenance issues. In rank order of importance they were: "There are no easy ways to maintain my hair style after exercise" (19%), followed by "I do not exercise very hard because I am concerned about messing up my hair" (15%) and "I do not have a lot of time to style my hair after exercise" (15%), "I do not exercise because it messes up my hairstyle" (13%), and "My hair style is more important than my exercise" (9%).

Table 8.

Perceived Barriers to PA Specific to African American Women (N=47)

Perceived Barrier	N (%)
Exercise makes me sweat	34 (72%)
There are no easy ways to maintain my hair style after exercise	9 (19%)
I do not exercise very hard because I am concerned about messing up my hair	7 (15%)
I do not have a lot of time to style my hair after exercise	7 (15%)
I do not exercise because it messes up my hairstyle	6 (13%)
My hair style is more important than my exercise	4 (9%)

Results: Aim #1

The purpose of the first aim was to describe the PA behaviors and PA biomarkers in African American women. In aim 1.a, the levels of self-reported weekly PA, moderate intensity or greater, was examined in each of the following domains: leisure time, household activity, work-related activity, and transportation related activity. Weekly time spent in PA by domain is listed in Table 9. Based on the mean scores, the activity domain where the greatest amount of time was spent was in work-related activity (97.7 minutes/week), followed by transportation activity (87.6 minutes/week), household activity (67.9 minutes/week), and the least time was spent in leisure time activity (40.1 minutes/week). Because a substantial proportion of women were not engaging in any moderate or vigorous PA in each domain, the medians and interquartile ranges (IQR) were also examined. Based on the median, the activity domain where the greatest amount of time was spent was transportation activity.

Table 9.

Weekly Minutes of Current Physical Activity Behavior in African American Women (N=47)

Type of activity (in minutes)	Minutes/week Mean (SD, Range)	Women not engaged in any moderate or vigorous activity in this domain Frequency (%)	Median (Interquartile Range)
Work-related activity	97.7 (145.3, 0-420)	26 (55%)	0 (0 – 130)
Transportation activity	87.6 (82.3, 0-370)	25 (53%)	60 (30 - 140)
Household activity	67.9 (79.8, 0-290)	16 (34%)	30 (0 – 70)
Leisure-time activity	40.1 (44.1, 0-165)	17 (36%)	30 (0 – 70)
Total across all activities	293.3 (239.5, 0-1090)	6 (13%)	240 (140 – 340)

The next step was to multiply time spent in PA by MET values, as specified in the IPAQ manual, to calculate MET minutes/week. Based on mean scores, women reported the most MET min/week in relation to work related activities (M = 1791.0), followed by household activity (M = 588.4) (domestic and garden or yard), leisure time activity (M=583.3), and finally transportation related activity (M=487.6) (see Table 10). Based on median scores, women reported the most MET min/week in relation to leisure time activity, followed by household activity. In examining the mean MET minutes/week in all of these activities (M = 3450.0), the total time and intensity of activity equates to walking at 3 mph (3.3 METs) for 1045 minutes (or 17 hours) per week. The PA behavioral markers that were used in the remaining analyses in aims 2 and 3 were the total MET min/week in work-related, transportation, household, and leisure-time activities, and the total across all activities.

Table 10.

MET minutes/week of Current PA Behavior in African American Women (N=47)

Type of activity (in MET minutes)	MET minutes/week Mean (SD, Range)	MET minutes/week Median (IQR)
Work-related activity	1791 (3042.6, 0-10800)	0 (0-1890)
Transportation activity	487.6 (882.0, 0-4158)	0 (0-693)
Household activity	588.4 (180.0, 0-5555)	180 (0-795)
Leisure-time activity	583.3 (198.0, 0-5337)	198 (0-720)
Total across all activities	3450.3 (4341.3, 0-16539)	1689 (717-4158)

In aim 1.b, the levels of PA biomarkers (physical fitness [400 M Walk Test] and perceived exertion) were described. The results of the 400-meter walk test (PA biomarker) and perceived exertion of the 400-meter walk test can be found in Table 11. Only 40 women participated in the 400-meter walk test in the study. Fewer women were able to participate in this part of the study due to time and logistical constraints. The average time taken to complete the 400-meter walk test was 277.3 seconds (SD = 122.0), ranging from 154 to 840 seconds. The average perceived exertion rating was 11 (SD = 1.9; Range = 7-15). The post-walk heart rate averaged 100 beats per minute (bpm) (SD = 12.2, Range 76-146).

Table 11.

Levels of Physical Fitness as Measured by a 400-meter Walk Test in African American Women (N=40)

Variable	Mean (SD, Range)	Median (IQR)
400 meter walk test (seconds)	277.3 (121.6, 154-840)	252 (202 - 299)
Perceived exertion rating (Borg)	11 (1.9, 7-15)	11 (10 - 12)
Post walk test Heart Rate	100 (12.2, 76-146)	100 (92.5 – 107.3)

Results: Aim #2

The purpose of aim 2 was to examine the relationships among personal factors (systolic and diastolic BP, BMI and waist circumference) and PA behavioral markers and PA biomarkers. In aim 2a, the relationships between personal factors and PA behavioral markers was examined. These results are in Table 12. Spearman correlations were used to examine the relationships among the variables. Because of the small sample size, the same effect sizes that are used for Pearson correlations were used for interpreting effect sizes (ES): small = 0.10, medium = 0.30, and large = 0.50 (Cohen, 1992). None of the correlations were statistically significant. In relation to systolic BP, higher systolic BP was associated with more transportation activity (small ES), leisure time activity (small-medium ES), and total activity (small ES). Higher diastolic BP was associated with greater work-related activity (small ES), but less transportation activity (small-medium ES) and less leisure-time activity (small ES). Greater BMI was related to greater work-related activity and leisure time activity (small ESs) but less transportation (small ES) and household activity (small-medium ES). In relation to waist circumference, greater waist circumference was related to less transportation and household activity (small-medium ES).

Table 12.

Spearman Correlations among Personal Factors and PA Behavioral Markers and Biomarkers

	Physical Activity Behavioral Domains (MET minutes/week)				
Personal factors	Work-related activity	Transportation activity	Leisure-time activity	Household activity	Total of all activities
Systolic blood pressure	.04	.11	.23	.07	.16
Diastolic blood pressure	.12	-.18	-.12	.01	.05
BMI	.12	-.11	.10	-.19	-.01
Waist Circumference	.07	-.17	-.04	-.21	-.06

The purpose of aim 2b was to examine the relationships between personal factors (systolic and diastolic BP, BMI and waist circumference) and PA biomarkers (400 meter walk test, rating of perceived exertion). The results can be found in Table 13. Greater systolic BP was related to a higher rating of perceived exertion (small-medium ES). Lower diastolic BP was associated with longer time needed to complete the 400-meter walk test and a greater rating of perceived exertion (small ESs). Greater BMI was associated with longer time needed to complete the 400-meter walk test and a greater rating of perceived exertion (small-medium ESs). Similarly, greater waist circumference was associated with longer time needed to complete the 400 meter walk test (small-medium ES) and a significantly greater rating of perceived exertion ($\rho = .40$, $p=.012$).

Table 13.

Spearman Correlations among Personal Factors and PA Biomarkers

	PA Biomarkers	
Personal Factors	400 meter walk test	Perceived exertion rating (Borg scale)
Systolic blood pressure	.06	.23
Diastolic blood pressure	-.16	.18
BMI	.23	.25
Waist Circumference	.21	.40*

*p<.05

Results: Aim #3

The purpose of aim 3 was to examine the relationships between behavior specific influences (perceived barriers and interpersonal influences and PA behavioral markers and biomarkers. In aim 3a, the relationships between perceived barriers (Exercise Barriers and Barriers Unique to African American women) and social support (Family and Friend Positive

Support for PA and Family and Friend Negative Support for PA) and PA behavioral markers were examined. The results are included in Tables 14. More barriers to exercise were associated with less work-related activity, transportation activity (small ESs), household activity, and all activities (small-medium ES). More barriers unique to African American women were associated with less work-related activity (small ES), transportation (small-medium ES), household (small ES), and all activities (small-medium ES). Greater family support for PA was associated with more work-related activity (small ES) and leisure-time activity (small-medium ES). In addition, more Family Support for PA was related to both household activity and all activities (small ES). Greater friend support for PA was related to more work-related activity (small ES), leisure-time, household activity, and all activities (small-medium ESs). More family and friend negative support was related to more leisure-time activity (small ES).

Table 14.

Spearman Correlations among PA Behavioral Markers and Behavior Specific Influences

	PA Behavioral Markers (MET minutes/week)				
Behavior specific influences	Work-related activity	Transportation activity	Leisure-time activity	Household activity	All activities
Exercise Barriers Scale	-.13	-.14	-.04	-.24	-.22
Barriers Unique to African American women	-.14	-.26	-.05	-.15	-.21
Family Social Support for PA	.14	.03	.20	.17	.14
Friend Social Support for PA	.14	-.04	.26	.28	.22
Family Negative Support for PA	.09	-.13	.10	-.05	-.07
Friend Negative Support for PA	.04	-.04	.19	.03	-.06

In aim 3b, the relationships between perceived barriers (Exercise Barriers and Barriers Unique to African American women) and social support (Family and Friend Positive Support for PA and Family and Friend Negative Support) and PA biomarkers were examined. The results are reported in Table 15. More barriers to PA were associated with requiring more time to complete the 400-meter walk test and a higher rating of perceived exertion (small-med ESs). Neither the barriers unique to African American women or the family social support for PA were related to the PA biomarkers. More friend support for PA was associated with a greater rating or perceived exertion (small-med ES). More family negative support was associated with requiring less time to complete the 400 meter walk test (small ES) and a greater perceived exertion rating (small ES). Similarly, more friend negative support was associated with a greater perceived exertion rating (small ES).

Table 15.

Spearman Correlations among PA BioMarkers and Behavior Specific Influences

	PA Biomarkers	
Behavior specific influences	400 meter walk test	Rating of perceived exertion (Borg)
Exercise Barriers Scale	.20	.18
Barriers Unique to African American women	-.04	.01
Family Social Support for PA	.07	.05
Friend Social Support for PA	.09	.19
Family Negative Support for PA	-.14	.12
Friend Negative Support for PA	-.07	.13

Results: Aim #4

The purpose of aim 4 was to examine the relationships between self-reported PA behavioral markers and PA biomarkers (400 M Walk test and perceived exertion). These results can be found in Table 16. None of the relationships between the PA biomarkers and the PA behavioral markers were significant. In relation to the 400-meter walk test, there was a positive correlation between the 400-meter walk test and transportation activity (small ES) indicating that more time was required to complete the test with greater transportation activity. In contrast, more time needed to complete the 400-meter walk test was associated with less leisure-time (small ES) and household activities (medium ES). On the Borg scale, the participant's rating of their perceived exertion was lower if they were involved in more work-related activities (small ES). In contrast, perceived exertion ratings were higher with more household activities (small-med ES).

Table 16.

Spearman Correlations among PA Behavioral Markers and Biomarkers

	Physical Activity Behavioral Domains (MET minutes/week)				
Variable	Work-related activity	Transportation activity	Leisure-time activities	Household activities	All activities
400 meter walk test	-.03	.13	-.11	-.29	-.07
Borg rating of perceived exertion	-.13	-.06	.03	.23	.05

In conclusion, the African American women in this study were, on average, 49 years of age, single, not working/retired, with some college education, and annual incomes < $20,000. In addition, they had a waist circumference of 39 inches and fell into the obese category by BMI. The BP readings for 45% of the women fell into the "prehypertension" category and for the remaining 55% fell into the "Stage I hypertension" category. Only half of those women with Stage I hypertension BP readings had been diagnosed with hypertension.

Findings in relation to personal factors and PA behavioral markers and biomarkers were mixed. Systolic and diastolic BP were not consistently related to PA behavioral or biomarkers. Greater BMI was related to greater work-related activity and leisure time activity but less transportation and household activity. Greater BMI was associated with longer time needed to complete the 400-meter walk test and a greater rating of perceived exertion. Greater waist circumference was related to less transportation and household activity. Greater waist circumference was also associated with longer time needed to complete the 400-meter walk test and a significantly greater rating of perceived exertion.

Findings in relation to behavior-specific influences and PA behavioral markers and biomarkers were also mixed. More barriers to exercise were associated with less work-related, transportation, household activity, and all activities. More barriers unique to African American women were associated with less work-related activity, transportation, household, and all activities. The findings examining the relationships between family and friend support for PA and PA behavioral and biomarkers were mixed. Finally, few relationships were found between PA behavioral markers and PA biomarkers.

CHAPTER V

DISCUSSION

The objective of this dissertation was to determine the physical activity behaviors of prehypertensive and stage I hypertensive African American women. Previous research has shown that African American women engage in the least amount of routine physical activity than any other group of women regardless of race and recently less than some groups of men (Mozaffarian et al., 2015; Flegal et al., 2010). The overall findings were that the majority of this sample of African American women were not meeting the recommended amounts of physical activity for health benefits as outlined by the American College of Sports Medicine (2010). In this chapter, the research findings are discussed in relation to each of the specific aims. This is followed by the limitations of the study, the nursing implications of the findings, and suggestions for future research.

The African American women in this study were, on average, 49 years of age, single, unemployed or retired, with some college education, and annual incomes < $20,000. In addition, they had a waist circumference of 39 inches and fell into the obese category by BMI. The BP readings for about half of the women fell into the "prehypertension" category and the BP readings for the other half fell into the "Stage I hypertension" category. However, this was in disagreement with their actual diagnoses of hypertension. It was concerning that half of the women whose BP readings fell into the Stage I hypertension category had not been diagnosed with hypertension even though they had been told by a health care professional that they had high blood pressure. Similarly, the other 50% of women with Stage I hypertension had been diagnosed with high blood pressure and the majority were taking medication; however, their blood pressure was still elevated (140-159/90-99). The majority of the prehypertensive women had not been diagnosed with hypertension but the majority of them had been told by a health care professional that they had higher than normal blood pressure. These findings are in contrast to

the results from the Women's Health Initiative (Hsia et al., 2007) examining the prevalence of prehypertension and the risk for stroke and cardiovascular disease in 60,785 women. Hsai et al. (2007) found that 32% of African American women were prehypertensive but 87% of those prehypertensive were unaware of this classification. Although more of the women in this study were aware of having higher than normal BP, few were receiving adequate treatment for their BP. The prevalence of hypertension in African American women for 2009 to 2012 was 46.1 % and 30.1 % for Caucasian women (Mozaffarian et al., 2015). Equally significant is that fewer African American women have blood pressure levels that are controlled (55.9%) versus Caucasian women (58.7%) (Mozaffarian et al., 2015). It is unknown if the women in this study lacked a consistent health care provider to monitor and treat their blood pressure on a regular basis or if they lacked access to health care. Future studies need to investigate the relationships between access to health care and blood pressure diagnosis and management in addition to PA behaviors in African American women.

The women in this study were at risk for cardiovascular disease. Not only did they have prehypertension or Stage I hypertension, they were also on average obese with a waist circumference (M = 39) higher than what is recommended. In 2014, it was estimated that 82% of African American women were either overweight or obese (USDHHS, 2010a; Mozaffarian et al., 2015). In this study, 88% of the women were either overweight or obese thus demonstrating very similar rates to the national prevalence rates. For all women, waist circumferences $\geq$ 35 inches increases their risk for cardiovascular disease as compared to women with smaller waist measurement (NIDDK, 2008). African American women with a waist circumference $\geq$ 35 inches were found to have an increased death rate by 50% as compared to African American women with circumferences $\leq$ 35 inches (Boggs et al., 2011). Okosun et al. (2004) found that the risk for development of high blood pressure could be reduced with the prevention of abdominal obesity. Thus, weight loss programs are an intervention strategy, in addition to PA interventions, that need to be used with African American women to reduce their cardiovascular risk.

Aim #1: PA behavioral and physical functioning

The purpose of the first aim was to describe the PA behaviors markers and physical functioning of African American women. Results from the IPAQ revealed that African American women in this study spent the most time in work-related activity, followed by transportation activity, household activity, and finally leisure-time activity. Findings from previous studies support these findings in that African American women spend more time in household, occupational, or walking for transportation and less in leisure time activity (Cohen, Matthews, Signorello, Schlundt, Blot, & Buchowski, 2013; Evenson, Rosamond, Pereira, & Ainsworth, 2003).

It is likely that the women in this study overestimated the intensity of their PA levels. In examining the average MET minutes/week in all activities (M = 3450.0), the total time and intensity of activity equates to walking at 3 mph (3.3 METs) for 1045 minutes (or 17 hours) per week. This result was obtained regardless of the finding that substantial proportions of women in each PA domain (34-55%) were not engaging in any moderate or vigorous PA in that category. Although one of the advantages of measuring PA using the IPAQ is that it measures total physical activity in a variety of domains; however, one of the concerns about the IPAQ is the high PA estimates generated from the measure. In several studies using the IPAQ, approximately 75% of the sample met or exceeded the 600 MET minute/week level defined as 5 X 30 min of moderate intensity (150 min X 4 MET) activity -- the "public health recommendation" for PA (Ainsworth et al., 2006; Bauman et al., 2009; Guthold et al., 2008). In an earlier study examining over-reporting with the IPAQ, 40% of participants overestimated their moderate and vigorous PA and more than 67% over-reported their walking (Rzewnicki, Vanden Auweele, & De Bourdeaudhuij, 2003). These authors concluded that many individuals in the general population do not understand the IPAQ or the type of effort required for moderate or vigorous activities.

It is not clear why women in this study overestimated their PA levels. It may be because of the sensation of fatigue. Prior studies have found that individuals with greater sensations of

mental fatigue (experimental condition) did not exercise as hard as individuals in the control condition most likely due to an altered perception of effort (Brownsberger, Cook, Edwards, Crowther, & Cottrell, 2013). Marcora, Staiano, and Manning (2009) also found that mentally fatigued individuals rated perception of effort during exercise to be significantly higher compared with the control condition. In addition, this study found that mental fatigue limited exercise capacity in participants through greater perceived effort rather than cardiorespiratory mechanisms.

These same levels of activity were not found when using objective measures of PA. In a systematic review of self-reported versus objective measurement of PA (e.g., accelerometers, pedometers), 60% of respondents self-reported higher values of activity than what was measured by objective methods (Prince et al., 2008). Further, they found that, in men, self-reported PA was 44% greater than objective measures of PA and, in women, was 138% greater than objective measures of PA (Prince et al., 2008). Future studies in African American women would benefit from measuring PA using objective instruments such as an accelerometer or a physical activity monitor. A physical activity monitor may be ideal as it would also provide the participant with real time information about how active they are and what intensity their PA effort is.

The average time for the 400 meter walk test was 277 seconds with considerable variability in the range of scores ($\pm$ 121.6; range 154-840). The median score was 252 seconds (Range = 202-209). This mean score was similar to the mean score found by Pettee Gabriel et al. (2010) in their assessment of physical fitness in middle-aged women (Mean age = 52.6 years). Their mean score was 248 seconds for the first 400 m test and 245 seconds for the second test, one week later. Based on their walk times and other physical fitness measures, they rated their participants at below average to average fitness levels. Simonsick, Fan, and Fleg (2006) also used the 400 m walk test to estimate fitness in older adults (Mean age = 72 years) and found that women completed the test in 269 seconds. Thus, it appears that the women in the current study required about the same amount of time to complete the walk test than women of approximately

the same age in earlier studies (Pettee Gabriel et al., 2010). This would suggest that the women in this study were at an average level of fitness. They may have improved their time by completing the test on a second occasion which is a recommended option in the testing protocol (Pettee Gabriel et al., 2010).

In this study, the average rating of perceived exertion at the completion of the walk test was 11. Perceived exertion ratings are indicative of an individual's actual heart rate during activity. Borg (1998) found a high correlation between post walk heart rates and perceived exertion ratings times 10. A mean rating of 11 according to Borg (1998) indicates exertion that is "light". Perceived ratings of 13 are expected when exertion is at a moderate level or 50% to 70% of maximum heart rate (220 - age). The mean exertion rating of the women in this study suggested that the women were not working at a moderate intensity level (Borg, 1998). Similarly, the average heart rate at the completion of the walk test in the current study was 100 compared to 124 in Pettee Gabriel et al.'s (2010) study and 124 in Simonsick et al.'s (2006) study. Taken together, both of these findings suggested that either the women did not walk as briskly as they were able or their fitness levels were at or below average, or both. Future studies need to incorporate a second walk test or a submaximal treadmill-walking test to measure physical fitness in African American women.

Aim #2: Relationships between personal factors and PA behavioral markers and Physical Functioning

The purpose of this aim was to examine the relationships among personal factors (systolic and diastolic BP, BMI and waist circumference) and PA behavioral markers and PA biomarkers. Findings in relation to personal factors and PA behavioral markers and biomarkers were mixed. Systolic and diastolic BP were not consistently related to PA behavioral or biomarkers. Higher systolic BP was associated with more transportation activity, leisure-time activity, and total activity. Lower diastolic BP was associated with less work-related activity, but more transportation and leisure-time activity. Prior studies have found that physical activity has a

positive effect on lowering both systolic and diastolic blood pressure (Eckel, et al., 2013). Comprehensive reviews on physical activity and treatment of hypertension have found that physical activity can lower systolic blood pressure an average of 11 mm Hg and 8 mm Hg for diastolic blood pressure for all races/ethnicities (Hagberg et al., 2000; Oberg, 2007). The findings in this study may have been contradictory to prior research because of the women's overestimation of self-reported PA.

In examining the relationships between BP and PA biomarkers, higher exertion ratings on the 400-meter walk test were associated with greater systolic and diastolic BP. Because the 400 meter walk test is a measure of fitness, if women are less fit and require more time to complete the 400 meter walk test, they will rate their effort harder; and it is likely that their BP was also higher because of their lower fitness levels. In contrast, it was not clear why women needing more time to complete the 400-meter walk test also had lower diastolic BP. It may be due, in part, to the small sample size in the current study.

BMI and waist circumference were the two personal factors that were more consistently related to the domains of PA behavior and biomarkers, particularly PA biomarkers. Greater BMI was related to greater work-related activity and leisure time activity but less transportation and household activity. Greater waist circumference was related to less transportation and household activity. Greater BMI was associated with longer time needed to complete the 400-meter walk test and a greater rating of perceived exertion. Similarly, greater waist circumference was also associated with longer time needed to complete the 400-meter walk test and a significantly greater rating of perceived exertion.

Waist circumference is considered a risk factor for cardiovascular disease. On average, the women in this study were obese with a waist circumference that placed them at risk for cardiovascular disease. In Okosun et al.'s study (2004) examining the prevalence of prehypertension, nearly 72% percent of African American women had a waist circumference ≥ 35 inches, few exercised routinely, and the number of African American women with

prehypertension exceeded that of all other races including men (Okosun et al., 2004). They found that the risk for development of high blood pressure could be decreased with prevention of abdominal obesity. However, by 2020, an estimated 70% of African American women will be obese and 90% will have abdominal obesity (Boggs et al., 2011). Thus, treatment strategies are urgently needed to offset this epidemic of obesity in African American women.

Aim #3a: Relationships between exercise barriers and PA behavioral markers and Physical functioning

The purpose of aim 3a was to examine the relationships between behavior specific influences (barriers to and social support for PA) and PA behavioral markers and biomarkers. The African American women in this study reported moderate levels of barriers to PA on both the Exercise Barriers Scale (e.g., lack of time, fatigue) as well as on the new 6-item barriers to PA scale developed for this study (e.g., sweating, maintain hairstyle) measuring items unique to African American women. Women in the current study cited the following barriers that contributed to being less physically active or not active at all as an adult: too tired, no time, not motivated, job responsibilities, family responsibilities, and pain/discomfort with exercise. This history of barriers is support by findings from previous studies (Gletsu & Tovin, 2010; Siddiqi et al., 2011). Rimmer et al. (2010) examined 33 obese (Mean BMI=49.1 kg/m2) African American women at baseline in a study of barrier removal to increase physical activity levels. The most commonly cited environmental barriers were costs of an exercise program (66.7%), lack of transportation (48.5%), unknown location of neighborhood fitness centers (45.5%), and lack of neighborhood fitness facilities (45.5%). Personal barriers cited were pain (63.6%), don't know how to exercise (45.5%), health issues (39.4%), don't know where to exercise (39.4%), and fatigue (36.4%). However, time was a barrier for only 15.0% of participants. In the current study, 49% of women cited lack of time as a reason for being less physically active as an adult.

In this study, six items measuring barriers to PA specific to African American women were added to the barriers scale and were examined. Of these six items added, only one item,

"exercise makes me sweat" was a significant barrier for the majority of the women (72%). The other items focused on maintaining the hairstyle with PA were only important for 9-19% of the women. These findings are in contrast to earlier studies. Hall et al. (2013) found in a sample of 103 African American women aged 21 to 60 years they were 3 times less likely to engage in the recommended guidelines for physical activity due to hair care concerns. Previous studies have found that "sweating out [an expensive] hairstyle" as the PA barrier item most often mentioned (Brown, 2009; Gathers and Mahan, 2014; Hall, et al., 2013; Joseph, Ainsworth, Keller, & Dodgson, 2015). Hall et al. (2013) found African American women in higher income groups spent more money to maintain their hairstyles (e.g., relaxed or chemically straightened) in contrast to women with lower incomes who were likely to wear hairstyles that required significantly less to maintain (e.g., natural, braids). One possible reason for these differences between earlier studies and this study may be due to the fact that most of the women in this study were from a lower socioeconomic group with an annual income less than $20,000. Although women in this study had less money to spend on maintaining their hairstyle because of their lower incomes, prior studies have found that African American women in lower socioeconomic groups do not engage in more PA than women in higher socioeconomic groups (Hall et al., 2013). Thus, it is likely that there are additional factors of equal importance to this group of women that influence engagement in routine PA. More study is needed in this area.

Consistent inverse relationships were found in this study between barriers to exercise and work, transportation, household, and total activities. This suggests that exercise barriers and barriers unique to African American women interfered with physical activities in these domains. No correlations were found between barriers to exercise and leisure-time activities. This may be because women were not interested in engaging in leisure-time activity, or they just had no barriers in this domain. Similarly, exercise barriers were positively related to the 400 meter walk test and the perceived exertion rating. This suggests that women did more poorly on the 400 meter walk test and rated their exertion higher if they perceived more barriers to exercise. In

prior research, perceived barriers to PA, such as not enough time, inconvenience, or lack of transportation, have been the strongest and most consistent correlates of lower physical activity levels across studies (CDC, 2011e; 2011f; Joseph et al., 2015). Thus, because overcoming barriers appears to be an important mechanism by which African American women could become more active, interventions focused on these behavioral strategies are needed to increase PA behaviors in this population.

Aim #3b: Relationships between social support and PA behavioral markers and Physical functioning

Family and friend social support for exercise was minimal. The average score from both family and friends about the frequency of social support corresponded to "rarely" on the questionnaire. One of the goals of this study was to examine the amount of support from friends and family and to determine who was providing more support for PA. In this study, family and friends provided equal levels of support for PA. On the questionnaire, family was defined as anyone living in the household; friends were defined as friends, acquaintances coworkers, or family not living with you. Thus, participants may have rated support for some family members as family support and friend support. This needs to be clarified in future studies to better distinguish between family and friend support.

Although the average level of support from family and friends was fairly low, there were consistent positive relationships between PA behavioral markers and PA activities. PA behaviors were related to work activity, leisure-time activity, household activity and all activities. Correlations were strongest between family and friend support for PA with leisure time and household activities. Perhaps these women were getting together with their friends to exercise during their leisure time. Approximately 50% of the women were living with another family member and they may have engaged in household or gardening activities together as well. The only domain of activity that was unrelated to social support from family and friends was

transportation activity. The pattern of correlations between family and friend social support and PA biomarkers was mixed.

Social support for physical activity from family and friends has been consistently associated with engaging in routine physical activity (CDC, 2010). However, the majority of earlier studies examining social support for physical activity in African American women were qualitative in nature (Felton, Boyd, Bartoces, & Tavakoli, 2002; Nies et al., 1999; Thomas et al., 2009). These earlier studies found that social support for PA from family and having a friend to exercise with were found to be significant determinants across nine qualitative studies (Gletsu & Tovin, 2010). Thomas et al. (2009) found that supportive behaviors, thought to promote more physical activity in African American women, included having someone to exercise with and greater encouragement from family members or friends. Felton et al. (2002) found that 85% of African American women believed family and friends would be "proud" of their being more physically active, 74% were encouraged by family and friends to be physically active, and 55% had family or friends who were physically active. More quantitative studies are needed specifically examining who the best sources of support are for PA (friend, family, co-worker) and the type of social support (i.e., encouragement, tangible person to exercise with) that is associated with greater levels of PA behavior.

Family and friend negative support for exercise was very low in this study. Felton et al. (2002) found that 36% reported disapproval of family and friends for their spending time being physically active. Similarly, Thomas et al. (2009) found that avoidance of negative support (e.g., criticism) was believed to foster greater physical activity in African American women participating in a focus group. The findings for family and friend negative support for PA and PA behavioral markers and PA biomarkers were mixed with no clear cut pattern of relationships emerging. More studies are needed to better understand how negative support for PA is perceived by African American women and how it is related to PA behavior markers and PA biomarkers.

Aim #4: Relationships between PA behavioral markers and Physical functioning

The purpose of aim 4 was to examine the relationships between self-reported PA behavioral markers and PA biomarkers (400 M Walk test and perceived exertion). In relation to the 400 meter walk test, greater time required to complete the test was related to more transportation activity. In contrast, less time needed to complete the 400-meter walk test was associated with more leisure-time (small ES) and household activities (medium ES). Perhaps the activities these women performed during their leisure time and with household activities were of a higher intensity than that performed for transport activity which in turn improved their fitness performance on the 400-meter walk test.

On the Borg scale, the participant's rating of their perceived exertion was lower if they were involved in more work-related activities (small ES). In contrast, perceived exertion ratings were higher with more household activities (small-med ES).

Limitations

There were several limitations to this study. The primary limitation of the study was the small sample size and lack of sufficient power in many of the analyses to detect significant correlations. The ability to generalize results to all prehypertensive and stage I hypertensive African American women is limited by use of a convenience sample. Measurement of physical activity behavioral markers by self-report (questionnaires) may be biased by social desirability of response. Although the women were instructed to give the best description possible of their weekly physical activity, it is likely that they overestimated their self-report of PA. There were also fewer women who were willing to complete the 400-meter walk test reducing the sample size even more for aims examining the PA biomarkers. The study would have been strengthened by conducting a second walk test so that the women had a chance to improve their performance on the 400-meter walk test. The instructions for the social support questionnaire may have been confusing for participants in relation to the definition of family (within the household) and friends

(outside the household). Family members not living with the participant were included in the ratings of support from friends which may have altered the scores in an unknown way.

Implications for Research and Theory

The results of this study provided a greater understanding of cultural norms likely affecting PA behaviors in African American women. There are unique barriers to PA in African American women, including sweating during exercise and an expensive hairstyle that is difficult and costly to maintain, that has received minimal study in this population. The additional items measuring PA barriers unique to African American women in this study identified important culturally relevant barriers to PA that are not on existing Exercise Barriers scales. Participants in this study scored at a moderate level of barriers related to hair care and hair maintenance were major barriers for engaging in PA for AAW in this study as in previous studies (Gathers and Mahan, 2014; Hall, et al., 2013; Joseph et al., 2015). One additional barrier that was relevant to the majority of women in this study (exercise makes me sweat) needs to be asked directly in future studies—whether sweating out the hairstyle is a barrier to my exercise program. It is therefore necessary to address these barriers in future physical activity interventions for African American women.

The theoretical framework used for this study, the Health Promotion Model, appeared to be an appropriate framework in which to study PA behavior in this population. The model was supported by results from this study as personal factors, particularly BMI and waist circumference, were related to lower PA behaviors and PA biomarkers. Similarly, Exercise Barriers were found to be negatively related to PA behaviors and biomarkers and Family and Friend Social Support was found to be positively related to PA behaviors and biomarkers. Thus, the results of this study plus earlier studies (Edmonds, 2010; Anderson & Pullen, 2013) provide support for the use of the Health Promotion Model in which to examine PA behavior with a particular focus on personal factors, exercise barriers, and family and friend social support.

Recommendations for Future Research

Limited descriptive data are available identifying the specific physical activity behaviors of prehypertensive and stage I hypertensive African American women and those factors (e.g., barriers and interpersonal (social) support) most influential for health behavior change (Griffin, Wilson, Wilcox, Buck, & Ainsworth, 2008). Individuals of all ages who adopt a healthy lifestyle can improve blood pressure significantly (Mozzaffarian, et al., 2015; Egan, Lackland, & Jones, 2010). Future interventions need to focus on removing barriers to PA and improving social support for PA behavior.

Although these studies address barriers to physical activity for African American women few studies were found that addressed specific cultural barriers to PA for prehypertensive and stage I hypertensive African American women. Identifying the perceived barriers to physical activity common among African American women is significant for development of future interventions aimed at increasing physical activity levels and is a potential means to achieving optimal health. To better distinguish between family and friend support in future studies, the definition of family and friends needs to be considered. The definition of family and friends may be broader or different for African American women compared to other races or ethnic groups.

To improve the accuracy of estimates of PA using self report instruments, it is important to provide more examples of the types of activities that constitute moderate and vigorous intensity. Ainsworth, Caspersen, Matthews, Masse, Baranowski, and Zhu (2012) suggest methods for reducing overreporting of physical activity from self-report instruments that include determining the number of days needed in estimation of usual PA behavior and the domains of PA. Additionally, researchers should identify PA questionnaires that are able to assess true PA behavior. Lastly, PA questionnaires need to be identified that are appropriate for use in the targeted sample. The IPAQ was chosen as a means to comprehensively assess PA in this study to determine if AAW met PA guidelines for moderate levels of PA. It has been found to be a valid and reliable tool for assessing PA behavior in Black women in 5 domains (Joseph et al., 2015). The addition of an objective measure of PA, such as an accelerometer or a physical activity

monitor, would be of great benefit in future studies. Future studies need to incorporate a second walk test or a submaximal treadmill walking test to measure physical fitness in African American women.

In conclusion, this dissertation study was successful in its examination of the physical activity behaviors of prehypertensive and stage I hypertensive African American women residing in Omaha, NE. This study further bridges the gap in the literature regarding the behavior specific influences to engaging in routine PA by African American women. It is the hope of the PI that further study will address those areas as suggested in this study to further establish interventions to improve upon the amount of physical activity among African American women thereby reducing the current health disparities so plagued by these women in an effort to improve overall health outcomes.

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Appendix A-1

Qualified? YES_____ NO____ WHY NOT? _____

Need Medical Clearance? YES___ NO____

Consent form received/sent? YES_____ NO_____

DATE_____ SENT BY_____

ELIGIBILITY PHONE SCRIPT

Physical Activity Behaviors of Prehypertensive African American women

Interviewer _____

Time and Date of Call _____

Name _____ Phone #_____

Hello! My name is _____ and I am calling in response to your recent phone call stating interest in the prehypertensive African American women's study.

Is this a good time to call you?

If NO, say → When would be a good time to call you back? _____

If YES, continue

I would like to invite you to participate in a research study that will examine the physical activity behaviors of prehypertensive (blood pressure reading of 120 to 139/80 to 89 mmHg) African American women.

If you are interested, I have a few questions for you:

1. What is your racial background?

   a. Black or African American _____ Yes _____ No

   b. Other race _____ Yes _____ No (If yes, other race_____)

   - If other race, say
     Unfortunately, you are not eligible for this study. We are looking for people who meet strict requirements and, unfortunately, many of the people we speak with, like yourself, do not fit these requirements for the research project. Thank you for taking time to talk to me. That is all the questions I have for you. Thank you again.

2. What was your age on your last birthday? _____

3. What is your birthdate? (mm/dd/yyyy)_____

   - If not 25-59 (born before current day/month in 1951 [age = 60 +] or after current

day/month in 1986 [not yet 25]), say Unfortunately, only women between the ages of 25 and 59 are eligible for this study. Thank you for taking time to talk to me. That's all the questions I have for you. Thank you again.

- If 25 – 59, continue.

4. Do you live in Omaha, NE? _____

- If not, say
  Thank you for taking time to talk to me. We are looking for people who meet strict requirements and, unfortunately, many of the people we speak with, like yourself, do not fit these requirements for the research project. That is all the questions I have for you. Thank you again.

5. Are you currently taking blood pressure medicine?_____

If so, which one(s)?_____

- If yes, say
  Thank you for taking time to talk to me. We are looking for people who meet strict requirements and, unfortunately, many of the people we speak with, like yourself, do not fit these requirements for the research project. That is all the questions I have for you. Thank you again.

6. BMI (see chart next page) height (kg)/weight (m^2) = _____. Is BMI ≤ 50?

- If BMI is over 50, say "We are looking for people who meet strict requirements and, unfortunately, many of the people we speak with, like yourself, do not fit these requirements for the research project. Thank you for your interest."
- If BMI is ≤ 50, say "From the information you have given me, it appears you are eligible. The only way to be sure you are eligible based on BMI is to come to the research office and have your height and weight measured on our research scale."

If the woman agrees to come to the research office then say "I can schedule a time and day for you to come to the research office to have your BMI accurately measured or we can call and schedule it at your convenience."

If the woman does not agree to come to the research office say "Thank you for your interest."

Physical Activity Readiness Questionnaire

FOR THE INTERVIEWER: The women must respond to EACH question.

1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?

_____ Yes

_____ No

2. Do you feel pain in your chest when you do physical activity?

_____ Yes

_____ No

3. In the past month, have you had chest pain when you were not doing physical activity?

_____ Yes

_____ No

4. Do you lose your balance because of dizziness or do you ever lose consciousness?

_____ Yes

_____ No

5. Do you have a bone or joint problem that could be made worse by a change in your physical activity?

_____ Yes

_____ No

6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure?

_____ Yes

_____ No

7. Is your doctor currently prescribing drugs for a heart condition?

_____ Yes

_____ No

8. Do you know of any other reason why you should not do brisk walking?

_____ Yes

_____ No

- If ANY answer is YES, say
  In order for you to participate in the study, you will need to check with your primary healthcare provider before coming in for the scheduled appointment. The principle investigator will send you more information and a form to get signed by your healthcare provider that approves your participation in the study.

- If ALL answers are NO, say

With the information you have given me, you are eligible to participate if your blood pressure is in the prehypertensive range.

As a participant, you will be asked to come to the research office at UNMC's Student Life Center one time only to complete survey questionnaires and a physical fitness exam at no cost.

Contact Information

Let me get some specific information from you so that we can mail you a confirmation letter for your scheduled appointment and a consent form with more information about the research project. This contact information will not be used for any purpose other than this study.

NAME (Ask her to spell her first and last names if not clear)
_____

HOME ADDRESS

_____

_____

MAILING ADDRESS (if different from home address)
_____

_____

HOME (Repeat her telephone number) _____

WORK _____

CELL _____

Are there any other phone numbers you might be reached at if we need to get hold of you with questions or instructions?

_____ If Yes, Where? (family, friends, other) _____

PHONE NUMBER _____

_____ No, Home Phone Number Only

EMAIL ADDRESS_____

Let's determine what would be a good date and time for you to come in to the Butler-Gast YMCA for the assessments (Tell the women the dates and times available for the assessments then ask which would work best for her)?

Date_____

Time_____

Within the next 5 days you will receive a letter in the mail and a consent form with more details of the study. Please read the consent form carefully and bring it with you to your appointment. The principle investigator will go over it with you and ask you to sign it at that time.

FOR THE INTERVIEWER: If the recruit answered yes to any PARQ questions, remind her that she will need her physician's or health care professional's signature allowing her to participate in the research study. She must bring the signed letter to the scheduled appointment.

Inform the women to wear tennis shoes or comfortable walking shoes when coming in to the research office for the physical fitness assessment.

If you have any questions, you can contact the Principle Investigator, Hope Jackson at (402) 598-6191 or hjackson@unmc.edu.

Thank you and have a great day.

Body Mass Index Table

	Normal						Overweight					Obese										Extreme Obesity															
BMI	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**
Height (inches)	**Body Weight (pounds)**																																			
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379	386
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443

Source: Adapted from *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report.*

Appendix A-2

Qualified? YES_____ NO____ WHY NOT? _____

COMMUNITY ELIGIBILITY SCRIPT

Physical Activity Behaviors of Prehypertensive African American women

Interviewer _____

Time and Date _____

My name is _____ and I am a (graduate student/nursing student) at the University of Nebraska Medical Center College of Nursing/Clarkson college. We are looking to enroll prehypertensive (120/80 to 139/89 mmHg) African American women in a research study to find out about their physical activity behaviors.

If you are interested, I have a few questions for you:

1. What is your racial background?

   a. Black or African American _____ Yes _____ No

   b. Other race _____ Yes _____ No (If yes, other race_____)

   - If other race, say
     Unfortunately, you are not eligible for this study. We are looking for people who meet strict requirements and, unfortunately, many of the people we speak with, like yourself, do not fit these requirements for the research project. Thank you for taking time to talk to me. That is all the questions I have for you. Thank you again.

2. What was your age on your last birthday? _____

3. What is your birthdate? (mm/dd/yyyy)_____

   - If not 25-59 (born before current day/month in 1951 [age = 60 +] or after current day/month in 1986 [not yet 25]), say Unfortunately, only women between the ages of 25 and 59 are eligible for this study. Thank you for taking time to talk to me. That's all the questions I have for you. Thank you again.
   - If 25 – 59, continue.

4. Do you live in Omaha, NE? _____

   - If not, say
     Thank you for taking time to talk to me. We are looking for people who meet strict requirements and, unfortunately, many of the people we speak with, like yourself, do not fit these requirements for the research project. That is all the questions I have for you. Thank you again.

5. Are you currently taking blood pressure medicine?_____

If so, which one(s)?_____

- If yes, say
  Thank you for taking time to talk to me. We are looking for people who meet strict requirements and, unfortunately, many of the people we speak with, like yourself, do not fit these requirements for the research project. That is all the questions I have for you. Thank you again.

6. BMI (see chart next page) height (kg)/weight (m^2) = _____. Is BMI ≤ 50?

- If BMI is over 50, say "We are looking for people who meet strict requirements and, unfortunately, many of the people we speak with, like yourself, do not fit these requirements for the research project. Thank you for your interest."
- If BMI is ≤ 50, say "From the information you have given me, it appears you are eligible. The only way to be sure you are eligible based on BMI is to come to the research office and have your height and weight measured on our research scale."

If the woman agrees to come to the research office then say "I can schedule a time and day for you to come to the research office to have your BMI accurately measured or we can call and schedule it at your convenience."

If the woman does not agree to come to the research office say "Thank you for your interest."

Physical Activity Readiness Questionnaire

FOR THE INTERVIEWER: The women must respond to EACH question.

1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?

_____ Yes

_____ No

2. Do you feel pain in your chest when you do physical activity?

_____ Yes

_____ No

3. In the past month, have you had chest pain when you were not doing physical activity?

_____ Yes

_____ No

4. Do you lose your balance because of dizziness or do you ever lose consciousness?

_____ Yes

_____ No

5. Do you have a bone or joint problem that could be made worse by a change in your physical activity?

_____ Yes

_____ No

6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure?

_____ Yes

_____ No

7. Is your doctor currently prescribing drugs for a heart condition?

_____ Yes

_____ No

8. Do you know of any other reason why you should not do brisk walking?

_____ Yes

_____ No

- If ANY answer is YES, say
  In order for you to participate in the study, you will need to check with your primary healthcare provider before coming in for the scheduled appointment. The principle investigator will send you more information and a form to get signed by your healthcare provider that approves your participation in the study.

- If ALL answers are NO, say

If yes, to all questions, say

With the information you have given me, you are eligible to participate if your blood pressure is in the prehypertensive range.

To be certain that your blood pressure is in the prehypertensive range, I would like to take your blood pressure here.

First measure _____

Second measure _____

Average blood pressure _____

Contact Information

Let me get some specific information from you so that we can mail you a confirmation letter for the scheduled appointment and a consent form with more information about the research project. This contact information will not be used for any purpose other than this study.

NAME (Ask her to spell her first and last names if not clear)

_____

HOME ADDRESS

_____

_____

MAILING ADDRESS (if different from home address)

_____

_____

HOME (Repeat her telephone number) _____

WORK _____

CELL _____

Are there any other phone numbers you might be reached at if we need to get hold of you with questions or instructions?

_____ If Yes, Where? (family, friends, other) _____

PHONE NUMBER _____

_____ No, Home Phone Number Only

EMAIL ADDRESS_____

Let's determine what would be a good date and time for you to come in to the UNMC's Student Life Center for the assessments (Tell the women the dates and times available for the assessments then ask which would work best for her)?

Date_____

Time_____

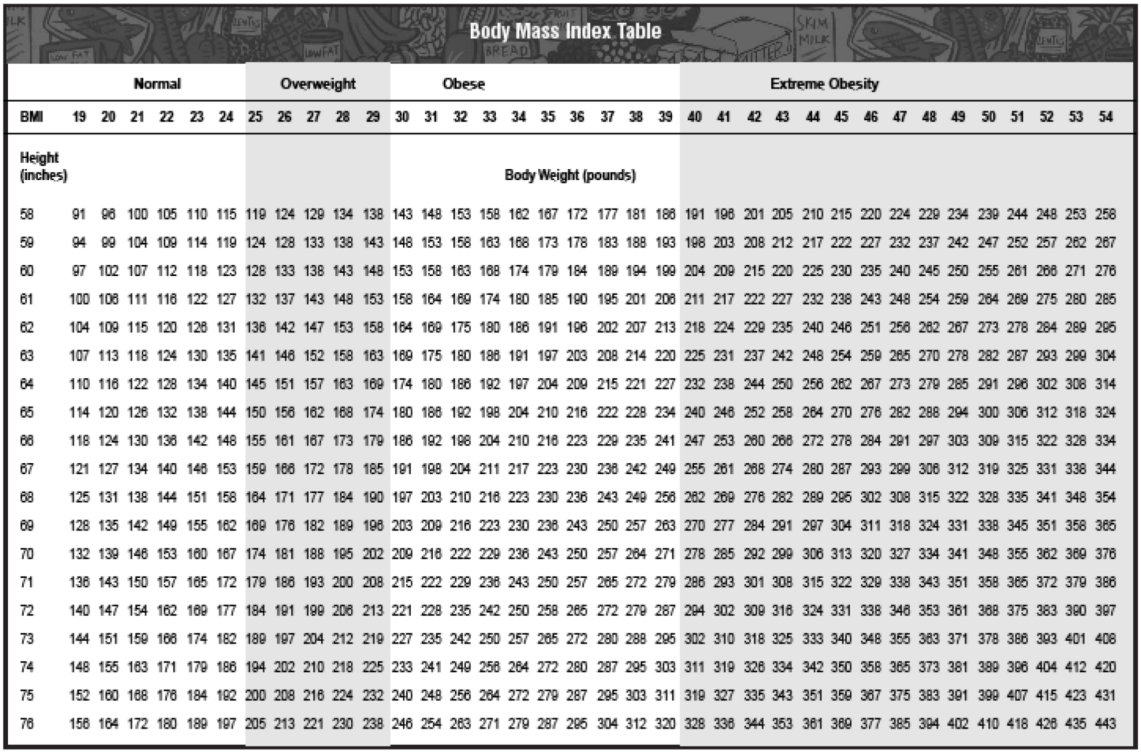
Within the next 5 days you will receive a letter in the mail and a consent form with more details of the study. Please read the consent form carefully and bring it with you to your appointment. The principle investigator will go over it with you and ask you to sign it at that time.

FOR THE INTERVIEWER: If the recruit answered yes to any PARQ questions, remind her that she will need her physician's or health care professional's signature allowing her to participate in the research study. She must bring the signed letter to the scheduled appointment.

Inform the women to wear tennis shoes or comfortable walking shoes when coming in to the research office for the physical fitness assessment.

If you have any questions, you can contact the Principle Investigator, Hope Jackson at (402) 598-6191 or hjackson@unmc.edu.

Thank you and have a great day.



Body Mass Index Table

	Normal						Overweight					Obese									Extreme Obesity																			
BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Height (inches)	**Body Weight (pounds)**																																						
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250	257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379	386
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443

Source: Adapted from *Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults: The Evidence Report.*

Appendix A-3

Dear Doctor:

_____has expressed interest in participating in a research project that will examine the Physical Activity Behaviors of Prehypertensive African American women. The principle investigator is a doctoral student at the University of Nebraska Medical Center College of Nursing.

Ms._____will complete survey questionnaires to assess perceived barriers to engaging in physical activity and perceived support from family and friends for physical activity, and self-reported physical activity behaviors, in addition to fitness testing.

Ms. _____ answered one or more questions on the Physical Activity Readiness Questionnaire, recommended by the American College of Sports Medicine as a pre-participatory moderate exercise screening measure, indicating that she must obtain clearance from a physician prior to having a fitness assessment and increasing her physical activity. She has her questionnaire results to share with you.

Your patient has been asked to come to the research office at the UNMC's Student Life Center one time only to complete fitness assessments including: a 400 meter (1/4 mile) walk test (brisk walking) to assess physical fitness, chair stands (quickly rising from sitting to standing position ten times) to assess lower body strength, and arm curls to assess upper body strength. Her level of exertion during the fitness assessment will be no greater than that associated with moderate physical activity.

If you agree that Ms. _____ can be a study participant, please sign below and give this completed form to your patient. If you have questions, call me at (402) 598-6191. Thank you for your time.

Sincerely,

Hope Jackson MSN, RN

Doctoral student at the University of Nebraska Medical Center College of Nursing

****

_____ has medical clearance to enroll in the Physical Activity Behaviors study and to participate in the physical fitness assessments and recommended walking activity described above.

_____ _____

Physician signature Date

_____ _____

Physician Name - Printed Office Telephone Number

Appendix B-1

PERSONAL DATA

Please respond to the following questions about yourself so that we may know more about you. None of the information in this document about you as an individual will be reported nor revealed.

1. What year were you born? _____

2. What is your current marital status?

___ Married

___ Widowed

___ Divorced/Separated

___ Partnered, but not married

___ Never Married

3. How many people live in your household (including yourself)? _____

4. Who are the people who live with you (e.g., husband, daughter, friend)?

___ Live Alone

___ Husband Only

___ Husband and Others

___ Other Relatives

___ Unrelated Others

5. What is the highest level of education that you have completed?

___ Less than eighth grade

___ Completed eighth grade

___ Completed some high school

___ Graduated from high school

___ Completed some college

___ Earned baccalaureate degree

___ Completed some graduate school

___ Completed graduate or professional degree

6. What is your annual salary?

___below $10,000

___$10,000 to $20,000

___$20,000 to $30,000

___$30,000 to $40,000

___$40,000 to $50,000

___above $50,000

Appendix B-2

BRIEF HEALTH HISTORY

Have you ever been told by a physician or any other healthcare professional that you have any of the following health problems or potential health problems?

1. Higher than normal blood pressure? ____Yes ____No

2. Overweight or obese? ____Yes ____No

3. Diabetes or high blood sugar? ____Yes ____No

4. Coronary heart disease? ____Yes ____No

5. A heart attack? ____Yes ____No

6. Stroke? ____Yes ____No

7. Asthma? ____Yes ____No

8. Arthritis? ____Yes ____No

9. Broken hip? ____Yes ____No

10. Breast cancer? ____Yes ____No

11. Cancer of the bowel, colon or rectum? ____Yes ____No

Appendix B-3

PAST BARRIERS TO PHYSICAL ACTIVITY

Physical activity often decreases, as we get older. Please select (✓) all barriers below that may have contributed to your being less physically active or not active at all as an adult.

_____no time

_____not interested

_____family responsibilities

_____job responsibilities

_____costs (gym membership, exercise clothing/shoes, home equipment)

_____Sweating

_____Hair care/maintenance

_____too tired

_____not motivated

_____illness/disease

_____pain/discomfort with exercise

_____no support for exercise from family or friends

_____do not enjoy exercise

_____increased body weight

_____no safe place to exercise (walk) in your neighborhood

_____child care not available

_____happy with current weight/body size

_____None of the above

_____Other:_____

_____

Appendix B-4

RESTING HEART RATE & RESTING BLOOD PRESSURE

Equipment : stethoscope

mercury sphygmomanometer

latex free inflation system (cuffs, bladder, bulb, tubing)

stopwatch

Procedures and Measures**:**

Pre-Visit

Participants should be advised to avoid caffeine, intensive exercise, and smoking at least 30 minutes prior to measures of resting heart rate and blood pressure.

Preparation

1. Participants should be seated in a chair with their backs supported, legs uncrossed, feet resting firmly on the floor, their arms bared and supported at heart level. Participants should refrain from smoking, exercising or ingesting caffeine during the 30 minutes preceding the measurements of resting heart rate and resting blood pressure.

2. Measures of resting heart rate and resting blood pressure should begin after at least 5 minutes of rest in a quiet room. No talking permitted.

Resting Heart Rate

1. Use the tips of the middle and index fingers. Do not use your thumb for measurements.

2. Palpate the radial pulse on the right arm. If the left arm must be used, make a note on the participant's file and always use the left arm for subsequent resting pulse measures. Using a watch or clock with a second hand count the pulse starting with 0. Continue counting for a set period of 60 seconds. Record on the data sheet.

Blood Pressure

1. After measuring resting heart rate, place the participant's bare arm to rest on a table so that the middle of the arm is at the level of the heart. The upper arm circumference will be measured in centimeters. Based upon guidelines recommended by the AHA, the appropriate cuff (small adult, adult, or large adult) will be used to accurately measure blood pressure. (Perloff, et al. 1993; Pickering, Hall, Appel, Falkner, Graves, Hill, et al., 2005; Prineas, 1991, Williams, 2009).

2. Examine the participant's arm circumference (midpoint between acromion process of the shoulder and the olecranon process of the elbow). The appropriate cuff size must be used to ensure accurate measurement. The bladder within the cuff should encircle at least 80 percent of the arm. Many adults will require a large adult cuff.

Calculate Peak Inflation

1. Apply the appropriate deflated cuff around the upper right arm so that the midline of the cuff is over the brachial artery pulse. The lower edge of the cuff should be approximated 2.5 cm above the antecubital fossa. If the left arm must be used, make a note on the participants file and always use the left arm for subsequent blood pressure measurements.

2. Locate and palpate the radial pulse, closing the valve of the blood pressure unit, and rapidly pump cuff to 70 mm/Hg. Then slowly increase the pressure in 10mm/Hg increments while palpating the radial pulse, and note when the pulse disappears (estimate of systolic blood pressure). The peak inflation will be calculated using this number. Peak inflation is the point at which the pulse disappears plus 30 mm Hg.

3. Then partially open the valve to slowly release the pressure at a rate of 2-3 mm Hg/sec and note when the pulse reappears so you will have an estimate of diastolic blood pressure. Fully open the valve to completely release the pressure in the cuff. Raise the participants arm above her head for 10 seconds, lower her arm and wait another 30 seconds before measuring blood pressure again.

Blood Pressure Procedure

1. With the appropriate cuff applied to the right arm, and at least 30 seconds after determining Peak Inflation, place the stethoscope diaphragm below the antecubital space over the brachial artery.

2. Quickly inflate cuff pressure to Peak Inflation level (calculated above).

3. Slowly release pressure at rate equal to 2 mm Hg/second while listening for Korotkoff sounds. As the pressure in the bladder falls, note the level of the pressure on the manometer at the first appearance of repetitive sounds (Phase I) and at the level when the sounds disappear (Phase V)

   During the period the Korotkoff sounds are audible, the rate of deflation should be no more than 2 mm per pulse beat, thereby compensating for both rapid and slow heart rates.

4. Record both Systolic and Diastolic Blood Pressure (DBP) on the Data Sheet.

   The first appearance of sound is used to define SBP.

   The disappearance of sound is used to define DBP.

5. Fully deflate cuff, raise arm 10 seconds, and wait another 30 seconds. Repeat the procedure.

6. Two or more readings separated by 30 seconds of rest should be averaged. If the first two

   readings differ by more than 5 mm Hg, additional readings should be obtained and averaged.

   (Compare SBP with SBP and DBP with DBP).

7. Record the average reading value on the Data Sheet.

Eligibility for study

To be eligible for participation in the study, the average of 2 measures taken must be within the pre-hypertensive classification of blood pressure defined as a systolic blood pressure (SBP) of 120-139 mm Hg or a diastolic blood pressure (DBP) of 80-89 mm Hg. All readings must be below the hypertensive range SBP 140 mm Hg and higher and a DBP 90 mm Hg and higher.

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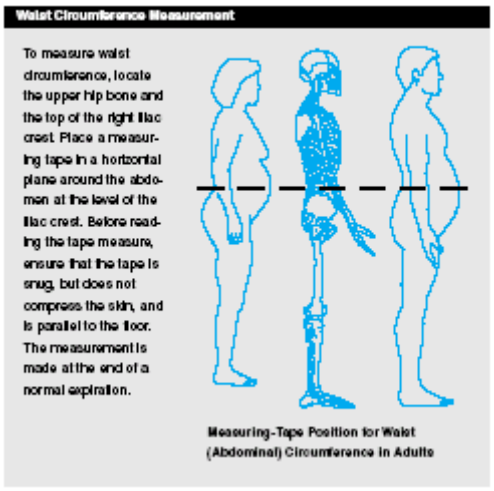
Appendix B-5

Waist Circumference

Equipment: tape measure

To measure waist circumference, locate the upper hip-bone and the top of the right iliac crest. Place a measuring tape in a horizontal plane around the abdomen at the level of the iliac crest. Before reading the tape measure, ensure that the tape is snug, but does not compress the skin, and is parallel to the floor. Use a mirror to make sure the tape is snug and parallel all the way around the abdomen. The measurement is made at the end of a normal expiration. Record the reading in centimeters to the nearest tenth. Continue to measure and record until 2 measures are within 0.5 cm. Circle these two measures and enter only these two on the data entry page.

Figure 3



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Appendix B-6

Participant ID_____

Date_____

Data collection by_____

The 400-meter Long Distance Corridor Walk test

Purpose: To determine physical fitness.

Equipment: Tape

40-meter corridor

Stopwatch

Pre-procedure:

1. Participants were informed to wear tennis shoes or comfortable walking shoes before arriving at the assessment site.
2. Tape used to indicate the beginning and ending of the walking course (corridor) in 40-meter lengths are laid out prior to participant arrival.

Procedure:

Read: We would like you to walk 400 meters (about ¼ mile) as briskly and comfortably as you can as a measure of physical fitness. You will be asked to complete the walk once walking a total of 10 laps around the course. Before and immediately after the walk test, I will measure your heart rate and blood pressure.

While walking, I want you to rate your perception of exertion. This feeling should reflect how hard or difficult the exercise feels to you. We want you to combine all sensations and feelings of physical stress, effort, and fatigue. Do not concern yourself with any one factor such as leg pain or shortness of breath, but try to focus on your total feeling of exertion.

The rating scale ranges from 6 to 20, where 6 mean's "no exertion at all" and 20 mean's "maximal exertion." After completion of the walk I will ask you to choose the number that best describes your level of exertion.

If at any time during the walk test, you become short of breath, lightheaded or dizzy or experience chest pain, tightness or pressure in your chest, or experience any knee, hip, calf, or back pain, please let me know immediately. You may then choose to slow down, sit and rest, or to stop the walk.

In case of a medical emergency (e.g., shortness of breath, chest pain not relieved with rest), the PI will seek medical attention immediately by dialing 911 and complete an adverse event form.

Do you have any questions?

Participant ID_____

Pre-walk resting heart rate_____bpm

Pre-walk blood pressure SBP_____mmHg DBP_____mmHg

Read: I want you to begin the course with both feet placed behind the line marked "start" and stop where the course is marked "end". You will walk on one side of the tape, turn at the 40-meter endpoint and walk on the opposite side of the tape. This is one lap. *Demonstrate how participants are to walk each lap.*

At the line marked "end" have the participant raise her arm immediately to waist level for a post-walk heart rate measure.

First, I will have you complete a 2-minute warm up walk along the length of the course prior to the actual walk test.

When I say GO, start walking at your usual pace. "Ready, GO"

Start the stopwatch when the participants step over the starting line to begin the warm up, stopping after 2 minutes have elapsed. Instruct the women to return to the starting line to begin the actual walk test.

Read: When I say GO, start walking as comfortably (briskly) as you can. "Ready, GO"

Press the stopwatch at "GO" to begin recording the time it takes for participants to complete the walk.

Check off each lap as completed.

Walk test 1:

1	2	3	4	5	6	7	8	9	10

Give encouragement after each 40-meter lap by holding up a card showing her each lap completed and stating: *You have completed_____ laps and have_____ to go!*

At the end of the 10^{th} lap, take a radial pulse (standing) counting for 15 seconds. Allow the women to walk for 2 minutes and then take a blood pressure reading with her sitting.

Time (1) at 400 meters or stopping _____minutes: _____seconds

Post-walk (1) heart rate (15 seconds) _____ bpm (standing)

Post-walk (1) blood pressure SBP_____mmHg DBP_____mmHg (sitting)

Rate of perceived exertion_____

Tell the participants to walk 5 minutes (longer if needed) to cool down ***and to sit and rest for 15-20 minutes prior to the start of the second walk test.***

If she did not complete the walk test, reason(s) stated (check all that apply)

_____Too tired

_____Chest pain, tightness, or pressure during the test

_____Trouble breathing or shortness of breathe during the test

_____Feeling faint, lightheaded or dizzy during the test

_____Knee pain during the test

_____Hip pain during the test

_____Calf pain during the test

_____Back pain during the test

_____Sat down during the test

_____Needed to rest for more than 60 seconds

_____Requested or needed an assistive device

_____More than 15 minutes elapsed from start to end of the test

_____Refused to complete the test

_____Other
(specify)_____

Walk test 2:

1	2	3	4	5	6	7	8	9	10

Repeat the instructions for walk test 1.

Give encouragement after each 40-meter lap by holding up a card showing her each lap completed and stating, *You have completed_____ laps and have_____ to go!*

Time (2) at 400 meters or stopping _____minutes: _____seconds

Post-walk (2) heart rate (15 seconds) _____ bpm (standing)

Post-walk (2) blood pressure SBP_____mHg DBP_____mmHg (sitting)

Rate of perceived exertion_____

Tell the participants to walk 5 minutes (longer if needed) to cool down.

If she did not complete the walk test, reason(s) stated (check all that apply)

_____Too tired

_____Chest pain, tightness, or pressure during the test

_____Trouble breathing or shortness of breathe during the test

_____Feeling faint, lightheaded or dizzy during the test

_____Knee pain during the test

_____Hip pain during the test

_____Calf pain during the test

_____Back pain during the test

_____Sat down during the test

_____Needed to rest for more than 60 seconds

_____Requested or needed an assistive device

_____More than 15 minutes elapsed from start to end of the test

_____Refused to complete the test

_____Other
(specify)_____

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Appendix B-7

Borg's Rate of Perceived Exertion Scale

Purpose: To measure the intensity level of physical activity.

Equipment: Borg's RPE scale

While doing physical activity, we want you to rate your perception of exertion. This feeling should reflect how difficult the exercise feels to you. We want you to combine all sensations and feelings of physical stress, effort, and fatigue. Do not concern yourself with any one factor such as leg pain or shortness of breath, but try to focus on your total feeling of exertion.

Look at the rating scale below while you are engaging in an activity; it ranges from 6 to 20, where 6 means "no exertion at all" and 20 means "maximal exertion." Choose the number from below that best describes your level of exertion. This will give you a good idea of the intensity level of your activity, and you can use this information to speed up or slow down your movements to reach your desired range.

Try to appraise your feeling of exertion as honestly as possible, without thinking about what the actual physical load is. Look at the scales and the expressions and then give a number.

6 No exertion at all

7
Extremely light (7.5)
8

9 Very light

10

11 Light

12

13 Somewhat hard

14

15 Hard (heavy)

16

17 Very hard

18

19 Extremely hard

20 Maximal exertion

9 corresponds to "very light" exercise. For a healthy person, it is like walking slowly at his or her own pace for some minutes

13 on the scale is "somewhat hard" exercise, but it still feels OK to continue.

17 "very hard" is very strenuous. A healthy person can still go on, but he or she really has to push him- or herself. It feels very heavy, and the person is very tired.

19 on the scale is an extremely strenuous exercise level. For most people this is the most strenuous exercise they have ever experienced.

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Appendix B-8

EXERCISE BARRIERS SCALE

DIRECTIONS: Below are statements that relate to ideas about exercise. Please indicate the degree to which you agree or disagree with the statements by answering strongly agree, agree, disagree, or strongly disagree.

1. Exercising takes too much of my time.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

2. Exercise tires me.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

3. Places for me to exercise are too far away.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

4. Exercise makes me sweat.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

5. I am too embarrassed to exercise.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

6. It costs too much money to exercise.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

7. I do not exercise because it messes up my hairstyle.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

8. Exercise facilities do not have convenient schedules for me.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

9. I am fatigued by exercise.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

10. I do not exercise very hard because I am concerned about messing up my hair.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

11. My spouse (or significant other) does not encourage exercising.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

12. Exercise takes too much time from family relationships.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

13. I think people in exercise clothes look funny.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

14. I do not have a lot of time to style my hair after exercise.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

15. My family members do not encourage me to exercise.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

16. Exercise takes too much time from my family responsibilities.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

17. There are no easy ways to maintain my hairstyle after exercise.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

18. Exercise is hard work for me.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

19. There are too few places for me to exercise.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

20. My hair style is more important than my exercise.

____ Strongly agree

____ Agree

____ Disagree

____ Strongly disagree

Appendix B-9

SOCIAL SUPPORT FOR EXERCISE: SURVEY

DIRECTIONS: Below is a list of things people might do or say to someone who is trying to increase their physical activity or to exercise regularly. If you are not trying to be more physically active, then some of the questions may not apply to you, but please try and answer every question.

You will be asked to rate each question twice. Under family, rate how often anyone living in your household has said or done what is described during the last 3 months. Under friends, rate how often your friends, acquaintances coworkers, or family not living with you have said or done what is described during the last 3 months.

1. During the past 3 months, my family or friends *exercised with me*.

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

2. During the past 3 months, my family or friends *offered to exercise with me*.

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

3. During the past 3 months, my family or friends *became annoyed when I didn't accept their advice about exercising.*

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times

___ Often

___ Very often

___ Does not apply

___ Often

___ Very often

___ Does not apply

4. During the past 3 months, my family or friends *gave me helpful reminders to exercise* ("Are you going to exercise tonight?").

a. Family (or others in your household):

___ Never

___ Rarely

___ A few times

___ Often

___ Very often

___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never

___ Rarely

___ A few times

___ Often

___ Very often

___ Does not apply

5. During the past 3 months, my family or friends *gave me encouragement to stick with my exercise program.*

a. Family (or others in your household):

___ Never

___ Rarely

___ A few times

___ Often

___ Very often

___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never

___ Rarely

___ A few times

___ Often

___ Very often

___ Does not apply

6. During the past 3 months, my family or friends *changed their schedule so we could exercise together.*

a. Family (or others in your household):

___ Never

___ Rarely

___ A few times

___ Often

___ Very often

b. Friends, acquaintances, coworkers or family not living with you:

___ Never

___ Rarely

___ A few times

___ Often

___ Very often

___ Does not apply ___ Does not apply

7. During the past 3 months, my family or friends *tried to change the way I exercise (i.e., time of day, location, etc.) in a way I didn't like.*

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

8. During the past 3 months, my family or friends *discussed exercise with me*.

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

9. During the past 3 months, my family or friends *complained about the time I spend exercising*.

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

10. During the past 3 months, my family or friends *gave me information or made suggestions about exercising that I found unhelpful or upsetting.*

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

11. During the past 3 months, my family or friends *criticized me or made fun of me for exercising*.

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

12. During the past 3 months, my family or friends *gave me rewards for exercising (bought me something or gave me something I like).*

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

13. During the past 3 months, my family or friends *found it hard to understand the way I feel about exercising.*

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

14. During the past 3 months, my family or friends *planned for exercise on recreational outings*.

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

15. During the past 3 months, my family or friends *helped plan activities around my exercise.*

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

16. During the past 3 months, my family or friends *asked me for ideas on how they can get more exercise.*

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

17. During the past 3 months, my family or friends *talked about how much they like to exercise*.

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

18. During the past 3 months, my family or friends *took over chores so I had more time to exercise*.

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

19. During the past 3 months, my family or friends *made positive comments about my physical appearance*.

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

20. During the past 3 months, my family or friends *got angry with me for exercising*.

a. Family (or others in your household):

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

b. Friends, acquaintances, coworkers or family not living with you:

___ Never
___ Rarely
___ A few times
___ Often
___ Very often
___ Does not apply

Appendix B-10

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days.** Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** and **moderate** activities that you did in the **last 7 days. Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

____Yes

____No

Skip to PART 2: TRANSPORTATION

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the **last 7 days,** on how many days did you do **vigorous** physical activities like heavy lifting, digging, heavy construction, or climbing up stairs **as part of your work?** Think about only those physical activities that you did for at least 10 minutes at a time.

_____ days per week

_____ No vigorous job-related physical activity ***Skip to question 4***

3. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work?

_____ hours per day _____ minutes per day

4. Again, think about only those physical activities that you did for at least 10 minutes at a time.

During the **last 7 days,** on how many days did you do **moderate** physical activities like carrying light loads **as part of your work?** Please do not include walking.

_____ **days per week**

_____No moderate job-related physical activity ***Skip to question 6***

5. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work? _____ **hours per day** _____ **minutes per day**

6. During the **last 7 days,** on how many days did you **walk** for at least 10 minutes at a time **as part of your work?** Please do not count any walking you did to travel to or from work.
_____ **days per week**

_____No job-related walking ***Skip to PART 2: TRANSPORTATION***

7. How much time did you usually spend on one of those days **walking** as part of your work?

_____ **hours per day**

_____ **minutes per day**

PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place,

including to places like work, stores, movies, and so on.

8. During the **last 7 days,** on how many days did you **travel in a motor vehicle** like a train, bus, car, or tram?

_____ **days per week**

_____No traveling in a motor vehicle ***Skip to question 10***

9. How much time did you usually spend on one of those days **traveling** in a train, bus, car, tram, or other kind of motor vehicle?

_____ **hours per day** _____ **minutes per day**

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the **last 7 days,** on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place?**

_____ **days per week**

_____No bicycling from place to place ***Skip to question 12***

11.How much time did you usually spend on one of those days to **bicycle** from place to place?

_____ hours per day _____ minutes per day

12. During the **last 7 days,** on how many days did you **walk** for at least 10 minutes at a time to go **from place to place?**

_____ days per week

_____No walking from place to place ***Skip to PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY***

13. How much time did you usually spend on one of those days **walking** from place to place?

_____ hours per day _____ minutes per day

PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days,** on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging **in the garden or yard?**

_____ days per week

_____No vigorous activity in garden or yard ***Skip to question 16***

15. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard?

_____ hours per day _____ minutes per day

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days,** on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard?**

_____ days per week

_____No moderate activity in garden or yard ***Skip to question 18*** .

17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard? **_____ hours per day _____ minutes per day**

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days,** on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home?**

_____ days per week

_____No moderate activity inside home ***Skip to PART 4: RECREATION, SPORT AND LEISURE-TIME PHYSICAL ACTIVITY***

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home? **_____ hours per day _____ minutes per day**

PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking you have already mentioned, during the **last 7 days,** on how many days did you **walk** for at least 10 minutes at a time **in your leisure time?**

_____ days per week

_____ No walking in leisure time ***Skip to question 22***

21. How much time did you usually spend on one of those days **walking** in your leisure time?

_____ hours per day _____ minutes per day

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days,** on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time?**

_____ days per week

_____No vigorous activity in leisure time ***Skip to question 24***

23. How much time did you usually spend on one of those days doing **vigorous** physical activities in your leisure time? **_____ hours per day _____ minutes per day**

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days,** on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time?**

_____ days per week

_____No moderate activity in leisure time ***Skip to PART 5: TIME SPENT SITTING***

25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time? _____ **hours per day** _____ **minutes per day**

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days,** how much time did you usually spend **sitting** on a **weekday?**

_____ **hours per day** _____ **minutes per day**

27. During the **last 7 days,** how much time did you usually spend **sitting** on a **weekend day?**

_____ **hours per day** _____ **minutes per day**

This is the end of the questionnaire, thank you for participating.

Appendix C

Participant ID _____
Testing date_____ Assessment completed by:_____

Measure	Result	Explanation of fitness testing results
Cardiovascular Fitness Blood Pressure (Systolic/Diastolic in mmHg) Resting Heart Rate (beats per minute)	First measure_____ Second measure_____ Average BP_____ RHR _____ Arm used_____	***Resting Blood Pressure*** This also shows how hard the heart is working before doing physical activity. As you exercise and become more fit, these numbers may decrease. Optimal blood pressures are generally less than 120/80. ***Resting Heart Rate*** This value indicates how well your heart functions and overall cardiovascular fitness. As you exercise and become more fit, these numbers may decrease. Ideal values range from 60 to 100 bpm.
Body Composition Height (inches) Weight (pounds) Body mass index (BMI) Waist circumference (inches)	Ht_____ Wt_____ BMI_____ WC_____	***Body Mass Index*** This is a classification of weight status. The healthy BMI range is 18.5-24.9. Higher values indicate an individual is overweight (25.0-29.9) or obese (30 or higher). Physical activity and strength training will help in keeping your BMI in the healthy range. ***Waist Circumference*** Waist circumference is a measure of fat in the abdomen. Excess fat in the abdomen increases the risk of health related problems. Waist circumference measures greater than 35 inches in women may indicate increased risk for disease. Even small reductions in abdominal fat through physical activity may lower risk of disease significantly.

Appendix D

NEBRASKA'S HEALTH SCIENCE CENTER

Office of Regulatory Affairs (ORA)
Institutional Review Board (IRB)

February 5, 2015

Hope Jackson, MSN
College of Nursing
UNMC - 5330

IRB # 660-10-EP

TITLE OF PROPOSAL: Physical Activity Behaviors of Prehypertensive and Stage 1 Hypertensive African American women

DATE OF EXPEDITED REVIEW: 01/28/2015

VALID UNTIL: 01/28/2016

EXPEDITED CATEGORY OF REVIEW: 45 CFR 46.110; 21 CFR 56.110, Category 4

The UNMC IRB has completed its review of the Application for Continuing Review for the above titled research project including the complete protocol file and has expressed it as their opinion that you have provided adequate safeguards for the rights and welfare of the subjects involved in this study and are in compliance with HHS regulations (45 CFR 46) and FDA regulations (21 CFR 50.56) as applicable.

This letter constitutes official notification of the re-approval of your research project by the IRB for the IRB approval period indicated above. You are therefore authorized to continue this study. **All copies of the outdated consent form must be discarded immediately.** The original IRB stamped form may be archived.

We wish to remind you that, under the provisions of the Federal Wide Assurance (FWA 00002939) from the Institution to HHS, the Principal Investigator is directly responsible for keeping the IRB informed of any proposed changes involved in the procedures or methodology in the protocol and for promptly reporting to the Board any unanticipated problems involving risks to the subjects or others.

In accordance with HRPP policies, this project is subject to periodic review and monitoring by the IRB and, as part of their monitoring, the IRB may request periodic reports of progress and results. For projects which continue, it is also the responsibility

of the Principal Investigator to initiate a request to the IRB for Continuing Review of the research project in consideration of the IRB approval period.
On Behalf of the IRB,

Signed on: 2015-02-05 16:29:00.000

Gail Paulsen, RN, BSN, CIP
IRB Administrator III
Office of Regulatory Affairs