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Dispositional Optimism: Modeling Cardiovascular Disease Mortality with Traditional Risk Factors and a Psychosocial Personality Trait

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The University of Southern Mississippi

DISPOSITIONAL OPTIMISM: MODELING CARDIOVASCULAR DISEASE
MORTALITY WITH TRADITIONAL RISK FACTORS AND
A PSYCHOSOCIAL PERSONALITY TRAIT

by

Kiana Ramisi Lockett Robinson

Abstract of a Dissertation
Submitted to the Graduate School
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

August 2014

ABSTRACT

DISPOSITIONAL OPTIMISM: MODELING CARDIOVASCULAR DISEASE MORTALITY WITH TRADITIONAL RISK FACTORS AND A PSYCHOSOCIAL PERSONALITY TRAIT

by Kiana Ramisi Lockett Robinson

August 2014

Despite increased awareness of clinical risk factors for cardiovascular disease (CVD), heart disease remains a physical and economic burden to African Americans. The aim of this study was to investigate the relationship between dispositional optimism, a psychosocial personality trait, and CVD mortality, based on immediate cause of death. A cross-sectional design was used to examine the predictive value of dispositional optimism in CVD mortality concomitant with traditional CVD risk factors. The traditional CVD risk factors of interest consisted of body mass index, waist circumference, systolic and diastolic blood pressures, total cholesterol, and C-reactive protein. Also, aggregated mortality data for optimists and pessimists were compared to illustrate the distribution of death relative to attitudinal disposition.

A total of 413 Jackson Heart Study (JHS) participants who completed the revised Life Orientation Test (LOT-R) during year 2 of Annual follow-up and had suffered a fatal event before October 2013 contributed toward this effort. The one-factor solution of dispositional optimism was considered for this analysis.

Results showed that dispositional optimism did not significantly improve the predictive ability of traditional CVD risk models in males or females. However, in males, a five-fold increased risk of CVD death was associated with separation from a spouse.

Also, females demonstrated a similar risk where household incomes rose above \$75,000 per annum. Also based on these data, higher LOT-R scores were significantly associated with all manner of deaths. Optimists were disproportionately represented in this sample; CVD mortality and all-cause mortality were higher for optimists than for pessimists. Finally, dispositional optimism was not a discriminator of traditional clinical CVD risk factors in neither males nor females.

CVD mortality models did not support the combined role of dispositional optimism and traditional CVD risk factors. These results appear to indicate an immaterial influence of dispositional optimism on fatal CVD events in this African American sample. Future efforts may concentrate on aggregating CVD mortality based on the underlying cause of death and not the immediate cause of death. Also, additional insight may be gained by examining the relationship between nonfatal CVD events and dispositional optimism.

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DEDICATION

Achievement is always the response to a life that demands excellence, discipline, and sacrifice. To a 12 year old Kiana Ramisi, figure skater and Olympic bronze medalist, Debi Thomas, was the essence of achievement. In Debi's first interview after a mediocre performance in the Ladies Long Program at Calgary in 1988, she was asked of her intentions to compete in the 1992 Olympics. Catching her breath, Debi expressed the following sentiment, "No . . . I can get on with my life". As my formal educational training ends, Debi's words are alive to a now grown-up Kiana Ramisi. With the completion of this dissertation, I too can get on with my life and follow the path of simplicity.

Through the years, the life decisions of others have broadened the parameters of my journey. The completion of this work was made possible by a remarkable few. Some I have met personally, others I have not, but to all of which, I humbly dedicate this dissertation.

To HaMashiach Yeshua for giving me your shalom, the peace that comes from being whole. As you are, so am I in this age. *Hallelujah, ki-tov ki l'olam chesdo.*

To my mother, Beverly Joyce Young, who set me on a course that led to Kenneth Copeland, Charles Capps, and E.W. Kenyon. You have trained me in the truth; I will not depart from it. Every dream that has materialized and every aspiration seen to fulfillment is solely because you are my mother. The process was difficult, but the product is undeniable. Thank you for a love that demanded more than average.

To my grandmamma, Bertie Mae Graves, who during the unforgiving 1960s manufactured the fortitude to leave Mississippi in search of economic opportunities and

social justice. That pivotal decision in 1966 was the double-six domino in a chain reaction that has shaped my identity, culture, and spirituality. Eureka, we have found it!

To Dr. Lawrence Clifton Jones who is presumably the only person in American history to negotiate an old fashioned Mississippi lynching into a fundraiser. Dear Piney Woods, you are the flower of my heart.

To Alexander Pierre Tureaud, Jr., your courage made it possible for me to mature among the stately oaks and broad magnolias that shade inspiring halls. Forever LSU!

To Elberita “Twinkie” Clark, you spent a lifetime composing the soundtrack of my life. Your labor is not in vain!

To my Piney Woods Country Life School classmate who against all odds became my friend, spouse, advocate, and business partner. Keithfer, you were the voice of reason when the process lacked logic. Thank you for holding my hand when it trembled and most of all, thank you for being the perfect shade of blue to complement my unique shade of pink. Together, we make an awesome purple!

There is no tangible way for me to express the depth of my gratitude for the demonstrative example of excellence, discipline, and sacrifice by these individuals. I can only commit myself to live as the Maid of Orleans, under the blood of the cross and pressing toward the mark. So be it.

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CHAPTER I

INTRODUCTION

Seccession of life is the incontrovertible conclusion of the human experience, an inevitable end to the birth process. Of the approximate 56 million deaths that occur globally (World Health Organization [WHO], 2014a), there is little variability in the cause of death. The manner in which people die is nearly as predictable as the inevitability of death itself. Consequently, the epidemiology of cardiovascular disease (CVD) dominates the discourse on human mortality and disability. Irrespective of geography, socioeconomic status, race, or religion, the leading cause of death worldwide is heart disease. In 2008, approximately 17.3 million heart disease deaths occurred worldwide (WHO, 2012). Similarly, in the United States of America (U.S.), CVD was the documented primary cause of death accounting for 1 in 5 deaths in 2008 (Minino, Murphy, Xu, & Kochanek, 2011). For the past century, heart disease has trended toward the top of ranked diseases, a vast departure from the infectious diseases that plagued human existence during the 19th and early 20th centuries. U.S. mortality data for 2011 also mimicked this pattern of disease (Hoyert & Xu, 2012). These mortality statistics reveal that chronic diseases, namely diseases of the heart, have supplanted infectious diseases in dominating the leading cause of death for the 21st century. The stability of this centurial trend supports a heightened consciousness toward evaluating the effectiveness of health policies that govern the prevention and treatment of heart disease. Consequently, the prospective study and management of heart disease has become a priority for the public health profession.

The endeavors of public health collectively propose to fulfill the vision of public health; the vision provides for Healthy People in Healthy Communities. The vision of public health is anchored in the belief that improved health for groups of individuals is beneficial to society. This tenet guides the ambitions of the public health effort, which are evident in the core function of public health. The core functions of public health include preventing epidemics, injuries, and the transmission of disease. Public health also protects against environmental hazards, promotes healthy behaviors, responds to natural disasters, and assures health services to the public (Turnock, 2001). Just as a medical doctor or nurse practitioner assesses the health of an individual, teams of specialists (e.g., epidemiologists, biostatisticians) assess the health of the nation as a whole. The overall assessment collapses patient level data into aggregate metrics that function as aggregate indicators of wellness for the nation. These indicators enable public health practitioners to investigate health hazards, identify innovative and sensible solutions, and develop scientifically grounded policies that favorably influence health outcomes (Turnock, 2001).

Comparatively, the epidemiology of disease in past centuries was straightforward. In the past two centuries, diseases of pathogenic origin represented the leading causes of death and disability. As scientists investigated the events that led to ill health, the identification and isolation of pathogens was inevitable and often expedient. The etiology of cardiovascular and other chronic diseases is quite complex; any number of genetic, environmental, psychosocial, socio-economic, and clinical influences synergistically interact to facilitate negative health outcomes. In spite of this complexity, researchers have successfully identified meaningful and modifiable risk factors for CVD.

Moving forward, decreasing CVD risk in vulnerable populations must become the chief focus of public health practitioners and policy makers, both in word and deed.

Consequently, the data reveal significant declines in heart disease mortality rates, but all segments of the U.S. population do not universally benefit from this decline.

The U.S. Department of Health and Human Services (HHS) identifies improving cardiovascular health as a Healthy People 2020 objective. This objective was also a feature in Healthy People 2010 and Healthy People 2000 (Health & Human Services [HHS], 2013). Systematically, the approach to preventing and managing CVD should evolve beyond the influences of traditional, biological risk factors. The sheer complexity of how CVD develops in the human body is justification to broaden the knowledge of researchable pathways to CVD. One such pathway includes studying non-biological factors that are potentially prohibitive to favorable health outcomes. These factors may be the key to decreasing CVD events in the nation's most vulnerable CVD risk group, African Americans. Herein lies the opportunity to broaden CVD research to include examining the influence of a psychosocial trait on CVD within an at-risk population.

One such psychosocial factor of interest is dispositional optimism, the positive expectation for future events (Scheier & Carver, 1985). The manner in which people choose to regulate their actions may have important health implications (Scheier & Carver, 1985). Growing evidence supports the notion that attitudinal disposition, both positive (optimism) and negative (pessimism), influences health. The strength of this generalization where CVD outcomes are involved is the basis of dispositional optimism research. Dispositional optimism research focuses on the effect that one's positive or negative expectation has on quality of life. In Christianity, the world's most recognized

religion with more than 2.2 billion believers, this positive expectation is called biblical hope (Romans 8:24-25 Complete Jewish Bible). Psychology refers to it as positive thinking (Scheier & Carver, 1993), but regardless of its contextual application, this immutable expectation is at the core of dispositional optimism research.

Relative to human history, dispositional optimism as a theoretically grounded, measurable construct is relatively new. A reduction of dispositional optimism into its lowest terms reveals that it is not a new idea in the human experience. The champions of faith (Hebrews 11 King James Version) which includes the likes of Enoch, Abraham, and Rahab the harlot, would perceive dispositional optimism as biblical hope. Biblical hope, *elips*, is a favorable and confident expectation (Nelson, 1999). It is applicable when the desire of one's expectation has yet to materialize. Dispositional optimism, unlike biblical hope, has scientific endorsement and an innocuous, politically correct name. By definition, dispositional optimism is the deliberate focus on a future favorable outcome rather than on an undesired, present obstacle. Biblical teachings often reference deliberate focus, a practice that unquestionably predates the 1985 development of Carver and Scheier's dispositional optimism construct. Examples of biblical references whose theme includes positive expectation can be identified in many of the Apostle Paul's letters to the Church (Romans 12:12; Ephesians 1:18; Colossians 1:23; Hebrews 3:6 King James Version). The Apostle Paul admonished the church to continue in hope until the object of their expectation materialized (Romans 12:2 King James Version). In Hebrews 11:1 (Good News Translation), Paul's most famous exposition on faith reveals the role of biblical hope in the Church. He states that faith in the Word of God is the elementary particle, the most basic building block, which draws into the material world the object of

one's expectation. Furthermore, Paul offered this advice to the church, "I keep pursuing the goal in order to win the prize offered by God's upward calling in the Messiah Yeshua" (Philippians 3:14 Orthodox Jewish Bible). Therefore, two millennia before the operationalization of dispositional optimism as a measurable construct, Paul articulated and emphasized that a commitment to one's positive expectations was the most desirable disposition in life. Undoubtedly, Paul delivered his message in a spiritual context, but surely, the similarity between biblical hope and dispositional optimism is apparent.

Conceptually, dispositional optimism neither is new to the human experience nor is dispositional optimism unfamiliar in CVD research. Previous research in this area has laid the groundwork for the present research effort. Prior efforts were fundamentally lacking in applicability of research findings to persons who present with the greatest risk of disease and disability, namely African Americans. Conducting exploratory CVD research within this sub-set of the population appears to be a practical and prudent approach to identifying and subsequently overcoming barriers that are prohibitive to improved CVD health in African Americans.

Problem Statement

CVD mortality remains ranked as the leading cause of death in the U.S., yet, in recent years, the incidence rate of CVD in the U.S. has been on the decline (National Institutes of Health [NIH], 2012). When CVD data are aggregated, this trend holds true. However, stratification of these data by race reveals a persistent disparity in rates of decline between African Americans and Caucasians, so much so that the National Heart, Lung, and Blood Institute (NHLBI) allocated federal dollars to identify and subsequently examine the contributory factors toward this disparity. As an extension of that effort, the

present study will explore a novel approach to understanding the relationship between dispositional optimism and CVD mortality within an at-risk African American population. The association between dispositional optimism and CVD outcomes has been vetted in elderly populations (Giltay, Geleijnse, Zitman, Hoekstra, & Schouten, 2004; Kim, Park, & Patterson, 2011), but few studies have been conducted to specifically identify and remediate CVD risk factors and in African Americans. African Americans comprise approximately 14% of the U. S. population, yet the risk of CVD is 30% higher in African American males than in Caucasian males (Kochanek, Xu, Murphy, Minino, & Kung, 2011). This distinguishing characteristic warrants CVD research with African Americans.

Mississippi leads the nation in CVD deaths, followed by six other southern states (NIH, 2012). Examining dispositional optimism as a potential determinant of health in African Americans will be an essential first step toward unearthing the complex etiological web of non-clinical CVD determinants within African Americans as a group. For this purpose, the researcher retrieved and analyzed archival data from the Jackson Heart Study (JHS), an observational study of CVD in African Americans. Public health researchers conducted the JHS in Jackson, Mississippi, an area where behavioral patterns relative to diet and exercise predate the Civil War Era. These longstanding patterns of behavior (e.g., consuming high-calorie, nutrient deficient foods) have fostered successive generations of individuals who have become vulnerable to a spectrum of chronic diseases.

CVD is a chronic disease whose pathology begins early in life. The temporal aspect of the etiology of CVD positions dispositional optimism as an ideal construct to

study. Void of intervention, dispositional optimism is a stable personality trait. Through targeted health education programs, dispositional optimism may be taught to individuals who seek to shift their attitudinal disposition. To this end, dispositional optimism, a learnable personality trait (Scheier & Carver, 1993), is a desirable emergent risk factor to explore. For the sake of CVD wellness, individuals may be taught to make personality trait changes and yet have the time to benefit positively from those changes. Initial cross-sectional analysis will determine whether longitudinal examination is justified.

Purpose of the Study

In an effort to examine the relationship between dispositional optimism and CVD mortality within a vulnerable population, the intent of this study was to (1) test dispositional optimism as a statistically significant predictor of CVD mortality and (2) determine whether high dispositional optimism was associated with lower CVD mortality and all-cause mortality than low dispositional optimism. To accomplish this goal, the researcher obtained descriptive statistics for cohort optimists and pessimists on measures of CVD health. These measures included demography (i.e., age, gender), adiposity (i.e., waist circumference), socioeconomic status (i.e., income, education, occupation), hypertension indicators, lipid profile (i.e., total cholesterol), and C-reactive protein. Cross-sectional examination of JHS baseline data evaluated dispositional optimism as a significant predictor of CVD mortality along with known clinical CVD risk factors. The researcher analyzed CVD mortality and all-cause mortality between cohort optimists and pessimists categorically.

The JHS is unique in that it is the only public health research study in the history of the U.S. Department of Health of its size and magnitude to focus exclusively on comprehending African American cardiovascular health. Consistent with other diseases where race is a significant risk factor (e.g., alcoholism in Native Americans, melanoma in Caucasians), the findings from this study will be generalizable to the population of interest, African Americans. Therefore, the knowledge gained from this area of research will enable public health practitioners to develop comprehensive strategies for combating CVD within the African American community.

The following research hypotheses are representative of the study purpose:

H₁: Dispositional optimism is a significant predictor of CVD mortality in males.

H₂: Dispositional optimism is a significant predictor of CVD mortality in females.

H₃: CVD mortality is significantly lower in optimists than in pessimists.

H₄: All-cause mortality is significantly lower in optimists than in pessimists.

Justification

African Americans have disproportionately borne the burden of CVD disability and mortality. Increased knowledge of clinical risk factors along with biochemical and pharmacological advancements have been unsuccessful in eliminating this disparity. CVD treatment options for African Americans should expand to consider a more comprehensive and holistic approach to eliminating this trend. Presently, conventional treatment of CVD is limited to lifestyle considerations, medication, and surgery (Mayo Clinic, 2012). The unique contribution of the psychosocial determinants of CVD and the mechanisms by which they operate are a grossly understudied area in public health research, and even more so within the country's most vulnerable minority group.

Decades of research have revealed numerous clinical, CVD risk factors (e.g., hypertension, hypercholesterolemia). While both secondary and tertiary prevention strategies have been successful in non-African American groups, African Americans must still overcome seemingly insurmountable barriers. Consequently, initiating efforts that identify novel psychosocial risk factors that are best suited for primary prevention strategies may be a reasonable suggestion for overcoming negative CVD events for this group.

One such approach is to explore the relationship between CVD mortality and one's attitudinal disposition. An exploration into the psychology of CVD coupled with knowledge gained from the clinical pathology of CVD may be a noble launching point. Research in this area has the potential to alter the strategic approach of clinicians and public health practitioners as they prevent (primary prevention) and treat (secondary and tertiary prevention) diseases of the heart and their comorbidities. Incorporating the psychosocial influences of CVD into existing prevention strategies may prove favorable in mediating the epidemic of CVD in the U.S. and ultimately around the world.

Delimitations

The analysis sample for this study was delimited to deceased participants from the JHS cohort (n= 433); this sample size of this study is reflective of inclusion criteria that are outlined in Chapter III of this document. The JHS cohort (n= 5301) consists of African American adults between the ages of 35 and 85 years old who reside in the Jackson, Mississippi Metropolitan Statistical Area (MSA). This study was also delimited to JHS participants who completed all six items on the JHS version of the revised-Life

Orientation Test at one-year post baseline. Cohort deaths were also delimited to those abstracted by the JHS Surveillance and Events Monitoring Unit.

Definitions

1. *All cause mortality* The number of deaths from all causes of death.
2. *Cardiovascular disease* These are diseases of the circulatory system as categorized by the International Statistical Classification of Diseases and Related Health Problems (ICD) 10th edition Chapter IX, codes I00-I99 (World Health Organization, 2006).
3. *Cardiovascular disease mortality* The number of deaths attributed to cardiovascular disease.
4. *Dispositional optimism* A personality trait of people who generally have an expectation of positive outcomes for future events. Dispositional optimism is measured with the revised Life Orientation Test (Carver, 2011).
5. *Jackson Heart Study* Funded by the National Institutes of Health contracts N01-HC95170, N01-HC-95171, and N01-HC-95172, provided by the National Heart, Lung, and Blood Institute and the National Center for Minority Health and Health Disparities; the JHS is a single-site observational study of CVD in African Americans within the Jackson, MS Metropolitan Statistical Area (Taylor et al., 2005).
6. *Life Orientation Test (revised)* The LOT-R operationalizes optimism and pessimism on a continuum; there is no cut-off score that definitively distinguishes one from the other. For this reason, exclusive use of the LOT-R is restricted to research and not clinical (diagnostic) applications. The instrument contains six items, three of which are negatively worded, all rated on a 5-point Likert scale. An overall optimism score is

computed by summing the items (three items are reverse scored). Scores range from 0 to 24; higher scores on the continuum suggest optimism (Carver, 2011). The LOT-R is available free of charge for research and teaching purposes. The JHS adaptation of the LOT-R is rated on a 4-point Likert-like scale and thus scores range from 0 to 18.

7. *Obesity* A body mass index (BMI) equal to or greater than 30 (Centers for Disease Control and Prevention, 2013).

8. *Prevalence* The rate of existing cases of a disease within a population (Timmreck, 1998).

9. *Primary prevention* The halting of the occurrence of disease or disability (Timmreck, 1998).

10. *Psychosocial risk factor* The mental and social influences that have deleterious effects on health. For the purposes of this study, dispositional optimism is the psychosocial risk factor of interest.

11. *Secondary prevention* Detection or screening activities aimed at identifying pathogenic states (Timmreck, 1998).

12. *Socioeconomic status* The cumulative consideration of education, income, and occupation to determine one's social status.

13. *Tertiary prevention* Rehabilitation targeted at blocking the progression of disease or disability (Timmreck, 1998).

Assumptions

The researcher provides five (5) assumptions for consideration:

1. Dispositional optimism is clearly operationalized by Scheier and Carver (1985); it is measurable and grounded in theory.

2. Scores obtained from the JHS version of the revised Life Orientation Test (LOT-R) are valid and reliable within the population of interest.

3. The instrumentation used for anthropometry (e.g., weight scale, tape measure), blood pressures, and blood analytes were calibrated according to protocol as outlined in the JHS Manual of Operations.

4. The JHS cohort, consisting of four (4) sampling frames, is representative of the population of interest. Results from this study will be generalizable to the population from which the sample was drawn.

5. Responses to the LOT -R reflect the true disposition of JHS participants; consequently, social desirability bias is minimized.

CHAPTER II

LITERATURE REVIEW

Background

Heart disease is a common colloquialism for cardiovascular disease (CVD). CVD is a family of non-communicable chronic diseases that affect the circulatory system, namely the heart and blood vessels. The circulatory system is a closed system where nutrients, gasses, pathogens, hormones, and other organic molecules are exchanged between the body and the environment (American Heart Association [AHA], 2012a). Chronic injury to the circulatory system initiates a sequence of reactions that inhibit the body's ability to maintain homeostasis (AHA, 2012a). Such impairment in the body's functioning consequently leads to the development and progression of CVD.

The prosaic description of CVD development in the preceding paragraph provides a short summary of the metabolic activities that initiate CVD. CVD is a complex disease; our understanding of its etiology is yet unfolding. As there are numerous pathways to CVD development, there are also various manifestations of CVD in the human body. The most prevalent presentation of CVD is coronary heart disease (CHD). CHD is a progressive disease that initiates with the accumulation of plaque within the walls of an artery. Plaques are comprised of cholesterol, fat, and other cellular material found in the blood. Plaque accumulation can occur in three major blood vessels, the coronary, peripheral, or carotid arteries thus inhibiting blood supply to the heart, extremities, and brain, respectively (NIH, 2009). Left unmonitored, the continual deposition of plaque within the artery walls leads to atherosclerosis, a hardening of the arteries.

Atherosclerosis is a chronic and often asymptomatic condition that increases the

probability of blockages or clots within the blood vessel; likely outcomes include myocardial infarction, stroke, or sudden death (NIH, 2009). Other types of CVD include congestive heart failure, cardiomyopathy, cardiac dysrhythmia, pulmonary heart disease, and hypertensive heart disease (AHA, 2012b).

Traditional risk factors for CVD include hypertension, hypercholesterolemia, obesity, diabetes, smoking, diabetes, physical inactivity (Kurian & Cardarelli, 2007), and metabolic syndrome (Gaillard, Schuster, & Osei, 2009), most of which are modifiable. Male gender, age, and heredity are common non-modifiable CVD risk factors. Current recommendations for decreasing CVD risk include maintaining a blood pressure below 120/80 mmHg and maintaining a body mass index below 25. Adopting healthy eating habits aids in managing serum cholesterol and serum glucose levels. The Department of Health and Human Services also recommends engaging in moderate intensity aerobic physical activity (e.g., brisk walking, water aerobics) 2.5 hours a week (HHS, 2008). Moreover, most doctors agree that smoking cessation is also essential in decreasing CVD risk.

Based on historical data, CVD risk assessments indicated Caucasian males who were middle-aged and middle-class as the dominant high-risk group for CVD events. Gradually, CVD risk became a greater area of concern for the poor, a class of people now vulnerable to diseases historically classified as prosperity diseases, (Stimson Center, 2011), including CVD. Contributory factors to CVD in the poor include lack of access to healthcare and inequity of other civil rights. In an unprecedented attempt to classify all diseases into three categories, McKeown (1988) resolved that pre-natal diseases, diseases of poverty, and diseases of prosperity encompassed the ways in which disease manifested

in the human body. Originally, maladaptation related to industrialization distinguished diseases of prosperity or affluence (Mackenbach, 2006). Today, prosperity diseases are preventable, chronic diseases that present in a society where low physical activity relative to daily caloric intake are cultural norms. These diseases are no longer relegated to persons with disposable income and wealth, but they indiscriminately affect the lives of all socio-economic classes of people. Other chronic diseases classified as prosperity diseases are diabetes mellitus, pulmonary disease, and cancer (Stimson Center, 2011). In short, long-term personal choices facilitate the onset of prosperity diseases. They are diseases of lifestyle. Some of the factors credited to bringing prosperity diseases to prominence are urbanization, demographic aging, and behavioral risk factors (Stimson Center, 2011).

If lack of access to healthcare, including health education and health promotion programs, influences the options and behaviors of the poor, then the correlation between health and socio-economic status is not conjecture. The literature substantiates this correlation (Diex-Roux et al., 1997; Jones et al., 2009). An illustration of the association between health and socio-economic status is observed in the southeastern U.S., a region plagued with the nation's highest prevalence of heart disease and poverty. The "Stroke Belt" is the name assigned to this region of the country. Based on 1980 data, the "Stroke Belt" is a contiguous cluster of 10 states (and one outlying state) whose stroke mortality rate was more than 10% above the average national stroke mortality rate (Perry & Roccella, 1998). A stroke is an acute event, consequential of cerebrovascular disease. The family of cardiovascular diseases includes cerebrovascular disease (WHO, 2012). Consequently, suggested alternative and yet equally appropriate epithets for this

geographic area can include the following: “Obesity Belt”, “Hypertension Belt”, or “Cholesterol Belt”, all of which refer to underlying conditions that are generally supportive of CVD progression.

The “Stroke Belt” consists of Alabama, Arkansas, Georgia, Indiana, Kentucky, Louisiana, North Carolina, South Carolina, Tennessee, Virginia, and Mississippi (Perry & Roccella, 1998). Of these states, Mississippi has the highest CVD mortality rate with approximately 41% of all-cause mortality attributed to diseases of the heart (Mississippi Department of Health [MSDH], 2004). According to the U.S. Census Bureau, more than 21.6% of Mississippians live in poverty; nationally, 14.3% of the population lives in poverty (U.S. Census Bureau [CENSUS], 2013). Mississippi not only has the highest percentage of poverty in the nation but for many African Americans in Mississippi, poverty is an inevitable reality. For African American men and women who live in the state of Mississippi the percentage of poverty is 32% and 38%, respectively. In the nation as a whole, 27.2% of African Americans live in poverty. Consequently, these data position the state of Mississippi as an ideal source of information for examining the psychosocial risk factors for CVD in African Americans.

History of Heart Disease Research

Large scale cardiovascular disease research has its beginnings in Great Britain, where in 1944, Dr. Jerry Morris sought to retrospectively study the relationship between occupational physical activity and coronary heart disease (CHD) in middle-aged men (n=5,000) (Morris & Crawford, 1958). The hypothesis driving his research stated the incidence of CHD would be lower in men whose occupations demanded high levels of physical activity. A major finding from the study revealed that while coronary narrowing

was present in all levels of occupational physical activity, occlusion of the main coronary artery was more common in sedentary and light physically active workers than in active and heavy-duty workers (Morris & Crawford, 1958). This outcome suggested a protective effect and not a causal effect of occupational physical activity on CHD.

Four years after Dr. Morris began his epidemiological study in Great Britain, the Framingham Heart Study (FHS) launched in the U.S. The FHS is an intergenerational, observational study of CVD in an adult population of Framingham, Massachusetts residents. The original cohort consisted of 5,209 participants between the ages of 30 and 62 years (Framingham Heart Study [FHS], 2013). Some of the major contributions of the FHS include identifying cigarette smoking, hypertension, hypercholesterolemia, obesity, and menopause as factors that increase CVD risk. Complementing Dr. Morris's findings, Framingham researchers also identified an inverse relationship between physical activity and CVD (FHS, 2013).

After the initiation of the FHS, NIH became sympathetic to studying the epidemiology of CVD in racially diverse samples. The rise of research studies like Coronary Artery Risk Development in Young Adults (CARDIA) in 1985, Atherosclerosis Risk in Communities (ARIC) in 1987, and the Multi-Ethnic Study of Atherosclerosis (MESA) in 2001 was eminent. From an exclusive African American field site of the ARIC study, the Jackson Heart Study (JHS) developed into an independent research study. Commissioned in 2000, NIH entrusted the JHS with identifying novel CVD risk factors in an all African American cohort within the Jackson, MS Metropolitan Statistical Area (MSA). JHS is an observational, epidemiological study of CVD whose charge has included a consideration of how genetics, socio-cultural norms, and traditional risk

factors interact toward the development of CVD. Part of this initiative includes investigating psychosocial constructs in the epidemiology of CVD. Discrimination, anger, hostility, coping (problem focused, emotion focused, and religious), John Henryism (coping strategy where high levels of effort are expended), depression, and dispositional optimism are the psychosocial constructs that JHS elected to focus (Jackson Heart Study [JHS], 2001a). The study of dispositional optimism, the positive expectation of future events, as a determinant of CVD is a proactive approach to health. Empirical evidence generally supports dispositional optimism as an independent predictor of health outcomes (Giltay et al., 2004; Matthews, Raikkonen, Sutton-Tyrell, & Kuller, 2004; Scheier et al., 1989; Scheier et al., 1999; Tindle, et al., 2009). Within the JHS, dispositional optimism remains understudied, but it is the goal of this research to elucidate the relationship between dispositional optimism and CVD mortality within a vulnerable African American population.

Racial Differences in CVD

Nationally, CVD is an epidemic that disproportionately affects African Americans (Taylor et al., 2005). In 2008, the NIH reported CVD mortality for African Americans as 301.9 and 201.1 per 100,000 for males and females, respectively (NIH, 2012). During that same year, the mortality rate for Caucasian males was 235.9 per 100,000 and 150 per 100,000 for Caucasian females (NIH, 2012). Between the races, there is a disparity of more than 50 deaths per 100,000; the greatest observed difference is among men. A similar inequitable trend was observed in Mississippi. For the year 2000, the Mississippi Department of Health reported mortality rates between African American and Caucasians as 85 and 107 more deaths per 100,000 than for men and women, respectively (MSDH,

2004). These statistics highlight the need for an innovative approach to CVD prevention and treatment within African Americans in Mississippi. Though extreme, Mississippi statistics are reflective of a national trend in that they paint a picture of the health of African Americans as a national group.

Mississippi's 2004-2013 plan to prevent heart disease and stroke includes "identifying key socio-cultural influences on CVD that are specific to each target community and implementing multi-level interventions to improve health and overcome health disparities in those communities" (MSDH, 2004, p. i). The CVD and stroke plan for the state of Mississippi is not concrete, and there is little tangible evidence to suggest effective implementation of that plan to the benefit of Mississippi's residents. The state of Mississippi's methodology for identifying the socio-cultural influences on CVD within communities is not stated explicitly. Attempts by the researcher to contact MSDH regarding the specific steps involved in implementing the prevention plan have been unfruitful.

Race influences wellness. During the mid 20th century, differences in heart disease mortality rates between African Americans and Caucasians were similar (Williams & Leavell, 2012). Yet, as the new millennium approached, all documented races experienced declines in CVD mortality rates, but the decrease in CVD mortality for African Americans progressed at a slower rate than for other racial groups. Consequently, an ever-widening CVD disparity was born (Victor et al., 2004). This disparity in CVD events was especially apparent in persons under the age of 65 years (Victor et al., 2004). By 2007, the age-adjusted risk for CVD mortality was 30% higher in African Americans than in Caucasians (Williams & Leavell, 2012). Moreover, African Americans presented

with heart failure earlier in life, accounting for the highest prevalence of heart failure in the nation (Bibbins-Domingo et al., 2009). In addition to earlier onset of disease, African Americans often present with more advanced forms of disease at diagnosis (Williams & Leavell, 2012). One supposition attributes the lack of access to care to the health disparities that African Americans experience. While the contributory factors for health disparities in African Americans, particularly CVD disparities, are beginning to surface, it is an indisputable fact that African Americans bear a disproportionate burden of the negative health outcomes attributed to CVD (Taylor et al., 2005). Fortunately, there is hope in knowing that a considerable amount of this burden is linked to modifiable risk factors (Kurian & Cardarelli, 2007).

Research is supportive that there are distinctive metabolic differences that place African Americans at a greater risk for CVD events. A systematic review of 12 CVD research studies concluded that African Americans had a significantly higher prevalence of hypertension and elevated body mass index than Caucasians (Kurian & Cardarelli, 2007). Additionally, among African American women, abdominal obesity was more prevalent than in other racial groups (Kurian & Cardarelli, 2007). Moreover, during 20 years of follow-up, findings from the CARDIA study suggest incident heart failure in African Americans to be at least 20 times higher than in Caucasians (Bibbins-Domingo et al., 2009). The CARDIA cohort consists of 52% African Americans, yet 96% of the incident heart failure cases occurred in African Americans. The CARDIA findings also revealed that among African Americans between the ages of 18 and 30, the risk of incident heart failure doubled with each standard deviation (10.0 mm Hg) increase in diastolic blood pressure (Bibbins-Domingo et al., 2009). Also, untreated and resistant

hypertension was evident in all of the African American heart failure cases (Bibbins-Domingo et al., 2009).

As noted, CVD is prevalent among southern African Americans, and they bear a disproportionate burden of the negative health outcomes attributed to this family of diseases. The body of literature adequately documents CVD risk factors (Taylor et al., 2005). Common non-modifiable risk factors for CVD include age, genetics, menopause, and preeclampsia (AHA, 2012c). While these factors are beyond the control of at-risk individuals, treatment models should then focus on overcoming the traditional, modifiable risk factors (e.g., smoking, hypertension, elevated blood cholesterol, high triglycerides, obesity) and emerging risk factors (e.g., C-reactive protein levels, low folate intake, psychosocial influences) for CVD. Further complicating matters, persons with CVD are often afflicted with chronic co-morbidities (Tong & Stevenson, 2007).

Diabetes mellitus (DM) and chronic kidney disease (CKD) have shared risk factors with CVD that ultimately strengthen the probability of co-occurrence (Tong & Stevenson, 2007). Co-morbidities inhibit multiple systems in the body and places patients at a greater disadvantage for overcoming disease. Research initiated through the Framingham Heart Study and related research studies have successfully identified a biological profile for CVD, CKD, and DM risk. Known as metabolic syndrome, this profile includes indicators of central adiposity, high fasting glucose, high serum cholesterol, and high blood pressure (AHA, 2012c). Defined by the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III, the criteria for metabolic syndrome consist of metabolic and anthropometric thresholds (Gaillard et al., 2009). Patients with problematic measures on three or more parameters out of five qualify as

having metabolic syndrome. The parameters for metabolic syndrome include (1) blood pressure > 130/85 mmHg, (2) serum glucose > 100 mg/dL, (3) high-density lipoprotein cholesterol (HDL-C) < 40 mg/dL for men and < 50 mg/dL for women, (4) triglycerides > 150 mg/dL, and (5) waist circumference > 40 inches in men and > 35 inches in women (Taylor et al., 2008).

Excluding children and adolescents, approximately 47 million people in the U.S. have metabolic syndrome (Gaillard et al., 2009). The prevalence of metabolic syndrome in an African American sample (n=5,036) was 39.4% and far exceeds national estimates of 26.7% in this group (Taylor et al., 2008). At baseline, the age-adjusted prevalence of metabolic syndrome in men and women was 33.4% and 44.8% ($p < .0001$), respectively (Taylor et al., 2008). The most frequent triad of metabolic syndrome parameters observed in this sample was elevated blood pressure, abdominal obesity, and low HDL-C (Taylor et al., 2008). Further research purports that despite extreme rates of CVD morbidity and mortality, African Americans generally have lipoprotein metabolic profiles that are supportive of cardiovascular health. In a review of metabolic syndrome in African Americans, Gaillard et al. (2009) concluded that higher levels of HDL-C, lower serum triglyceride levels (generally protective against insulin resistance but not in African Americans), and larger, buoyant, less atherogenic low-density lipoprotein particle sizes are dominant characteristics in African Americans. Focused research of cardiometabolic characteristics in African Americans may prove beneficial in developing a metabolic syndrome profile that has better predictive ability in African Americans.

Central adiposity, an indicator for obesity, is one of the most visible and modifiable risk factors for CVD that make up metabolic syndrome. One in three

Mississippians is obese (Centers for Disease Control and Prevention [CDC], 2011), an ignominious characteristic that ranks Mississippi (MS) as the most obese state in the nation. Obesity is a contributing factor in four of the ten leading causes of death in the U.S. (Kochanek et al., 2011), and it accounts for almost a tenth of the annual medical expenditures in the U.S. (Mississippi Department of Education, 2009). Noting the correlation between obesity and CVD, any successful treatment model would be wise to consider a component that addresses weight loss through physical activity and nutrition.

While clinical differences in CVD are apparent between African Americans and Caucasians, various social and economic differences exist as well between the races. Williams and Leavell (2012) explored the social context of CVD and concluded that socio-economic status contributes to disparities in CVD. They emphasize a graded inverse relationship between CVD mortality and educational attainment, noting that roughly a third of Caucasians and one-fifth of African Americans pursue higher education (Williams & Leavell, 2012). Thomas, Thomas, Pearson, Klag, and Mead (1997) identified disparities in CVD outcomes among African American and Caucasian medical doctors of equivalent income and education. A follow-up period of 25 years revealed that African American doctors presented an almost two-fold risk for CVD than Caucasian doctors. However, Williams and Leavell (2012) point out that racial disparities in wealth are greater than those for income alone. These findings are supportive of prospective research conducted by Duncan, Daly, McDonough, and Williams (2002) that identified wealth and family income as optimal indicators of SES in health research. Excluding home equity, African Americans have one penny in financial wealth for every dollar that Caucasians have amassed (Williams & Leavell, 2012). Also, parental socioeconomic

status is associated with negative health outcomes irrespective of one's adult income (James et al., 2006). Potentially, wealth and parental SES, not income and education, differentiate African American medical doctor's health outcomes from Caucasian medical doctor's health status.

CVD and psychosocial research

By the 1970s, Framingham researchers began to explore the social determinants of CVD. In a prospective, eight year study (n=1674) of CHD incidence and Type A behavior (a psychosocial factor) in persons aged 45 to 77 years, Type A behavior was demonstrated to independently predict CHD incidence (Haynes, Feinleib, & Kannel, 1980). In this study, CHD incidence in middle aged men with Type A behavior was significantly higher ($p < .05$) than in Type B behavior men of the same age group. Similarly, CHD incidence among Type A behavior housewives was three times greater than in Type B housewives ($p < .05$) (Haynes et al., 1980). These findings are significant in that the FHS demonstrated a psychosocial trait as a legitimate indicator of CVD health.

Dispositional optimism in CVD research

Dispositional optimism is a general expectation of positive future events. A positive attitudinal disposition is a characteristic of persons who generally hold positive expectations for future events. As optimistic people forge through the uncertainties of life, they have a confident expectation that good things rather than bad will happen to them (Scheier & Carver, 1985). Optimistic people tend to make decisions that support healthy behaviors, even in the presence of adverse events (Carver, Scheier, & Segerstrom, 2010; Scheier & Carver, 1993; Scheier et al., 1989; Segerstrom & Nes, 2006). Consequently, optimism is a positive psychological resource that decreases one's risk for

the vulnerabilities (Lai et al., 2005) that support the determinants of disability, disease, and death. In response to adversity, optimists form a mental image of a desired outcome with the expectation that life will conform to the image in their mind.

By 1989, the study of the social determinants of CVD expanded to include dispositional optimism when Scheier et al. (1989) examined the relationship between dispositional optimism and recovery from coronary artery bypass surgery (CABS) (Scheier et al., 1989). In a small sample ($n=51$) of Caucasian men with a negative history for CABS, optimists demonstrated a six month postoperative higher quality of life than pessimists, $F(1, 43) = 34.14, p < .0001$. Significant findings from this study revealed that upon facing surgery, optimists were more active in seeking out information that enabled them to make plans and set goals for recovery, $F(1, 45) = 10.18, p < .005$. Also, pessimistic patients were less satisfied with the level of medical care they received, $F(1,45) = 10.54, p < .003$. In the same study, Scheier et al. (1989) also sought to determine whether differences in coping strategies mediated the observed effects of dispositional optimism. Path analysis revealed that generally, optimism exerted direct effects on outcome variables; beta coefficients for direct effects ranged from .2 to .6 (Scheier et al., 1989).

A primary exploration of dispositional optimism in the context of cardiovascular disease by Scheier et al. (1989) identified the link between the pessimistic disposition and risk for difficult and prolonged recovery (Scheier et al., 1989) from CABS. In addition to conducting foundational research in the area of dispositional optimism and heart disease, Scheier et al. (1989) also brought to the forefront the importance of incorporating a patient's psychological disposition into secondary and tertiary heart disease prevention

strategies. For pessimists this may involve developing rehabilitation programs that address the patient's lack of initiative or interest in gathering requisite information that will facilitate long-term positive health outcomes.

There is a compelling body of evidence in support of formally acknowledging dispositional optimism as a relevant CVD risk factor. Scheier et al. (1989) also demonstrated that optimistic persons were less likely to exhibit evidence of myocardial infarction (heart attack) during CABS, $F(1,46) = 7.82, p < .01$. Also in this study, evidence that optimism differentiated pre-surgery hostility, $F(1, 43) = 9.80, p < .005$, was presented (Scheier et al., 1989). Similar findings were duplicated in a large sample ($n=97,253$) of women (>10% African American) suggesting that optimists were less likely to be hostile, $p < .01$ (Tindle et al., 2009). Additionally, half of the most pessimistic African American women in this study were also the most hostile.

The study of dispositional optimism and subclinical CVD is an area of research that scientists have also explored. A subclinical disease is one where the patient has failed to present with clinical symptoms of the disease, but clinical tests (e.g., blood analysis) may or may not confirm the presence of disease (Timmreck, 1998). Using heart failure as an example, heart failure is a CVD event where the heart insufficiently pumps blood to meet the body's needs. Common symptoms of heart failure include dyspnea (shortness of breath), swelling of the extremities (e.g., feet, arms), and fatigue (NIH, 2013). Consequently, in subclinical heart failure patients, these symptoms would be undetected or extremely mild.

In two independent elderly samples ($n=1084$ and $n=6195$), a significant relationship emerged between dispositional optimism and inflammatory markers

(indicators of subclinical disease). Increased dispositional optimism scores were associated with decreased serum C-reactive protein (Rius-Ottenheim et al., 2011), interleukin-6 (IL-6), and fibrinogen levels (Roy et al., 2010). These findings were also observed in an adolescent sample of 12th graders (n=950, 44% African American). Among the African American students, lower levels of IL-6 were significantly associated with higher dispositional optimism scores (Oreskovic & Goodman, 2013). Also, in a study of women (n=209), high pessimism scores were predictive of greater carotid artery wall thickness ($p < .007$) (Matthews et al., 2004). Thicker artery walls are indicative of atherosclerosis, a risk factor for CVD.

Studies to elucidate the relationship between known CVD risk factors and dispositional optimism have produced significant outcomes. In a study of adolescents (n=217), a significant direct relationship between pessimism and ambulatory blood pressure was observed (Raikonen & Matthews, 2008). In another study of adolescents (n=1298, 46% African American), the likelihood of obesity was greater in the less optimistic subgroup (Khullar, Oreskovic, Perrin, & Goodman, 2011). Therefore, in the young, dispositional optimism is related to blood pressure and obesity.

In three samples of mature adults, researchers concluded dispositional optimism to be a determinant of mortality. All-cause death rates increased with decreased levels of dispositional optimism ($p < .0001$) in a large sample of women (n=97,253) (Tindle et al., 2009). Also in two independent Dutch samples, men with low dispositional optimism demonstrated a high CVD mortality rate ($p < .001$) (Giltay, Kamphuis, Kalmijn, Zitman, & Kromhout, 2006), and optimism was associated with a decreased risk for all-cause mortality ($p < .001$) (Giltay et al., 2004).

The study of dispositional optimism in CVD research has evolved to include various presentations of CVD events and outcomes. The interest in continued to continue study in this area rests upon the reiteration of research findings in support of a dispositional optimism and CVD relationship. As the empirical evidence for such a relationship continues to expand, the hope of unveiling the complete etiology of CVD strengthens.

Theoretical Perspective

The study of optimism as a psychosocial construct is an extension of positive psychology. At a time of preoccupation with predicting disappointment, hopelessness, and anguish, psychological theories favorable to life enhancing human qualities were understudied (Gillham & Seligman, 1999). The emphasis on negative psychology was thought to reflect an urgency in addressing the immediate problems and dangers associated with negative emotions (Gillham & Seligman, 1999). Kobau et al. (2011) characterize the shift from pathology and dysfunction to positive emotions and wellness as the hallmark of positive psychology. Building positive human qualities by comprehending and fostering factors that allow individuals and communities to thrive is the aim of positive psychology (Kobau et al., 2011; Seligman & Csikszentmihalyi, 2000). Since the emergence of positive psychology, the literature reflects an increase in predicting positive attributes and psychosocial assets (Kobau et al., 2011).

Study of the human personality is a branch of psychology that complements positive psychology. Personality traits are the building blocks of the composite personality. They are enduring feelings, thought patterns, and behaviors (Roberts & Mroczek, 2008). Dispositional optimism is just one of numerous traits that cumulatively

comprise the personality. Personality theorists generally accept the approach of mapping specific traits onto a broad five factor structure called the Big Five. The Big Five consists of five dimensions of personality that include extraversion, agreeableness, conscientiousness, emotional stability, and openness to experiences (Weisberg, DeYoung, & Hirsh, 2011). Extraversion is an indicator of sociability and assertiveness (i.e., talkative, energetic); the tendency toward cooperation and maintaining social harmony (i.e., good-natured, trustful) characterizes agreeableness (John & Srivastava, 1999; Weisberg et al., 2011). Conscientiousness describes the degree to which an individual exhibits self-discipline and organization (i.e., responsible, orderly), while, neuroticism (emotional stability) relates to the tendency toward negative emotion in response to adversity (i.e., anxiety, depression) (John & Srivastava, 1999; Weisberg et al., 2011). The degree of imagination, creativity, and intellectual curiosity characterize the dimension of openness to experiences (i.e., independent minded) (John & Srivastava, 1999; Weisberg et al., 2011).

Disagreement among theorists exists however in the malleability of the personality and its components. The contemporary perspective argues for the heritability of personality traits and thus concludes that personality trait change is a rare occurrence (Srivastava, John, Gosling, & Potter, 2003). The plasticity of personality traits is the focus of the contextual perspective, a position that has gained empirical support in recent years. The Californian view of the personality system, roughly paraphrased, suggests that the composite personality is akin to an earthquake proof structure (e.g., house) that is built along a fault line. While the earth below the structure (personality trait) may shift as tremors arise, the structure (composite personality) remains visibly unshaken and stable,

overall (Srivastava et al., 2003). Similarly, as personality traits develop, shift, and occasionally change, the composite personality remains stable throughout the process.

While contextual theorists believe in the mutability of personality traits, there is a consensus among both contemporary and contextual theorists that altering an individual's composite personality typology is rare. To this point, the mutability of personality traits beyond adulthood is the focus of emergent research. In a national study of 7,108 adults, aged 25 to 74 years old, personality traits were significant predictors of generalized health and blood pressure (Turiano et al., 2012). A review of cross-sectional and longitudinal research by Roberts and Mroczek (2008) lends support to the mutability of personality traits. Based on their review of previous findings, Roberts and Mroczek (2008) affirm that personality trait change occurs throughout an individual's lifetime, and between the ages of 20 and 40 years old is the greatest level of change observed. Srivastava et al. (2003) pose the question of whether the development of personality beyond adolescence is set like plaster or if the personality is persistent to change. Based on the data, they conclude that personality development continued beyond the age of 30 years old. Empirical evidence supports personality trait change; there is an emerging body of knowledge in support of personality trait change as a predictor of mortality risk (Mroczek & Spiro, 2007). As personality trait change gains acceptance among theorists, identifying the conditions and mechanisms by which this change occurs should drive future research.

Personality trait change occurs organically through changes to one's social environment, occupational experiences, and major life events (Roberts & Mroczek, 2008; Srivastava et al., 2003; Turiano et al., 2012). Researchers also demonstrate personality

trait change through deliberate intervention. Positive visualization is a documented optimism manipulation technique. It includes a family of exercises that enable an individual to imagine and anticipate future desirable outcomes (Riskind, Sarampote, & Mercier, 1996). Visualization of best possible self (BPS) is a positive visualization technique. Through writing exercises, BPS enables an individual to document concrete personal goals (Sheldon & Lyubomirsky, 2006). In two independent experimental studies, BPS groups but not control groups experienced gains in dispositional optimism (Peters, Flink, Boersma, & Linton, 2010; Sheldon & Lyubomirsky, 2006). Fosnaugh, Geers, and Wellman (2009) obtained similar results using future thinking manipulation, a form of visualization technique.

Based on the examples provided above, individuals who intentionally focus their thoughts have the ability to engage in deliberate personality change. Essentially, one's thoughts are led captive to a desired outcome. As the mind's focus shifts to a desirable outcome, the requisite commitments for attaining that outcome begin to unfold mentally. As such, replaying the mental image systematically builds confidence that the outcome is attainable. The implication here is that dispositional optimism is learnable through an individual's capability to lead and train their thoughts. On this premise, public health educators have the foundation to implement programs whose aim emphasizes personality trait change for the benefit of positive health outcomes.

Theoretical framework

Dispositional optimism research rests upon a theoretical foundation of both cognitive and behavioral frameworks. Carver and Scheier (1981) marked the beginning of research and global interest in dispositional optimism through an application of

control-theory to human behavior. By 1985, Scheier and Carver operationalized dispositional optimism, developed the Life Orientation Test (LOT) to measure the construct and conducted two studies to test the psychometric properties of the LOT. They defined dispositional optimism as the favorability of a person's generalized outcome expectancy (Scheier & Carver, 1985). By 1993, Scheier and Carver, (1993) defined dispositional optimism as holding positive expectancies for one's future. Dispositional optimism is a global measure of optimism. A person with high dispositional optimism generally expects positive outcomes; this is an optimistic person. The pessimistic person tends to expect negative outcomes, a function of low dispositional optimism (Rasmussen, Worsch, Scheier, & Carver, 2006). Carver and Scheier (1981) used the model of behavioral self-regulation to operationalize dispositional optimism. The model describes the processes that facilitate expected outcomes; it suggests that one's actions are directed by a belief in the probability of realizing the anticipated outcome (Scheier et al., 1989). Carver and Scheier (1981) also argued that goals influence human behavior and that the continual engagement or disengagement of those goals determines one's attitudinal disposition (Rasmussen et al., 2006). The model of behavioral self-regulation suggests that when one sees an outcome as attainable, continued effort is exerted to obtain the outcome; whereas, when people are doubtful that their efforts will lead to the desired outcome, reduced effort and disengagement from the goal pursuit is likely (Nes & Segerstrom, 2006; Scheier, Carver, & Bridges, 1994). Born out of the behavioral self-regulation model, there are five theoretical frameworks that drive the dispositional optimism model, they include, Cybernetics, Self-Awareness Theory, Expectancy Theory, Expectancy Value Theory, and the Theory of Planned Behavior.

Cybernetics. Conceptually, cybernetics, a control theory model, is at the core of dispositional optimism theory (Carver & Scheier, 1982). Weiner (1948) originally developed cybernetics as a theory of communication and control in machines. Since the unconventional application of control theory to behavioral self-regulation by Carver and Scheier in 1981, researchers have applied control theory to the disciplines of engineering, mathematics, economics, and medicine (Carver & Scheier, 1982). Within self-regulating systems, negative feedback loops function to maintain a desired goal or condition; this is the premise behind control theory (Carver & Scheier, 1982). The basic unit of control in control theory is the feedback loop, which consists of inputs, a reference value, a mechanism by which to compare the inputs to the reference value (comparator), and outputs (Rasmussen et al., 2006). The process is initiated when comparison between the input and reference value occurs, if a discrepancy is detected by the comparator, corrective action is initiated to bring the two into harmony by manipulating the input value (Doyle, Francis, & Tannebaum, 1990). In the absence of a discrepancy, no action is warranted to change the output. Characteristically, the feedback loop must be negative and self-regulating. A negative feedback loop is a discrepancy reducing loop (Carver, 2006). Its purpose is to negate or reduce the deviation between the input and the reference value (Carver & Scheier, 1982). The feedback loop is also self-regulating or closed. Therefore, the input is not intermittent but rather continuous to allow for back and forth communication between the input and the reference value (Rasmussen et al., 2006).

In self-regulating systems like the human body, Carver and Scheier (1981) theorize goal attainment (homeostasis) is regulated through not one but a hierarchy of negative feedback loops. They ascribe to the idea that desired goals are the mechanism

that drives the hierarchy of negative feedback loops, which inevitably drive human behavior. Within the loop, goals are approached or avoided based upon whether or not one expects to meet the requirements to achieve the goal under consideration (Rasmussen et al., 2006). For Carver and Scheier, goals are superordinate and subordinate in nature, each order possessing its own input, reference value, and outcome, hence the hierarchy. Applying control theory to human behavior suggests that superordinate (higher order) goals differ in level of abstraction from subordinate (lower order) goals. Higher order goals are more abstract than lower order goals and are achieved through accomplishing concrete activities that are associated with lower order goals (Rasmussen et al., 2006).

To illustrate the application of control theory to human behavior, the following fictitious example is provided. If an individual aspired to a healthier lifestyle, suggested subordinate concrete goals in support of the superordinate goal include (1) increasing physical activity and (2) increasing the intake of nutrient rich foods. Progressing down the hierarchy of goals, a specific direction of behavior in favor of increased nutrition unfolds. The possibilities of such include (1) adhering to the U.S. Department of Agriculture's My Plate guidelines, eliminating (2) food additives (e.g., hormones, pesticides, preservatives, artificial dyes), (3) high fructose corn syrup, and (4) genetically modified foods from the diet, as well as (5) increasing consumption of heirloom vegetables. Similarly, increasing physical activity to meet the overall goal of becoming healthier would have its own accompanying concrete goals. Traveling down the hierarchy, each of the five goals listed above are represented by measurable activities. Suggestions for eliminating additives from one's diet may include (1) purchasing milk from a local organic farmer, (2) purchasing groceries from Rainbow Grocery Co-op, and

(3) cooking meals at home versus eating out. Using the goal of becoming healthy as an example, the hierarchy of goals is a truly complex system of behavioral self-regulation. And, success in meeting the superordinate goal of attaining a healthier lifestyle depends upon accomplishing lower order yet more concrete goals. According to Carver and Scheier, approaching or disengaging throughout the hierarchy of goals is contingent upon one's expectation of achieving the goal in question (Carver & Scheier, 1982; Rasmussen et al., 2006). Therefore, approaching a goal is the result of one's positive expectation of reducing the deviation observed between being healthy and not being healthy. People who generally approach goals are labeled optimists, and those who generally disengage are called pessimists.

Self-awareness theory. While Carver and Scheier's theoretical approach to dispositional optimism is heavily influenced by cybernetics, the contribution of Self-awareness Theory (Duval & Wicklund, 1972) is acknowledged here. The self-awareness component of Carver and Scheier's model is adapted from Duval and Wicklund's (1972) idea that objective self-awareness lends itself to favorable outcomes. As one focuses attention inward, self-evaluation occurs that facilitates a comparison between one's current behavior and the desired perception of self. In the case of dispositional optimism, an optimistic person will evaluate the desired goal as well as the behavior required to achieve that goal; ultimately, the determination to pursue the goal in question is predicated upon whether or not one believes that they possess the resources to achieve the goal. The determination of resources is subsequent to a self-inventory.

Expectancy Theory. The dispositional optimism model also borrows from Vroom's (1964) expectancy theory, which maintains that the motivation to realize a specific outcome will govern behavior. Vroom operationalized motivation as (1) the product of the expectancy of realizing a desired outcome, (2) receipt of reward upon attaining the outcome, and (3) valuing the reward. Expectancy theory suggests that decisions are negotiated based on these three components. Therefore, the positive expectation of a future event is the motivation to pursue the event.

Expectancy value theory and Theory of planned behavior. Fishbein and Ajzen (1975) and later Ajzen (1985) built upon Vroom's theory and coined the Expectancy Value Theory and the Theory of Planned Behavior, respectively. The former focuses on the processes involved in attitude. The latter predicts that behavior (behavioral intention) is the accumulation of one's attitudinal disposition toward the behavior (attitude), the attitudinal disposition of one's social influence (subjective norm) regarding the behavior, and the belief that factors exist to encourage or impede the behavior (perceived behavioral control) (Fishbein & Ajzen, 1975).

Dispositional optimism theory borrows from Weiner's control theory with the added elements of self-awareness, motivation, and expectation. Carver and Scheier (1982) provide an illustration of the construct that can be applied to CVD. Suppose a patient is looking to assess their CVD risk through pulse pressure (the absolute difference between the systolic and diastolic blood pressures). In terms of control theory and expectancy, the patient will (1) measure their blood pressure with a sphygmomanometer, and (2) a comparison between the derived pulse-pressure (input), and acceptable range (reference value) will be initiated. If a discrepancy exists, the participant will self-focus

to determine if their expectation of overcoming the deviation is high (optimism) or low (pessimism). A positive expectancy of reducing the deviation will support behaviors that will reduce pulse pressure (i.e., changes in nutrition, increased physical activity).

Otherwise, a participant's negative expectation of reducing the deviation will result in disengaging from the goal of assessing CVD risk. Therefore, attitudinal disposition or one's approach to life guides behavior. In the case of dispositional optimism, a positive attitudinal disposition enables behavior that is beneficial to health, whereas, pessimism (negative disposition) fosters behaviors that are detrimental to health.

Summary

Public health practitioners attempt to overcome deviations from optimal health through health promotion programs whose core and initial activities include health education. Health education is classically defined as a combination of learning experiences that increase knowledge or influence attitudes of populations (WHO, 2014b). The clear intent of public health research is to identify emergent genetic, environmental, and behavioral risk factors that precipitate adverse health events. Quite often, public health research reveals disease risk factors that cannot be manipulated to influence health favorably. These immutable characteristics are traditionally called non-modifiable risk factors. Non-modifiable risk factors are often biologic (e.g., eye color, sex, age) but not exclusively biologic. Contingent upon the population and factors under investigation, factors like geography, culture, or religion are also considered immutable. Consequently, the exercise of identifying non-modifiable risk factors are of value when the research objective is to identify at-risk populations, but when the research objective shifts to

realizing changes in health outcomes, identifying modifiable risk factors becomes the focus of health promotion activities.

Behavioral and attitudinal risk factors are but a subset of influences that encompass modifiable risk factors. According to the Psychology Dictionary (2014), a behavioral risk factor includes a behavior or pattern of behavior that positively correlates with unfavorable health outcomes. Historically, behavioral risk factors in public health research include but are not limited to smoking and illegal drug use, high-risk sexual activity, lack of physical activity, and stress. The present research effort will examine dispositional optimism as a statistically significant modifiable risk factor for CVD death. The outcome of this research will potentially drive CVD health promotion initiatives that focus on educating populations, in this case, African Americans, on altering a singular personality trait in favor of decreased CVD mortality risk. While it is beyond the scope of this discussion to speculate on the architecture and implementation of such programs, if dispositional optimism tests as a significant indicator of CVD mortality in this and prospective research, health education curricula for shifting one's disposition toward the positive end of the spectrum through visualization techniques are eminent.

A review of the literature from 1981 to 2014 revealed that CVD related dispositional optimism research varies by design, objective, and population of interest. Collectively, the studies presented here provide credibility to the argument that the way in which people view life has an influence on health outcomes. Generally, expecting positive outcomes is significantly associated with decreased prevalence of subclinical disease, traditional risk factors, and all-cause mortality. There are two major methodological drawbacks to many of the studies reviewed here. First, the dispositional

optimism instrument, the LOT or LOT-R, was not consistently administered across the studies. Some of the researchers measured dispositional optimism on a continuum ranging from low dispositional optimism (pessimism) to high dispositional optimism (optimism). Others elected to divide the instrument into two subscales that measured optimism and pessimism separately. Each investigator used their discretion in administering the instrument, but this flexibility lends itself to the lack of comparability across studies. Second, the population of interest varied across studies. Variability in age, gender, and race was profound. Most of the studies were not representative of at-risk minority or socioeconomic groups. Researchers often opted to study Caucasian participants, a population that presents a statistically lower CVD risk than African Americans. Clearly, researchers have a civic obligation to design studies whose recruitment plan includes a representative sample of African Americans, particularly in instances where taxpayer dollars are funding the research.

In part, the goal of the present study was to overcome some of the deficiencies that have been identified in previous studies. First, use of the LOT-R was consistent with arguments supported by Scheier, Carver, and Bridges (1994); for this study, dispositional optimism was operationalized by representing optimism and pessimism as polar opposites on a continuum. Second, the researcher has opted to focus on a spectrum of ages for adults rather than on narrow demographic age groups (e.g., adolescents, elderly). And finally, the lack of African American representation in dispositional optimism research was overcome by sampling from the JHS cohort.

CHAPTER III

METHOD

Generally, the purpose of epidemiology is threefold: (1) to explain the etiology of disease within a population, (2) to provide a basis for developing a to prevent and control disease, and (3) to determine whether data retrieved from the population of interest is consistent with proposed hypotheses (Timmreck, 1998). The purpose of this research was to fulfill the second mandate of epidemiology. The outcome of this and subsequent studies will influence whether psychosocial factors, particularly dispositional optimism, are incorporated into CVD treatment protocols. To this end, the Jackson Heart Study (JHS), an epidemiological study of CVD within an African American cohort was the sample upon which all analyses were conducted.

Timmreck (1998) identified several advantages for using the cohort model for studying disease. These advantages include (1) targeting and closely studying disease state and risk factors, (2) establishing baseline rates for future study, and (3) based on the data, discovering new cases to target for treatment.

Participants

The JHS is a large (n=5301), community based, observational study of cardiovascular disease with an exclusively African American cohort (64% female). The population from which the JHS sample was drawn consists of non-institutionalized African American adults residing in the Jackson, Mississippi Metropolitan Statistical Area (MSA). The Jackson, MS MSA consists of residents dispersed across three counties, Hinds, Rankin, and Madison. Four statistically equivalent sampling frames comprise the JHS cohort. The sampling frames include (1) a community random sample retrieved with

an Accudata list (17%), (2) a volunteer sample (30%), (3) individuals from the Artherosclerosis Risk in Communities (ARIC) research study (22%), and (4) family of the previous three groups (31%). At baseline, persons between the ages of 35-84 years old were recruited for inclusion. The design and recruitment methods of the JHS are outlined elsewhere (Taylor et al., 2005).

Research Design

The purpose of this research study was to evaluate dispositional optimism as a statistically significant risk factor for CVD mortality. The present research effort used a non-experimental, cross-sectional research design. The National Institutes of Health (NIH) charged the JHS with studying disparities in CVD health and healthcare in African Americans (Taylor et al., 2005). By design, the JHS is an observational study whose primary data gathering approaches included person-to-person interviews, telephone interviews, and clinical examinations. Data acquisition for the JHS spanned more than a decade. The sampling approaches included a random community sample and three self-selection or volunteer samples (Taylor et al., 2005). As of 2012, the JHS ended clinical data acquisition.

Due to the exploratory nature of this study, archival data from Examination 1 (baseline) of the JHS were used for all analyses. The baseline examination for the JHS spanned from September 2000 to March 2004 (Jackson Heart Study [JHS], 2013). Data acquisition in the JHS involved a variety of data collection techniques. Variable specific data acquisition techniques are described below with an introduction of each variable of interest.

Independent variables

Dispositional optimism. Dispositional optimism is a researcher-derived variable. A derived variable is an algorithmic function that is comprised of existing variables. Dispositional optimism was derived mathematically; the dispositional optimism composite score equals the sum of six items on the revised Life orientation test (LOT-R). The JHS adapted the LOT-R and incorporated it into their Second Year Questionnaire (AF2A). The AF2A was administered by JHS Annual Follow-up (AFU) interviewers via telephone to JHS participants after the baseline examination but within a six month window of the one year anniversary of the baseline examination. Further insight into the administration of the AF2A is described in the JHS Manual 1 (JHS, 2001a).

Body mass index and waist circumference. Body mass index (BMI) is a clinical measure of obesity, a risk factor for CVD. JHS investigators derived the BMI variable based on the equation, $BMI = \text{Weight (kg)} / (\text{Height (m)} \times \text{Height (m)}) = \text{kg/m}^2$ (CDC, 2013). According to the Centers for Disease Control and Prevention (CDC), BMI is an ideal surrogate measure for body fat because of the ease in gathering the data and calculating the measure (CDC, 2013). As an alternative to directly measuring body fat, BMI is a measure of weight adjusted for height and is therefore a measure of excess weight presumably attributed to excess fat (CDC, 2013). BMI values classify individuals as either underweight, normal weight, overweight, and obese. Index scores that fall below 18.5 or are greater than 30 indicate underweight and obesity, respectively. Scores between 18.5 and 24.9 suggest normal weight, and scores between 25 and 29.9 suggest pre-obesity or overweight (CDC, 2013). The relationship between BMI and chronic disease mortality is well documented in the literature. According to the National Institutes of Health, BMI

is a reliable indicator of CVD events (NHLBI, 2014). In spite of this commendation, the limitations of BMI are notable in its applicability. According to the CDC (2013), age, sex, ethnicity, and muscle mass confound the relationship between BMI and body fat. Consequently, neither does BMI differentiate between adiposity, muscle tissue, or bone mass nor does it delineate the distribution of fat within an individual person (CDC, 2013). For this reason, using both BMI and waist circumference to predict disease risk is a prudent approach to evaluating CVD risk. Consequently, waist circumference, also called abdominal girth, has emerged as a useful tool in determining adiposity. Some research suggests that it is a more predictive tool than BMI alone (Shields, Tremblay, Connor, & Janssen, 2012). Anthropometric measurement techniques are provided in the JHS Cohort Procedures Manual (JHS, 2001b).

Both BMI and waist circumference were measured on the ratio scale of measurement; they are continuous variables. Waist circumference was measured in centimeters.

Systolic, diastolic, and pulse pressure. Three blood pressure components were examined in this study. Systolic, diastolic, and pulse pressure were the components of interest. The NHLBI (2013) defines systolic blood pressure as the force of blood against artery walls as the heart beats; conversely, diastolic blood pressure is the force exerted when the heart is at rest. Mathematically, pulse pressure is the absolute difference between the systolic and diastolic blood pressures. Elevated systolic and depressed diastolic blood pressures are especially predictive of CVD events. Elevated systolic blood pressure increases the left ventricular workload whereas decreased diastolic blood pressure reduces coronary perfusion (Fernandez-Fresnedo et al., 2006), both of which

make fatal CVD events a likely reality for the patient. Pulse pressure is an indicator of arterial stiffness, a hallmark of atherosclerosis. Atherosclerosis is arterial plaque build-up, a precursor to coronary heart disease, carotid artery disease, and peripheral artery disease (NIH, 2009). A wide pulse pressure caused by raised systolic and reduced diastolic blood pressures presumably increases CVD risk more than other causes of increased pulse pressure (Fernandez-Fresnedo et al., 2006). The predictive ability of blood pressure as a CVD risk factor increases when multiple blood pressure components are considered (Franklin et al., 2009).

Systolic, diastolic, and pulse pressures are continuous variables. Systolic and diastolic blood pressures are measured on the ratio scale of measurement whereas pulse pressure is measured on the interval scale. Systolic and diastolic blood pressure readings were measured in units of millimeters of mercury (mmHg). Pulse pressure is a researcher-defined derived variable. JHS blood pressure protocol is delineated in the Blood Pressure Manual (JHS, 2001c). Due to multicollinearity with systolic and diastolic blood pressure, pulse pressure was not analyzed with inferential methods.

Total cholesterol. Plasma lipid composition, particularly total cholesterol, is a traditional predictor of cardiac events (Fernandez et al., 2013). Cholesterol ($C_{27}H_{46}O$) is the principle sterol found in animals; it is distributed universally in all tissues (National Center for Biotechnology Information [NCBI], 2013). The function of cholesterol in the body is to produce hormones and bile, promote cellular structural integrity, and synthesize vitamin D (University of California Davis [UCD], 2007). The U.S. Departments of Health and Agriculture have not published dietary guidelines for

cholesterol consumption because when dietary cholesterol (plant and animal sources) is unavailable, an autogenic (self-produced) supply is generated (UCD, 2007).

Total cholesterol was measured in units of milligrams per deciliter (mg/dL). It is a continuous variable, measured on the ratio scale of measurement.

C-reactive protein. Chronic, systemic inflammation plays a role in atherogenesis (Panichi et al., 2012). In CVD research, C-reactive protein (CRP), a non-specific inflammatory biomarker (Yousuf et al., 2013), is often studied prospectively in defining atherosclerotic risk in healthy and unhealthy cohorts (Panichi et al., 2012). After cellular injury or infection, CRP rapidly increases and is thought to be part of the innate immune response (Black, Kushner, & Samols, 2004). CRP concentrations were measured in units of milligrams per liter (mg/L); it is a continuous variable.

Demographic variables. The influences of age, gender, income, and education were also included as independent variables. Age (AGE01), measured in years, is a continuous variable that represents the participant's chronological age at baseline. Gender (GENDER) represents biological sex; males were coded as "1" and females as "0". The JHS derived family income variable (INC01FM) was recoded so that the incomes between \$0-\$24,999, \$25,000-\$49,999, \$50,000-\$74,999, \$75,000-\$99,999, and \$100,000 and over corresponded to codes of "1", "2", "3", "4", and "5", respectively. Education level (EDU01L1), grouped into less than high school, high school/GED, vocational school/some college, associate degree, bachelor degree, and post college retained the original codes of "1", "2", "3", "4", "5", and "6", respectively.

Preexisting conditions. Smoking and diabetes mellitus are known risk factors for CVD events. These characteristics were initially candidates to be included as control

variables in the analysis. Descriptive statistics revealed a large margin (greater than 50%) of missing values for smoking status. Consequently, smoking status was not analyzed inferentially but diabetic status was retained for analysis. Participant smoking and diabetic status are categorical JHS-defined derived variables.

Dependent Variable

Mortality. This research reflects attrition due to deaths that occurred between April 2003 and September 2013. Within the JHS, the Events Monitoring and Surveillance Sub-Committee tracked cohort deaths. The Morbidity and Mortality Classification Manual (JHS, 2001d) provides the process for abstracting events. The causes of death were obtained from the JHS participant's death certificate. The causes of death in this study reflect the immediate cause of death as indicated by the signee on the death certificate. Codes for causes of death were "1" for CVD death and "0" for non-CVD death. Deaths attributed to any of the cardiovascular diseases, including stroke, were coded as a CVD event. Cardiac arrest is often a precursor to respiratory failure, but death due to respiratory failure for which an underlying cause was not indicated were coded as non-CVD deaths. Causes of death unfamiliar to the researcher were adjudicated with online resources.

Instrumentation

Developed by Scheier et al. (1994), the revised Life Orientation Test (LOT-R) measures dispositional optimism. The predecessor to the LOT-R, the Life Orientation Test (LOT), was developed to assess generalized optimism and pessimism in individuals (Carver, 2011). The original instrument, the LOT, reflected the expectancy toward future events and unintentionally contained two items that measured coping. Consequently,

Scheier et al. (1994) reevaluated the LOT based on (1) shared variance with a third variable, (2) conceptual overlap with other constructs, and (3) criterion-related validity.

The LOT-R is available free of charge for research and teaching purposes (Carver, 2011). The instrument contains six items, three of which are negatively worded; all are rated on a 5-point Likert-like scale. At the discretion of the researcher, two filler items can be added to the LOT-R to increase the item count to eight. The filler items are not summed into the dispositional optimism score. An overall optimism score is computed by summing the six items (three items are reverse scored). Suggested use of the LOT-R operationalizes optimism and pessimism on a continuum; there is no cut-off score that definitively distinguishes one from the other. For this reason, the LOT-R is exclusively used for research and not clinical (diagnostic) applications (Carver, 2011). LOT-R scores range from 0 to 24; higher scores on the continuum imply an optimistic disposition (Carver, 2011). For the purposes of this study, dispositional optimism scores above 9 were characterized as optimistic.

Administration and interpretation of the instrument is not explicitly covered in the literature, but as is the implication with all human subjects survey research, it is expected that the survey administrator(s) has/have been successfully trained in survey techniques. This training should encourage an assessment of the respondent's authentic feelings, thus manufacturing the least amount of measurement error. Instructions for the LOT-R are included on Carver's website: "Please be as honest and accurate as you can throughout. Try not to let your response to one statement influence your responses to other statements. There are no "correct" or "incorrect" answers. Answer according to your

own feelings, rather than how you think "most people" would answer" (Carver, 2011, para. 5). These instructions assume a 6.8 grade reading level on the Flesch-Kincaid Grade Level Test.

The LOT-R

Prior to administering annual follow-up (AFU) interviews, JHS AFU staff received training in the areas of survey research, Clintrial software, and telephone etiquette. Further information on AFU training is provided elsewhere (JHS, 2001b). All data were directly entered into Clintrial except in rare cases of technological difficulties. During these times, responses were recorded onto paper forms to be entered into the software application after computer problems were resolved.

The JHS instructions for completing the AF2A (JHS version of the LOT-R) are included on the instrument: "Now, I'm going to read a series of statements. For each one, tell me how much it is like you. For example, tell me whether the statement is *a lot like you, somewhat like you, a little like you, or not at all like you*" (JHS, 2001e). Items received a point value of 3, 2, 1, and 0 for the descriptors "a lot like you", "somewhat like you", "a little like you", and "not at all like you", respectively. Items 2, 4, and 5 were reverse scored; a response of 3 is converted to 0, a response of 2 is converted to 1, and so on.

Excluding filler items, the LOT-R is comprised of six items:

1. In uncertain times, I usually expect the best.
2. If something can go wrong for me, it will.
3. I'm always optimistic about my future.
4. I hardly ever expect things to go my way.

5. I rarely count on good things happening to me.
6. Overall, I expect more good things to happen to me than bad.

The AF2A (JHS adaptation of the LOT-R) and the LOT-R differ in two distinct ways: (1) filler items were excluded from the AF2A and (2) a 4-point Likert-like scale was used for the AF2A versus the 5-point scale for the LOT-R. Consequently, the scores for dispositional optimism range from 0 to 18 and 0 to 24 on the AF2A and LOT-R, respectively. Prior to this study, the psychometric properties of the 4-point scale instrument, the AF2A, had not been evaluated through confirmatory factor analysis.

Validity Evidence. Scheier and Carver (1985) engaged in an iterative process that produced the LOT-R. Initially, 16 items were written for the LOT. These items were pilot tested with a sample of 170 undergraduate students. Principal factors factor analysis was performed to identify the factor structure. The items that emerged were administered to four independent samples (combined $n=1,000$). Subsequent revisions to the LOT gave rise to a uniform and succinct instrument, the LOT-R. Furthermore, Carver (2011) cites ease of use as a benefit to the brevity of the instrument, which should also play a role in decreasing measurement error.

The content domain that dispositional optimism encompasses is purely theoretical. Scheier and Carver's (1985) approach to dispositional optimism is unique. They developed the LOT-R on the principal that outcome expectancies influence behavior. Specifically, favorable expectancies will support renewed or continued effort toward the outcome, while unfavorable expectancies will theoretically result in withdrawal or disengagement from the effort. To this end, the LOT-R seeks to assess generalized outcome expectancies. Previous attempts to measure optimism focused on

examining the underpinning source of the expectancy (i.e., luck, personal ability, favor) (Scheier & Carver, 1985). Generalized outcome expectancies is the main criteria for evaluating the content validity of the LOT-R, therefore, based on the six items that comprise the LOT-R, at face value, they are a good reflection of the content universe based on the theoretical framework.

Scheier et al. (1994) presented criterion-related validity evidence for the LOT-R. With a convenience sample of 4,309 students, the relationship between dispositional optimism and four indicators (self-mastery, $r = .55$; trait anxiety, $r = -.59$; neuroticism, $r = -.50$; and self-esteem, $r = .54$) was strong (Scheier et al., 1994). And, dispositional optimism was observed to be an independent and significant predictor of the outcomes outlined in Table 1. Self-mastery, trait anxiety, self-esteem, and neuroticism did not demonstrate the same predictive ability as dispositional optimism, see Table 2.

The correlations between the LOT-R and conceptually related scales were modest; absolute redundancy was unapparent, except in the case of the LOT. As anticipated, the correlation between the LOT-R and LOT was high (Scheier et al., 1994). While evidence for convergent validity was established by Scheier et al. (1994), there was no obvious attempt to gather divergent validity evidence for the LOT-R as previously had been done for the LOT (Scheier & Carver, 1985).

Factor Analysis. The factor structure of the LOT-R was explored with principal components factor analysis (orthogonal Varimax rotation, $n=2055$); factor retention was determined by the Kaiser criterion. All six items loaded onto one factor. The loadings ranged from .58 to .79; this factor accounted for 48.1% of the variance in dispositional optimism (Scheier et al., 1994). These results are inharmonious with the factor analysis

Table 1

Predictive Validity Evidence for LOT-R

Outcome	Correlation	Sample size
Depression	-.42***	1,900
Number of symptoms	-.21***	1,015
Intensity of symptoms	-.25***	1,015
Active coping	.30***	813
Planning	.30***	813
Suppression of competing activities	.14***	815
Restraint	.12***	814
Positive interpretation of growth	.47***	815
Use of humor	.10 **	815
Seeking instrumental social support	.16***	814
Seeking emotional social support	.12***	815
Turning to religion	.22***	816
Acceptance	.10 **	816
Mental disengagement	-.18***	816
Behavioral disengagement	.33***	816

Note. ** $p < .01$, *** $p < .001$

Table 2

Convergent Validity Evidence for LOT-R

Conceptually related scale	Correlation*	Sample size
LOT	0.95	2,055
Self-Mastery Scale	0.48	2,055
Trait version of the State-Trait Anxiety Inventory	-0.53	2,033
Rosenberg's Self-Esteem Scale	0.50	1,420
Neuroticism - Guilford-Zimmerman Temperament Survey	-0.43	1,041
Neuroticism - Eysenck Personality Questionnaire	-0.36	991

Note. * $p < .001$.

conducted on the LOT. The LOT was initially examined with principal factors (n= 624 undergraduate students). Oblique rotation and the Kaiser criteria were applied. In this instance, a two-factor structure emerged. The factors followed the negative and positive wording of the items. Confirmatory factor analysis of the LOT revealed that both the one-factor and the two-factor models were an acceptable fit to the data. A comparison between the models suggested the two-factor model as a slightly stronger model for the data $\chi^2(1) = 4.18, p < .05$ (Scheier & Carver, 1985).

Discordant factor structure results has led some researchers to contest the structure of the LOT-R. While evidence is generally supportive of the two-factor structure (Kubzansky, Kubzansky, & Maselko, 2004), there is some ambiguity with the conceptual

understanding of pessimism if conceptually it is not the polar opposite of optimism. Scheier and Carver (1985) originally designed the LOT as a measure of dispositional optimism to represent optimism as the polar opposite of pessimism as a singular construct. Their interpretation suggests that a low dispositional optimism score on the instrument represents a pessimistic disposition while a high score is indicative of optimism. For the present research effort, the researcher also operationalized dispositional optimism as such. Some investigators posit that optimism and pessimism represent two distinct constructs (Herzberg, Glaesmer, & Hoyer, 2006; Kubzansky et al., 2004; Robinson-Whelen, Kim, MacCallum, & Kiecolt-Glaser, 1997). There is evidence to suggest that the correlation between the two is moderate to weak (Lai et al., 2005). Representing optimism and pessimism as two distinct constructs maintains that persons who exhibit the personality trait for low dispositional pessimism will not necessarily experience the protective health outcomes of high dispositional optimism.

Comparability of fit indices between the single and two-factor solutions was conducted for the LOT-R. The two-factor model represented a significantly better and more parsimonious fit than the single factor solution, $\chi^2(1) = 115.63, p < .001$. Though Scheier et al. (1994) acknowledge the empirical justification for the two-factor solution, based on past experiences where the two-factor solution failed to yield different results from the one-factor solution (Scheier et al., 1999), the instrument developers remain committed to the single factor solution (Carver et al., 2010; Scheier et al., 1999).

Reliability Evidence. The researchers assessed internal consistency with Cronbach's alpha, $\alpha = .78$ (Scheier et al., 1994). The reduced reliability estimate for the LOT-R, relative to the LOT is attributed to a reduction in the number of items examined.

Stability estimates for the LOT-R were supportive of dispositional optimism as a stable personality trait. Test-retest reliability estimates were calculated at 4, 12, 24, and 28 month intervals; the correlations were .68, .60, .56, and .79, respectively (Scheier et al., 1994). Based on these results, the LOT-R produces stable scores over time.

Vassar and Bradley (2010) presented further internal consistency evidence. They meta-analyzed the coefficient alpha estimates from more than 300 research studies where the LOT and LOT-R were administered. For the LOT-R, the mean effect size (coefficient alpha) was .74 (SD=.11), an indicator of good internal consistency. Additional findings from this study revealed that significantly lower effect sizes were associated with adolescent users; consequently, this instrument should be limited to research with adult populations.

Norms. The LOT-R was normed with two independent samples; one sample consisted of healthy college students and the other included unhealthy elderly participants (Scheier et al., 1994). Normative data for the LOT and LOT-R (Scheier & Carver, 1985) are presented in Table 3. For the LOT-R, based on the two samples, the average dispositional optimism score was higher in the unhealthy sample. This difference could have been attributed to the accumulation of life experiences (maturity) of the unhealthy population who was considerably older than the college students. Statistical differences between the samples were not calculated.

Data Acquisition

Data collection for JHS Examination 1 was a multiphase process that spanned a period of four years. The data were collected predominately by licensed nurses and medical technology staff from the JHS Examination Center (EC). The EC was an ambulatory clinic housed in the Jackson Medical Mall in Jackson, MS.

Table 3

Norms for LOT and LOT-R

Instrument	Sample	Sample size	Mean	SD
LOT	College Undergraduates			
	Male	357	21.03	4.56
	Female	267	21.41	5.22
LOT-R	College Students			
	Male	1,394	14.28	4.33
	Female	622	14.42	4.12
	Bypass Patients			
	Male	122	15.40	4.09
	Female	37	14.92	3.97

All JHS participants underwent a clinic examination after 12 hours of *nil per os* (fasting). EC nurses collected anthropometric measures of height, weight, and waist circumference in the clinic or during home visits for non-ambulatory participants; sitting blood pressure was collected in like manner. For further reading on anthropometry or blood pressure protocol, refer to the JHS Cohort Procedures (JHS, 2001b) and Blood Pressure Manuals (JHS, 2001c), respectively. Concentrations of serum cholesterol and C-reactive protein were assayed from venipuncture draws obtained during the clinical examination. The JHS Central Laboratory and Specimen Repository: Specimen

Collection and Processing Manual (JHS, 2001f) provides a thorough description of the protocol for blood collection and the quality control measures that were instituted to ensure data integrity.

Within the JHS Coordinating Center, SAS and Crystal Reports software were used for data cleaning and data validation activities. The JHS Data Team facilitated these activities. The JHS Quality Control Manual (JHS, 2001g) provides an outlook on some of the more routine quality assurance and quality control activities of the Data Team.

Requesting data from the JHS involved a four-step process. First, the researcher submitted a manuscript proposal to the JHS Publications and Presentations Subcommittee for approval. Upon approval of the manuscript proposal, the researcher submitted a Data Management and Distribution Agreement (DMDA) to the academic institution for signature. Acceptance of the DMDA by JHS enabled the researcher to submit a statistical computing data request to the Coordinating Center. After the data request was approved, the Coordinating Center transferred the data to the researcher through a secure internet connection website.

Data Analysis

Based on a review of the literature, four research hypotheses were formulated to examine the dynamics of CVD risk factors and dispositional optimism within an exclusive African American cohort. Prior to testing the research hypotheses, confirmatory factor analysis (CFA) was performed to test the relationship between the instrument and the data. Given response scale and wording changes to the instrument by the JHS, this preliminary test was essential in assessing the reliability of inferences. The JHS cohort dataset was partitioned into two split halves, and CFA was conducted on each split-half. A

chi-square difference test along with absolute and relative fit indices assessed model fit. All CFA activities were conducted with AMOS v. 22 software.

The first and second hypotheses tested dispositional optimism as a significant predictor of CVD mortality in males and females, respectively. To this end, binary logistic regression analysis was selected to identify characteristics of statistical significance that are associated with CVD mortality in African Americans. Traditional risk factors for CVD along with dispositional optimism were included in the prediction model for CVD mortality specific to African Americans.

For hypothesis 1, CVD mortality was coded as a binary variable. Of the participants lost to death, a code of “1” represented participants lost to CVD death, and “0” denoted attrition from the JHS due to other causes of death. The same coding convention applied to hypothesis 2.

Hypothesis 3 tested differences in the CVD mortality ratio between optimists and pessimists. Similarly, hypothesis 4 tested differences in the all-cause mortality ratio between the two groups. Pearson chi-square was selected to test hypotheses 3 and 4; a 2 x 1 contingency table was constructed and tested the hypothesis that mortality ratios for optimists and pessimists were equivalent at 50%. To this end, arbitrary cut-offs for optimism and pessimism were established such that scores of 0-9 and 10-18, characterized optimism and pessimism, respectively.

CVD and all-cause mortality are researcher-derived variables. The all-cause mortality ratio for optimists reflected deaths from all documented causes of death (numerator) relative to the total number of cohort deaths (denominator). The CVD mortality ratio for optimists included deaths attributed to diseases of the heart

(numerator) relative to the total number of cohort deaths (denominator). Mortality ratios were calculated for pessimists in like manner. All data were analyzed with SPSS v. 22.

CHAPTER IV

RESULTS

Collectively, the descriptive and inferential statistics presented in this chapter support the purpose of the research endeavor at hand. The research hypotheses, enumerated below, guided all research activities.

H₁: Dispositional optimism is a significant predictor of CVD mortality in males.

H₂: Dispositional optimism is a significant predictor of CVD mortality in females.

H₃: CVD mortality is significantly lower in optimists than in pessimists.

H₄: All-cause mortality is significantly lower in optimists than in pessimists.

Supported by existing literature, the researcher sought to predict the relationship between dispositional optimism and CVD mortality in males and females. Mortality was also presumed to be lower in optimists than in pessimists. Hierarchical logistic regression analysis was the preferred method to test the predictive ability of dispositional optimism. Differences in the distribution of deaths attributed to CVD were assessed with Pearson chi-square. The researcher exclusively analyzed Jackson Heart Study (JHS) Examination 1 cohort data and JHS Surveillance data to obtain the results featured in this chapter.

Preliminary Analysis

Confirmatory Factor Analysis

Prior to testing the likelihood that CVD mortality is related to one's attitudinal disposition, psychometric analysis of the JHS modified LOT-R instrument was employed. The JHS adapted the LOT-R to reflect a four-response scale, a noticeable departure from the original Likert-like, five-response scale developed by Scheier, Carver, and Bridges (1994). There is no documented evidence to suggest that testing of the psychometric

properties of the JHS modified LOT-R occurred before or after administration of the instrument to JHS participants. Given the noted scale and response modifications to the original instrument, the researcher sought to explicate the relationship between the data and the dispositional optimism construct through confirmatory factor analysis (CFA).

Preliminary analysis of the one-factor model by the researcher revealed a poor fit with JHS cohort data (results not shown). Inter-item correlation was low for the preliminary analysis, Table 4. While Scheier et al (1994) support a one-factor model for the dispositional optimism construct, literature also exists in support of the two-factor model (Herzberg et al., 2006; Kubzansky et al., 2004; Robinson-Whelen et al., 1997). Testing of the four stated research hypotheses assumes accurate measurement of the construct. To test this assumption, the total sample (n=4501) was randomly divided into two split-half samples to test model fit with JHS cohort data. The sample size was sufficient to confirm reliability and goodness of fit using CFA (Meyers, Gamst, & Guarino, 2006). The first split-half sample modeled dispositional optimism as a one-factor solution. The remaining split-half sample modeled a two-factor solution of dispositional optimism, supported empirically by Robinson-Whelen et al. (1997).

The dispositional optimism models were independently evaluated with five fit indices, which included the chi-square, the comparative fit index (CFI), the root mean square error of approximation (RMSEA), the goodness-of-fit index (GFI), and the Tucker-Lewis index (TLI). Results of the GFI support good model fit for the one-factor model whereas results of four out of five fit indices support the two-factor model, Table 5. Comparison of model fit between the competing models was assessed with the chi-

Table 4

Correlations of Dispositional Optimism Variables

Item	Q1	Q2	Q3	Q4	Q5	Q6
Q1	1.000					
Q2	0.175	1.000				
Q3	0.125	0.198	1.000			
Q4	0.205	0.324	0.232	1.000		
Q5	0.207	0.328	0.235	0.384	1.000	
Q6	0.123	0.195	0.140	0.229	0.231	1.000

Table 5

CFA Model Fit Indices

Index	1-Factor Model	2-Factor Model
Chi-square	$\chi^2 (9) = 439.552^*$	$\chi^2 (8) = 42.222$
GFI	0.928	0.994
RMSEA	0.146	0.004
CFI	0.756	0.9777
TLI	0.589	0.957

Note. * $p < .001$

square difference test, $\chi^2(1) = 397.330, p = .05$. The outcome yielded a statistically significant result, concluding that the two-factor model of dispositional optimism included more freely estimated parameters that were a better fit to the data than the alternative one-factor model. Also, internal consistency for the one-factor solution was $\alpha = 0.645$; whereas score reliability of the two-factor solution was slightly lower, $\alpha = .585$.

Empirically, the two-factor model was better fitted to the JHS sample, but the scores on the one-factor solution were more reliable. Historically, the one-factor model is dominant in the literature. Refereeing the debate between which model should represent the dispositional optimism construct lies beyond the parameters of this research. To draw the most accurate conclusions for these data and to ensure comparability with existing and future research in this area, the prevailing one-factor model advanced to the logistic regression analysis.

Cohort Descriptives

Screening for out of range values and missing data for each observed and derived variable was conducted descriptively by exploring frequencies of each variable. All of the responses and values recorded in the cohort dataset ($n = 5301$) were valid. Cumulatively, missing data accounted for less than 3.5% of the cohort.

Tables 6 and 7 provide a summary of cohort descriptives. Within the cohort of 5301 participants, optimism scores were calculated for 4501 JHS participants whose responses to items one through six on the JHS adaptation of the LOT were not missing. There was a disproportionate split between males (35.4%) and females (64.6%). Analysis of continuous variables revealed females were generally older than males, $F(1, 4381) = 18.761, p < .001, \eta^2 = .004$. Excess body fat characterized female participants.

Table 6

Clinical Characteristics of Study Sample

Variable	Gender			
	Male (n=1594)		Female (n=2907)	
	M	SD	M	SD
Age (yrs)	53.410	12.530	55.120	12.540
Body Mass Index (kg/m ²)	29.920	6.040	32.960	7.620
Waist Circumference (cm)	101.440	15.020	100.460	16.770
Systolic Blood Pressure (mmHg)	127.480	17.570	126.290	18.470
Diastolic Blood Pressure (mmHg)	81.650	10.600	77.270	10.080
Pulse Pressure (mmHg)	45.830	14.930	49.020	16.200
Total Cholesterol (mg/dL)	196.070	39.810	200.600	39.520
C-Reactive Protein (mg/L)	0.316	0.520	0.606	0.842
Optimism	14.540	3.120	14.280	3.180

Statistically, females were more obese than males, $F(1, 4381) = 50.382, p < .001, \eta^2 = .040$. Average BMI scores classified males and females as overweight (pre-obese) and obese, respectively. Gender differentiated C-reactive protein, $F(1, 4381) = 153.330, p < .001, \eta^2 = .034$, and total cholesterol concentrations $F(1, 4381) = 13.151, p < .001, \eta^2 = .003$. C-reactive protein was significantly lower in males than in females; whereas, total cholesterol was significantly higher in females than in males. And, statistically wider pulse pressure, $F(1, 4381) = 41.159, p < .001, \eta^2 = .009$, values were recorded for females. However, on measures of systolic, $F(1, 4381) = 4.311, p < .001, \eta^2 = .001$, and

Table 7

Demographic Characteristics of Study Sample

Variable	Gender	
	Male	Female
	n = 1594 %	n = 2907 %
Education		
> High school	17.1	16.9
High school/GED	18.0	20.4
Voactional/some college	23.9	21.4
Associate degree	6.6	7.0
College degree	18.8	16.3
Graduate degree	15.6	18.1
Income		
>\$25,000	26.7	42.0
\$25,000 to \$49,999	24.9	29.1
\$50,000 to \$74,999	23.1	16.3
\$75,000 to \$99,999	13.4	6.4
≤\$100,000	12.0	6.1

diastolic blood pressure, $F(1, 4381) = 182.647, p < .001, \eta^2 = .040$, males ranked higher than females while simultaneously projecting higher levels of optimism, $F(1, 4381) = 6.869, p < .001, \eta^2 = .002$. Dispositional optimism was statistically lower in males,

Table 7 (continued).

Variable	Gender	
	Male n = 1594 %	Female n = 2907 %
Marital Status		
Married	72.7	46.8
Widowed	4.2	17.7
Separated	3.0	4.6
Divorced	10.3	17.6
Never married	9.8	13.3

t(1593) = -3.231, $p < .001$, and females, t(2906) = -8.149, $p < .001$, relative to normative samples identified by Scheier et al. (1994).

An examination of discrete variables revealed prevalent diabetes mellitus for 17% and 19.8% of males and females, respectively. Socioeconomic characteristics of the JHS cohort described most males as married (70%), 32% of males earned degrees at or beyond the bachelor degree, and household income totaled less than \$25,000 annually for 29% of the male sample. Females were more likely to be married (45.5%) than not. One-third of females acquired education at or beyond the bachelor degree, and for 44% of the female sample, household income fell below \$25,000 per annum.

Data Screening for Analysis Dataset

As of September 2013, the crude death rate for the JHS cohort was 126.01 per 1,000 or 12.6% (n=668). The crude CVD mortality rate for this sample (n=217) was

48.06 per 1,000 or 4.8%. Due to a lack of information, six causes of death were not adjudicated; consequently, these observations were excluded from analysis. A quality control check on a random sample of 10% of the cause of death codes revealed 100% accuracy of the single-data entry method. A case match between causes of death and optimism scores diminished the sample size to $n = 443$. The threshold for identifying and eliminating univariate outliers was z-scores ± 3 for each independent variable. With this liberal criterion, 27 observations (67% female) were deleted from the analysis dataset. Mahalanobis distance values greater than 24.32, at 7 degrees of freedom, identified multivariate outliers; of which 3 materialized. The final analysis dataset consisted of 413 JHS participants. There were a total of 208 CVD deaths and 205 non-CVD deaths in the sample. Females accounted for 57.21% and 59.5% of CVD deaths and non-CVD deaths, respectively. No significant association between type of death (CVD vs. non-CVD), and gender was detected, $\chi^2(1) = 0.225, p > 0.05$. Table 8 provides the distribution of named causes of death by gender. The two leading named causes of death were cardiac arrest and cancer for both males and females. In males, cardiac arrest and cancer represented 31% and 19%, respectively, of all male deaths. Within the female cluster, cardiac arrest and cancer were reflective of 27% and 24%, respectively, of all female deaths.

Hypotheses 1 and 2

To test the predictive nature of dispositional optimism relative to CVD mortality in males and females, CVD mortality was modeled hierarchically with logistic regression analysis. Logistic regression analysis is useful in instances where describing the relationship between predictor variables and a dichotomous outcome variable is desired (Peng, Lee, & Ingersol, 2002). Hierarchical logistic regression analysis, a controlled

Table 8

Distribution of Named Causes of Death by Gender

Cause of Death	Male	Female
Cardiac Arrest	53	66
Cancer	33	59
CVD non-specific	29	31
Respiratory non-specific	14	18
Infection	10	14
Non-Stroke Cerebrovascular Incident	3	9
Myocardial Infarction	5	10
Renal	8	11
Stroke	1	7
Blunt Force Trauma	0	2
Chronic Obstructive Pulmonary Disease	2	4
Liver Disease	1	2
Alzheimer's Disease/Dementia	5	1
Gun Shot Wound	2	1
Other	6	6
Total	172	241

adaptation of logistic regression, allows the researcher to enter predictors into the model based on theory obtained from prior research (Sawtelle, Brewe, & Kramer, 2011).

Consequently, it is particularly useful in determining whether dispositional optimism can significantly increase a model's ability to differentiate between the CVD mortality and non-CVD mortality.

Failure to meet or address statistical test assumptions potentially confounds test results and inflates error. There are three assumptions associated with the logistic regression model. The model assumes (1) independence of errors, (2) multicollinearity, and (3) linearity of the logit. Independence of errors implies that cases, observations, or subjects are independent and unrelated. To test this assumption, SPSS provides a mechanism (Data → Identify Duplicate Cases) to identify duplicate cases matched to a unique identifier. The identifier variable in the JHS dataset is the Subjid; the Examination Center assigned each JHS participant a Subjid at baseline. Duplicate cases were undetected for the cohort dataset (n=5301), but the surveillance death data file contained eight duplicate cases which were subsequently dropped from analysis. The resulting sample size for the death data file was n = 668.

By definition, multicollinearity suggests a high correlation between predictors; variance inflation factor (VIF) and tolerance are two reliable collinearity diagnostics. Acceptable values for VIF and tolerance are less than 10 and greater than 0.1, respectively. VIF values ranged from 1.030 to 3.509, Table 9. SPSS did not calculate VIF values for pulse pressure. Tolerance values for all independent variables exceeded 0.1 with the exception of pulse pressure, where tolerance < .001. Pulse pressure violated the multicollinearity assumption; it was redundant with one or more proposed predictors in the model. Consequently, pulse pressure, a derivative of systolic and diastolic blood pressures, was excluded from analysis. Based on the obtained VIF and tolerance values,

multicollinearity was unobserved in the remaining continuous predictors. Finally, linearity of the logit assumes a linear relationship between any continuous predictor and the logit of the dichotomous outcome variable. Testing for linearity of the logit involved examining the interaction between each continuous predictor and the log of the continuous predictor. Excluding systolic blood pressure and waist circumference, the interactions were not significant, indicative of having met the assumption of linearity of the logit, Table 9. An *a priori* decision to exclude smoking status from the analysis due to Table 9

Results from Logistic Regression Assumptive Tests

Predictor	Linearity of the logit	Multicollinearity	
	Significance	Tolerance	VIF
Age (years)	0.286	0.786	1.272
BMI (kg/m ²)	0.061	0.285	3.509
Waist circumference (cm)	0.025*	0.295	3.387
Systolic blood pressure (mmHg)	0.034*	0.741	1.349
Diastolic blood pressure (mmHg)	0.832	0.673	1.486
Total cholesterol (mg/dL)	0.452	0.971	1.030
C-reactive protein (mg/L)	0.496	0.905	1.104
Optimism	0.957	0.980	1.021

Note. * $p < .01$

missing responses that exceeded 50% of the sample is reflected in the logistic regression results.

The one factor solution of the dispositional optimism construct was tested to reveal the predictive ability of CVD mortality outcomes. Predictors entered the regression model sequentially. Model 1 of the regression included participant demographics (i.e., age, household income, education, marital status) and diabetic status. The addition of six indicators for CVD risk (i.e., BMI, waist circumference, systolic blood pressure, diastolic blood pressure, total cholesterol, and C-reactive protein) to the first model completed the components of Model 2. To Model 2, dispositional optimism scores were added to finalize the formation of Model 3. Male ($n = 172$) and female ($n = 241$) outcomes were assessed independently.

The data were fitted to a multiple predictor logistic regression model to test research hypotheses 1 and 2 regarding the predictive ability of dispositional optimism, a psychosocial personality trait, relative to CVD mortality. Deaths were assigned to one of two categories. The criteria for assignment to either the CVD mortality or the non-CVD mortality groupings were determined by the cause of death for the JHS participant. Table 10 provides mean optimism scores stratified across type of death. The descriptive statistics in Table 10 differ from those obtained in Table 6 due to changes in sample size attributable to exclusion criteria. The logistic regression procedure was carried out in SPSS v.22.

Table 10

Mean Optimism Scores by CVD Mortality

CVD Mortality	Analysis Sample	Males	Females	Optimism	
				M	SD
Yes	208	89	119	13.17	3.56
No	205	83	122	13.16	3.49
Summary	413	172	241	13.167	3.52

Hypothesis 1

Hypothesis 1 tested dispositional optimism as a significant predictor of CVD mortality in men. Table 11 provides results from the analysis. Model 1, the demographic and diabetic status model, was a poor predictor of CVD mortality, $p > .05$, in males. Approximately 18% of the variance in CVD mortality was accounted for in model 1, and the overall predictive accuracy of model 1 was 66.45%. With the addition of clinical risk factors for CVD, model 2 significantly improved, $p < .005$, over model 1. The predictive accuracy rose to 72.7%, and the predictors accounted for 28.73% of the variance associated with CVD mortality.

A reduction in the log-likelihood (-2LL) between models 2 and 3 suggests that the predictive ability of model 3 was better than the predictive ability of model 2. Results from the chi-square test for model 3 reveal that the inclusion of dispositional optimism did not significantly improve the model, $p > .05$. However, the predictive ability of model 3 was a significant, $\chi^2(22) = 34.833$, $p < .05$, a testament to the cumulative predictive power of the predictors entered into model 2, $\chi^2(21) = 34.700$, $p < .05$. The goodness-of-

fit test for model 3, the Hosmer-Lemeshow (H-L) test, yielded a nonsignificant chi-square statistic, $\chi^2(8) = 12.841, p > .05$. The H-L test suggests that the model fit well with the data. Model 3 correctly predicted the type of death for 73.4% of the sample. Having obtained vocational education or some college credit, $\chi^2(1) = 5.617, p < .05$, emerged as a statistically significant predictor of CVD mortality. Additionally, household incomes between \$25,000 and \$49,999, $\chi^2(1) = 4.226, p < .05$, significantly predicted CVD mortality. Odds ratios revealed that persons who earned an associate degree were two times more likely to die from CVD related causes than persons who had not completed high school or passed the General Education Development (GED) test. Males who never married were two times more likely to succumb to a CVD event than males who were married. Males separated from their spouse were five times more likely to die from a variant of CVD than cohabitating married persons were. However, widowed and divorced males had a lower risk of CVD death than married males. Also, for every unit increase in C-reactive protein (CRP) concentrations, the odds of CVD death decreased by a factor of 0.637.

The addition of dispositional optimism did not significantly improve the prediction of CVD mortality in males. Based on the data, the best fitting model for predicting CVD mortality included demographic characteristics and clinical risk factors for CVD, but not dispositional optimism.

Hypothesis 1 secondary analysis. Clinical predictors did not produce significant effects in the initial analysis. Of seven CVD risk factors entered into the model, none of them significantly predicted CVD mortality in males. This was an unanticipated outcome, and the researcher sought to research the discrepancy. In an effort to decrease the

Table 11

Logistic Regression Results for Optimism as a predictor of CVD Mortality in Males

Predictor	Model 1			Model 2			Model 3		
	B	SE	Odds Ratio	B	SE	Odds Ratio	B	SE	Odds Ratio
Constant	-0.809	1.591	0.446	-5.405	3.288	0.004	-5.539	3.316	0.004
Age (years)	0.016	0.021	1.016	0.005	0.026	1.005	0.003	0.026	1.003
Education (highest degree)									
HS/GED	0.333	0.535	1.395	0.527	0.585	1.695	0.533	0.586	1.703
Some college	-0.835	0.567	0.434	-1.575	0.658	0.207	-1.562	0.659	0.210
Associate	1.208	1.366	3.597	0.995	1.403	2.514	0.853	1.418	2.348
Bachelor	0.449	0.674	1.566	0.160	0.744	1.173	0.092	0.766	1.096
> Bachelor	-0.018	0.739	0.983	-0.067	0.800	0.935	-0.076	0.801	0.927
Income (annual)									
\$25,000 - \$49,999	-0.748	0.486	0.473	-1.084	0.534	0.338	-1.115	0.543	0.328
\$50,000 - \$74,999	0.439	0.665	1.552	0.398	0.725	1.489	0.395	0.724	1.484
\$75,000 - \$100,000	-1.614	0.998	0.199	-1.918	1.065	0.147	-1.959	1.069	0.141
> \$100,000	0.321	1.091	1.378	-0.268	1.160	0.765	-0.307	1.165	0.736

Note. B-values in bold indicate $p < .01$.

Table 11 (continued).

Predictor	Model 1			Model 2			Model 3		
	B	SE	Odds Ratio	B	SE	Odds Ratio	B	SE	Odds Ratio
Marital status									
Widowed	-0.632	0.617	0.532	-0.066	0.677	0.937	-0.056	0.679	0.945
Separated	0.979	1.000	2.662	1.665	1.066	5.284	1.652	1.068	5.217
Divorced	-0.815	0.631	0.443	-0.454	0.686	0.635	-0.432	0.686	0.649
Never married	0.476	0.759	1.069	0.782	0.829	2.186	0.782	0.832	2.187
Diabetes	0.14	0.422	1.15	-0.186	0.475	0.830	-0.205	0.478	0.815
BMI				0.095	0.096	1.099	0.094	0.096	1.098
Waist				0.015	0.039	1.015	0.015	0.039	1.015
Systolic				0.017	0.011	1.017	0.018	0.011	1.018
Diastolic				-0.028	0.022	0.973	-0.030	0.023	0.971
CRP				-0.452	0.413	0.637	-0.431	0.417	0.650
Cholesterol				0.006	0.005	1.006	0.006	0.005	1.006
Optimism							0.023	0.064	1.024

probability of Type II error, the logistic regression analysis was rerun using fewer clinical predictors. This strategy was employed as an indirect method of increasing the sample size. The model was restructured to test income and education in model 1; sequentially add BMI, pulse pressure, and total cholesterol to model 2; and ultimately include

optimism to complete model 3. In model 2, BMI, $\chi^2(1) = 9.933, p < .05$, emerged as a significant predictor of CVD mortality. As with previous attempts, dispositional optimism did not contribute significantly to the model.

Hypothesis 2

Hypothesis 2 postulated the significant predictive ability of dispositional optimism in females. Results from the logistic regression analysis for females are provided in Table 12. Model 1 was not significant, $\chi^2(15) = 19.185, p > .05$; therefore, demography and diabetic status were poor predictors of CVD mortality. The model accounted for 12.7% of the variance in CVD mortality. Type of death was correctly classified (CVD versus non-CVD) for 62.8% of the sample. Gains in model predictive ability and fit were realized with Model 2, $\chi^2(6) = 13.315, p < .05$. Variance estimates increased to 20.9%, and a 5% gain in predictive accuracy materialized. Statistical tests of individual predictors revealed one statistically significant predictor. The regression coefficient for systolic blood pressure, $\chi^2(1) = 6.571, p < .05$, was statistically significant. The transition from Model 2 to Model 3 produced a less robust model. A decrease in the -2LL increased the predictive ability of the Model 3 by 1.4%. Yet, the inclusion of dispositional optimism did not significantly improve the predictability of the model, $\chi^2(1) = 2.453, p > .05$. Overall, Model 3 performed well, $\chi^2(22) = 34.953, p < .05$. Results from the H-L test indicate a tenable fit between the model and the data, $\chi^2(8) = 5.704, p > .05$. Total cholesterol, $\chi^2(1) = 4.165, p < .05$, systolic blood pressure, $\chi^2(1) = 6.794, p < .05$, and widowhood, $\chi^2(1) = 6.828, p < .05$ were significantly associated with CVD mortality exclusive of any of the other predictors.

Table 12

Logistic Regression Results for Optimism as a predictor of CVD Mortality in Females

Predictor	Model 1			Model 2			Model 3		
	B	SE	Odds Ratio	B	SE	Odds Ratio	B	SE	Odds Ratio
Constant	-1.562	1.517	0.21	-2.049	2.488	0.129	-1.618	2.537	0.198
Age (years)	0.015	0.021	1.016	0.001	0.023	1.001	0.007	0.024	1.007
Education (highest degree)									
HS/GED	-0.109	0.434	0.896	-0.121	0.456	0.886	-0.038	0.460	0.963
Some college	-0.083	0.528	0.92	-0.236	0.567	0.790	-0.095	0.579	0.909
Associate	0.875	0.76	2.399	0.889	0.784	2.432	1.072	0.792	2.922
Bachelor	-1.024	0.666	0.359	-1.243	0.695	0.289	-1.198	0.699	0.302
> Bachelor	-1.063	0.58	0.346	-0.940	0.621	0.391	-0.805	0.631	0.447
Income (annual)									
\$25,000 - \$49,999	0.52	0.434	1.682	0.556	0.453	1.744	0.657	0.460	1.929
\$50,000 - \$74,999	1.174	0.623	3.234	0.920	0.666	2.510	1.058	0.680	2.882
\$75,000 - \$100,000	1.387	1.183	4.001	1.442	1.298	4.229	1.596	1.327	4.934
> \$100,000	1.961	1.395	7.109	2.264	1.565	9.617	2.483	1.675	11.98

Table 12 (continued).

Predictor	Model 1			Model 2			Model 3		
	B	SE	Odds Ratio	B	SE	Odds Ratio	B	SE	Odds Ratio
Marital status									
Widowed	0.991	0.413	2.693	1.034	0.432	2.813	1.159	0.444	3.188
Separated	0.394	0.691	1.482	0.050	0.741	1.052	0.196	0.757	1.216
Divorced	0.353	0.504	1.424	0.427	0.529	1.532	0.518	0.539	1.679
Never married	1.204	0.698	3.334	1.294	0.739	3.648	1.473	0.758	4.363
Diabetes	-0.067	0.329	0.935	-0.076	0.354	0.927	-0.079	0.356	0.924
BMI				-0.010	0.041	0.990	-0.005	0.041	0.995
Waist				0.012	0.018	1.012	0.011	0.019	1.011
Systolic				0.026	0.010	1.026	0.027	0.010	1.027
Diastolic				-0.021	0.018	0.979	-0.022	0.018	0.979
CRP				0.389	0.313	1.475	0.345	0.316	1.412
Cholesterol				-0.008	0.004	0.992	-0.008	0.004	0.992
Optimism							-0.077	0.049	0.926

Note. B-values in bold indicate $p < .01$

Prominent odds ratios from Model 3 indicate that widows and females who never married were 3 and 4 times, respectively, more likely to experience a fatal CVD event than married persons were. Also, females with household incomes between \$25,000 and \$49,999 were two times more likely to succumb to a fatal CVD event than individuals

whose household income fell below \$25,000. However, the risk of CVD mortality heightened for incomes above \$75,000 more than five-fold. The odds of CVD mortality for females with earned associate's degrees were three times higher than for high school dropouts.

For both males and females dispositional optimism failed to significantly predict CVD mortality. Based on each model's ability to predict the accurate assignment of death (CVD versus non-CVD), overall, in males, the prediction models were more astute predictors of non-CVD mortality, whereas in females the models were less accurate in predicting type of death.

Hypotheses 3 and 4

The premise of hypotheses 3 and 4 rests on the presumption that fewer deaths of optimistic persons than pessimistic persons characterize the JHS cohort. Hypothesis 3 specifically examines CVD related deaths, while hypothesis 4 assesses the distribution of deaths from all causes relative to disposition. The percentage of CVD deaths, a nominally measured variable with two levels, was tested with a 2 x 1 contingency table.

For hypothesis 3, CVD deaths were unequally distributed between optimists (n=170) and pessimists (n=38), $\chi^2(1) = 8.3769, p < .001$. There was significant statistical difference in the distribution of CVD deaths between optimists and pessimists in that optimism was more closely associated with CVD deaths. Consequently, hypothesis 3 was not supported. For hypothesis 4, deaths from all causes totaled 340 and 73 for cohort optimists and pessimists, respectively. The frequency of deaths from all causes was not statistically equivalent between cohort optimists and pessimists, $\chi^2(1) = 172.613, p < .001$. The number of deaths from all causes was statistically higher in optimists than in

pessimists. As with hypothesis 3, hypothesis 4 was not supported. For both CVD deaths and deaths from all causes, a higher distribution of optimists than pessimists characterized the JHS sample. A supplementary analysis tested equivalence in the distribution of non-CVD deaths between optimists and pessimists. The analysis revealed that deaths from non-CVD related causes were higher in optimists than in pessimists, $\chi^2(1) = 88.902, p < .001$. The number of non-CVD deaths for optimists and pessimists were 170 and 35, respectively. The number of optimists who expired from non-CVD related causes was statistically higher than expected. The optimistic disposition was high among all levels of death.

In a final supplemental analysis, dispositional optimism was tested as a discriminator of clinical risk factors for cardiovascular events. The dependent variables included the measures of waist circumference, BMI, systolic blood pressure, diastolic blood pressure, pulse pressure, total cholesterol, and CRP. Males and females were analyzed independently. There were no significant effects detected in male, $F(1,155) = .972, p > .05$, or in female, $F(1,218) = .519, p > .05$, participants of the Jackson Heart Study.

CHAPTER V

DISCUSSION

The singular purpose of this study was to test dispositional optimism, a stable personality trait, as a viable risk factor for CVD mortality in African Americans. The research strategy assumed a two-fold approach. The researcher sought to (1) provide empirical evidence in support of dispositional optimism as a predictor of fatal CVD events and (2) determine proportionally, the influence of one's attitudinal dispositional on cause of death. To this end, four research hypotheses were tested.

H₁: Dispositional optimism is a significant predictor of CVD mortality in males.

H₂: Dispositional optimism is a significant predictor of CVD mortality in females.

H₃: CVD mortality is significantly lower in optimists than in pessimists.

H₄: All-cause mortality is significantly lower in optimists than in pessimists.

The research idea developed from the notion that the reprehensible CVD health outcomes borne by African Americans are linked to etiologies of both biological and non-biological origins. In the past half-century, as the knowledge of biological CVD risk factors advanced, the CVD health of African Americans declined. This inverse trend was not only counterintuitive, but it also confirmed vulnerabilities in the quality of life of African Americans as a group. Herein lies the justification for conducting exploratory research targeted at identifying novel, non-biological CVD risk factors in African Americans.

The researcher selected dispositional optimism as the factor of interest because it was understudied in CVD research in which African Americans are the population of interest and because of the encouraging findings reported from prior studies. The current

study is the first to research, descriptively and inferentially, dispositional optimism within the JHS cohort, but it is not the first study to examine the relationship between a psychosocial characteristic and CVD within JHS.

Dispositional optimism instrument

When Scheier and Carver (1985) proposed that optimism might have a variety of consequences, the underlying assumption was that the link between optimism and outcomes, particularly health outcomes, was only as tenable as the reliability of scores and validity of inferences drawn with the dispositional optimism instrument.

Consequently, prior to addressing the four stated research hypotheses, psychometric testing of the revised Life Orientation Test (LOT-R), a multiple item measure of dispositional optimism, was initiated to ensure the trustworthiness of impending results. As previously noted, the JHS did not conduct a pilot test to assess the psychometric properties of the instrument before administration to the cohort of 5301 participants. Therefore, prior to the current study, the influence of changes made by the JHS to the instrument remained unknown.

In preparation for the confirmatory factor analysis (CFA), dimensionality of the JHS adaptation of the LOT-R was adopted from the literature. The original interpretation of dispositional optimism, published by Scheier et al. (1994) was the source of the one-factor solution. The two-factor solution was adopted from research published by Robinson-Whelen et al. (1997). While the one-factor model of the JHS instrument did not meet the model fit expectations of prior research, model fit of the two-factor model was consistent with research conducted by Glasemer et al. (2012) and Herzberg et al. (2006). Both the one-factor and two-factor solutions met the minimum standard for internal

consistency. Insufficient evidence to demonstrate a high level of inter-item correlation and reliability of composite dispositional optimism scores was produced. The higher than expected levels of error variance in dispositional optimism scores, obtained from the JHS instrument, revealed a weakness in the instrument. Optimism as assessed by the JHS potentially allows for inconsistent effects across the sample that may bias inferences drawn by investigators. Meta-analytic work conducted by Vassar and Bradley (2010) revealed that the LOT-R was not a good measure of dispositional optimism in adolescents. Their conclusion was based on reliability coefficients that were appreciably higher than those obtained in the present study. Consequently, it is plausible to suggest that the lack of reliability of the results obtained with the JHS instrument is attributed to measurement variance. As it is currently written, the JHS instrument simply may not be a good measure of dispositional optimism in African Americans, in Mississippians, or even in African Americans who reside in Mississippi. Yet, in an all African American sample, the relationship between dispositional optimism and life stress was tested in residents of Iowa and Georgia. In this administration of the instrument, the criteria for reliability were met (Taylor, Larsen-Rife, Conger, Widaman, & Cutrona, 2010). Taylor et al. (2010) demonstrated dispositional optimism scores to be a valid and reliable measure of dispositional optimism in southerners and in African Americans. Therefore, changes in the wording of responses and to the response scale of the JHS instrument are likely the source of dissonance and not racially or geographically driven measurement variance.

Juniper (2009) asserts the idea that modifications to validated instruments pervert the validity of these subjective measures. Relative to response modifications, Juniper (2009) posits that respondents use both the wording of the response and the number of

responses to make their response selection. The JHS did not give equal prominence to the wording and the number of responses and thus these seemingly insignificant changes may have corrupted the validity of the JHS adapted LOT-R. The reasons for the JHS modifications are undocumented and unknown but given the novelty of the JHS; the motivation behind the modifications may point toward a desire on the part of JHS investigators to adapt the instrument for a minority population. In multi-national research, there are published guidelines for semantic translations, but these guidelines fail to provide insight on how to modify instruments for minority populations where language translations are unnecessary (Stewart, Thrasher, Goldberg, & Shea, 2012).

Instrument modification is not unique to the LOT-R. Unauthorized modifications to the Asthma Control Questionnaire by Walter et al. (2009) which included esthetic modifications to the responses along with various other additions resulted in a formal apology to the instrument developer. Follow-up analyses were initiated to assess the impact of the unauthorized modifications in that study. The follow-up analyses revealed that the changes to the instrument did not alter the overall conclusions of the manuscript (Walter, Castro, Israel, & Sorkness, 2011). In the case of the JHS, the results of the confirmatory factor analysis from the present study differ from those obtained by Scheier et al. (1994). According to Coons et al. (2009), the JHS initiated changes to the LOT-R are classified as substantial, and the recommendation for assessing the magnitude of these changes includes full psychometric testing and usability testing. And on a final note, Juniper (2009) argues that copyrighting protects against untested and unauthorized modifications to validated instruments. Carver (2011) provides unrestricted use of the LOT-R to researchers, a liberality that is likely the source of the problem at hand.

Overview of Hypotheses

Hypothesis 1

Hypothesis 1 posited dispositional optimism as a significant predictor of CVD mortality in males. The findings from this study did not support that assertion. The addition of dispositional optimism to the model did not strengthen the model's predictive ability. Socioeconomics, not CVD clinical risk factors or dispositional optimism, emerged as significant predictor of CVD mortality in males. The educational attainment of males who obtained vocational training or who matriculated but had not earned a college degree was a significant predictor, and males whose annual household incomes rose to \$25,000 but not above \$50,000 per year was another. This finding is substantiated given the possible occupational choices of persons who attend vocational schools or of persons who do not complete college. It is reasonable to assume that occupational choices may be limited to blue-collar jobs where physical activity is often woven into the fabric of daily job activities, more so than white-collar jobs. Half a century ago, Morris and Crawford (1958) established occupational physical activity as having protective effect against CVD events. At the time of baseline JHS examination, the median household income of southern, African Americans in 2000 was \$38,349 (U.S. Census, 2014). This income is consistent with national figures for males who completed the associate degree or acquired some college credit short of a degree. So, the idea that this particular level of education would emerge as a significant predictor of CVD mortality is quite logical.

An unforeseen finding from this study was the lack of significance of any clinical CVD risk factors as predictors of CVD mortality in males. In inferential statistics, there are two prevailing explanations for why anticipated effects are not detected; they are

violation of assumptions and measurement error. When test assumptions are violated, there is the increased potential to make erroneous conclusions. With measurement error, Type II error in this instance, a small sample size renders the statistical test impotent in detecting differences where the margin of difference is narrow. In such cases, the probability of correctly rejecting a false null hypothesis (statistical power) is not only influenced by sample size, but the concomitant influences of effect size and significance are also relevant factors in detecting effects (Cohen, 1992).

In the initial analysis of the data ($n = 172$), there were 12 and 13 predictor or independent variables entered into the model. Hart and Clark (1999) conclude that as the number of independent variables increases, the risk of committing a Type II error also increases, where sample sizes are small. They recommend 30 to 50 cases per independent variable. Based on the recommendation by Hart and Clark (1999), a sample size between 360 and 650 was more suitable for the logistic regression analysis. Without a means to increase the sample size, for such an increase would entail premeditating the deaths of several hundred JHS participants, the next option included strategically eliminating predictor variables. Of the seven clinical predictors entered into the initial analysis, body mass index (BMI), pulse pressure, and total cholesterol were retained for the secondary analysis. Historically, these factors are reliable predictors for CVD events. In the secondary analysis, BMI emerged as a significant predictor of CVD mortality in males. As with the initial analyses, dispositional optimism did not significantly predict CVD mortality but consistent with the literature, BMI proved to discriminate CVD mortality.

Based on the methodology and analysis of these data, having never married and having earned an associate degree increased the risk of CVD death more than two-fold in JHS male participants. Males separated from their spouse presented with a more than five-fold risk for CVD mortality than married males, but for dispositional optimism, there was no increased risk of CVD mortality. Vocational education or having earned some college credit decreased the risk for fatal CVD events. These findings strongly suggest that indicators of socio-economic status influence the odds of succumbing to a CVD event. Socio-economic indicators provide information about an individual's access to resources, both social and economic (Duncan et al., 2002). Access or the lack of access to resources shape the decisions that individuals make relative to diet, physical activity, and healthcare. Cumulatively, these decisions affect quality of life, longevity, and manner of death. Therefore, discovering dramatic shifts in the odds of a CVD death versus a non-CVD death amplifies the relationship between socio-economic indicators and CVD events. Social and economic indicators influence behavior, behavior influences clinical measures for health, and those measures, in turn, determine the risk for CVD events, including death.

Hypothesis 2

Hypotheses 2 tested the predictive ability of dispositional optimism as an indicator for CVD mortality in females. Dispositional optimism failed to significantly improve the predictive ability of CVD mortality. Total cholesterol, widowhood, and systolic blood pressure discriminated between a CVD death and a non-CVD death in females.

The National Heart, Lung, and Blood Institute (NHLBI) reports that after women experience the change of life or menopause, both systolic blood pressure and total cholesterol are expected to rise (Reckelhoff, 2001). In a study of the natural onset of menopause, the average observed natural age of menopause in African American women was 49.9 years (SD = 3.71) (Palmer, Rosenberg, Wise, Horton, & Adams-Campbell, 2003). In a multiethnic sample (26% African American), the median observed age at menopause was 51.4 years (Gold et al., 2001). Therefore, after the age of 50, rises in total cholesterol level and systolic blood pressure in females are anticipated. Within the JHS cohort, total cholesterol and systolic blood pressure levels rise incrementally at the age of 65. This increase is preceded by declines in serum cholesterol concentrations between the ages of 55 and 64 years, a time when increases are anticipated. Also, 85% of females over the age of 65 reported widowhood. The commonality between total cholesterol, systolic blood pressure, and widowhood is time. Age, often used as a proxy for time, was not significant in the prediction model. Further testing revealed significant relationships between systolic blood pressure and widowhood, respective to age. The anomalous decline in total cholesterol values for females between the ages of 55 and 64 may explain the absence of an observed relationship between total cholesterol and age. It is sensible that as a person ages, the odds for CVD death or death from any other cause increase.

Based on these data, membership in the middle class and having never married are tremendous risk factors for CVD mortality in females. The odds of CVD death quadruple and quintuple, respective to referent groups based on the results of this study. These odds reveal that lifestyle behaviors matter. More important than possessing

resources, the manner in which those resources, both social and economic, are allocated has an impact on health and ultimately, cause of death.

Hypotheses 3 and 4

The data failed to support the hypothesized notion that higher distributions of CVD deaths occurred in pessimists than in optimists. Consequently, hypothesis 3 was not retained. Similarly, deaths from all causes of death were not higher in pessimists than in optimists. On the contrary, the opposite position was supported empirically. The distribution of deaths was higher for optimists whether the death was CVD related or not. Dispositional optimism scores characteristic of the pessimistic disposition (scores between 0 and 10) made up only 25% of the cohort. A majority of the cohort were optimistic persons. Consequently, mortality ratios reflect this distribution.

The national overall and national African American crude CVD mortality rates were 193.6 and 233.5 per 100,000, respectively (National Center for Health Statistics, 2013). The crude CVD mortality rate for the JHS was calculated as 4,806 per 100,000. Of note, the national and African American mortality rates were calculated in like manner based on International Classification of Diseases (ICD) codes. The JHS mortality rate was calculated according to the participant's immediate cause of death and thus this methodology lacks the sensitivity inherent in using ICD codes (at the time of this research, ICD codes were not available through the JHS). Nevertheless, the JHS CVD mortality rate is substantially higher than national rates for African Americans. It is quite possible that the extreme differences observed between the JHS and national African American crude CVD mortality rates may be linked to oversampling of sick or unhealthy individuals in the Jackson, MS metropolitan statistical area. Or, this difference may

reveal a truer picture of the CVD health of African Americans in Jackson, MS. Either way, categorically, the findings from this study are consistent with previous efforts in that CVD mortality is high for African Americans and for southern African Americans in particular.

Limitations

Two main limitations influence the interpretation of these data. The architecture of the dispositional optimism instrument accompanied by methodological constraints were domains that facilitate further discussion. The LOT-R is not an objective measure of dispositional optimism; the researcher has the authority to arbitrarily define the optimistic or pessimistic disposition. Since cut-off scores are relative with the LOT-R, the JHS adaptation of the instrument, which in this study was measured on a 4-item response scale, will not produce compatible scores in situations where the 5-item response scale was preferred. As was the case when dispositional optimism scores from the JHS cohort were compared with the normed scores in Table 3. The average JHS dispositional optimism scores for males and females were not necessarily comparable to the norms identified in Table 3. Therefore by condensing the scale of measurement, persons characterized as optimistic in one setting may not necessarily be classified as such in an alternate setting and effects that may otherwise be detected by a more liberal scale of measurement may go undetected.

Another concern with the JHS adaptation of the LOT-R was that the data were not a good fit with the one-factor model of the dispositional optimism construct. Based on these data, the two-factor solution is a stronger model than the one-factor solution sanctioned by the instrument developers. But, as noted by Scheier et al. (1994), the two-

factor solution poses problems in how to interpret optimism and pessimism as two distinct personality characteristics. They suggest that testing for the differential effects of optimism and pessimism can be conducted by analyzing dispositional optimism as a bipolar construct, but such attempts in the past have failed to yield a distinct outcome from the one-dimensional measure of dispositional optimism.

A final caveat to consider with the JHS administered LOT-R was the high level of error variance in the dispositional optimism scores. According to Tavakol and Dennick (2011), acceptable ranges for Cronbach's alpha, a measure of internal consistency, range from 0.70 to 0.95. The calculated alpha value for the LOT-R fell below this threshold. Consequently, the error variance associated with dispositional optimism scores in the JHS sample was quite high. The fraction of the dispositional score attributable to random measurement error was 0.58. Therefore, 58% of the dispositional optimism score was attributed to sources other than the personality trait under investigation. Given that the value of alpha is reduced when the number of test items are few, the low reliability estimate observed with these data may be a reflection of the brevity of the six-item LOT-R. However, alphas of less than .60 were observed by the instrument developers during test-retest reliability exercises (Scheier et al., 1994).

Methodological decisions may also present limitations for the present study. Within the JHS, socioeconomic and psychosocial factors were obtained through self-reported measures whereas clinical metrics were gathered through objective means. The subjective nature of self-reported measures that are unverified by independent sources has the potential to introduce bias into the research conclusion. Also, the actual administration of the LOT-R may have contributed to measurement error. The six-item

LOT-R instrument was administered as part of an annual follow-up telephone interview that included a 32-item questionnaire that was administered before the LOT-R was administered. Quite possibly, fatigue on the part of the participant may have contributed to the error variance in the dispositional optimism composite score for the JHS sample.

Limitations specific to the methodology imposed by the researcher include the cross-sectional design that restricts discussions to associations and bars any discourse on causality. Also, as intended by the researcher, inferences from these data are exclusively attributable to African Americans since they were the population of interest. Consequently, conclusions from these data may not be applicable to society as a whole. The researcher also exclusively chose to consider traditional clinical risk factors for CVD. While there a number of behavioral risk factors (e.g., physical inactivity) that play a role in CVD development, clinical factors were emphasized because they measure objective health status whereas the behavioral risk factors were self-reported and, thus, subjective in nature.

Another limitation to this study includes the classification of cause of death by the immediate cause of death and not the underlying cause of death. An immediate cause of death is often an acute injury or trauma that causes the patient to expire. Whereas, the underlying cause of death, particularly in the case of CVD, is attributed to a chronic condition for which the patient has suffered with a disability over a period of time. As noted in Chapter III of this document, instances where an underlying medical condition was not provided in support of the cause of death, by default, deaths were coded as non-CVD related. This decision may have elevated the number of non-CVD deaths introduced into the analysis.

Suggestions for Further Research

For both male and female participants of the JHS, marital status emerged as a prominent risk factor for CVD mortality. Specifically, there was a decreased risk for CVD mortality for co-habiting married couples than for persons who never married. While the risk for CVD death increased for widowed females and for males who were separated from a spouse compared with co-habiting married couples. Robards, Evandron, Falkingham, and Vlachantone (2012) propose that the emotional support and social networks that are inherent in marriage are the likely cause for decreased CVD mortality risk. For married persons, these emotional and social assets manifest in the form of recognizing symptoms early, seeking out of medical treatment when needed, and the avoidance of risky behaviors (Stack & Eshleman, 1998). Given these behaviors, Schoenborn's (2004) conclusion that poor health is less likely a reality for married persons seems reasonable.

In this study, the elevated risk for CVD mortality in females whose income was greater than \$75,000 per year, was exclusively observed in married, divorced, or widowed females. Further study that longitudinally explores the influence of marital status, including changes in marital status over time, may be of benefit to CVD research efforts.

The theoretical underpinning of dispositional optimism provides that self-focus changes behavior to reduce discrepancies between a present condition or situation and a desired outcome. In the case of CVD mortality, the discrepancy-reducing behaviors that are *sine qua non* determinants of optimistic or pessimistic dispositions did not influence the manner in which death occurred. Nor was attitudinal disposition a determinant in

clinical risk factors for CVD events. On this basis, the dominance of biology over learned traits appears to prevail in predicting health outcomes. The reluctance to change behaviors that potentially result in improved health in African Americans in light of scientific advancements that affect biology, involves identifying psychosocial traits that are unique predictors of health outcomes. That process begins with developing veracious measurement tools that quantify the phenomena of interest.

In addition to advancing capabilities in measuring dispositional optimism, further research in the area of dispositional optimism and CVD outcomes involves identifying the specific factors that potentially mediate the effects of optimism in African Americans. The relationship between dispositional optimism and CVD events may not be direct, but rather influenced by other distinct yet related unidentified variables. Given the evidence in support of dispositional optimism as a determinant of health in other populations, further research that employs a different methodological approach may detect significant effects in African Americans.

The findings from the current study come at a time when CVD-related conditions and diseases depict the denouement of the human experience. Death is inevitable, but CVD deaths are often preventable. The cardiovascular diseases are a family of diseases whose etiology often spans decades before CVD events manifest. With the vision of CVD wellness for African Americans at the forefront, herein lies an opportunity to reverse deleterious behaviors and attitudes that develop over the course of time.

APPENDIX A

INSTITUTIONAL REVIEW BOARD NOTICE OF COMMITTEE ACTION



INSTITUTIONAL REVIEW BOARD
 118 College Drive #5147 | Hattiesburg, MS 39406-0001
 Phone: 601.266.5997 | Fax: 601.266.4377 | www.usm.edu/research/institutional-review-board

NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.
 Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **14020303**
 PROJECT TITLE: **Dispositional Optimism: Modeling Cardiovascular Disease Mortality with Traditional Risk Factors and a Psychosocial Personality Trait**
 PROJECT TYPE: **New Project**
 RESEARCHER(S): **Kiana Robinson**
 COLLEGE/DIVISION: **College of Education and Psychology**
 DEPARTMENT: **Educational Studies and Research**
 FUNDING AGENCY/SPONSOR: **N/A**
 IRB COMMITTEE ACTION: **Expedited Review Approval**
 PERIOD OF APPROVAL: **02/05/2014 to 02/04/2015**

Michael Madson, Ph.D.
Institutional Review Board

APPENDIX B

JHS DATA MANAGEMENT AND DISTRIBUTION AGREEMENT

THE JACKSON HEART STUDY
Data and Materials Distribution Agreement

P#0438 Dispositional Optimism: Modeling
 JHS ASC# or MS# and Title
 Robinson CVD Mortality
 PI (last name)

The undersigned parties hereby enter into this Data and Materials Distribution Agreement (DMDA) as of the date specified on the final page hereof.

INTRODUCTION

The Jackson Heart Study (JHS) is a single site, multicenter epidemiology study of African Americans funded by contracts with the National Heart, Lung, and Blood Institute (NHLBI) and the National Institute on Minority Health and Health Disparities (NIMHD).

To protect the confidentiality and privacy of the JHS participants and their families, investigators granted access to Data and Materials must adhere to the requirements of this DMDA. Failure to comply with this DMDA could result in its termination, denial of further access to the JHS and other NHLBI resources, and may leave violators liable to legal action on the part of the JHS participants, their families, or the U.S. Government.

The undersigned parties entering into this DMDA include: the Recipient and Recipient's Principal Investigator (defined in the next section), the NHLBI, and the Coordinating Center for the JHS, on behalf of the JHS and under the direction of the JHS Steering Committee.

DEFINITIONS

For purposes of this agreement,

"Genetic Analysis Data" refers to any and all information derived from genetic materials and any and all data derived from statistical analyses linking data from genetic materials with other study data.

"Data" refers to any and all study data, including laboratory, examination, and questionnaire results, and Genetic Analysis Data, images (e.g., computed tomography scans, MRI scans), or primary signal data (e.g., ECG, spirometry tracings, polysomnography, accelerometry) and associated records either obtained directly from JHS participants or obtained from third parties as authorized by the participants pursuant to the contracts with the NHLBI, as well as data provided to the JHS by ancillary studies.

"Resultant Data" refers to data derived in whole or in part by Recipient from Data and/or Materials provided under this DMDA.

"Materials" refers to bio-samples, including but not limited to, urine and blood samples and products thereof, including but not limited to, immortalized lymphocytes and extracted DNA from said bio-samples pursuant to the contracts with the NHLBI, as well as Materials provided to the JHS by ancillary studies.

"The JHS Study Investigator" is a research investigator who works with the JHS either as an employee of the NHLBI or through a current and active contract or consulting agreement with the NHLBI or one of its contractors.

"Research Project" refers to the project described in the attached research application.

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"Recipient" refers to the institution or other entity receiving access to the JHS Data and/or Materials requested for the Research Project identified in section 3 below as described in the attached research application.

"Principal Investigator (PI)" refers to the Research Project director for the Recipient.

TERMS AND CONDITIONS

It is mutually agreed as follows:

1. **Materials.** The JHS and NHLBI agree to transfer to Recipient the Materials described below, including the types of samples, amount per sample, the number of individuals from whom samples are to be provided, and whether samples are nonrenewable or from a renewable resource (e.g., DNA from immortalized cell lines) for use by the Recipient's PI to conduct the Research Project as summarized in section 3 below.

n/a

2. **Data.** The JHS agrees to provide Recipient with Data described as follows:

mortality, clinical and psychosocial variables for the cohort.

The JHS will provide Recipient with the name and contact information of Study Investigators and all other investigator(s) who generated such Data.

3. Research Project.

3.1 These Materials and Data will be used by Recipient's PI solely in connection with the Research Project, as named and described in the attached research application (insert Research Project name below):

Dispositional optimism: modeling CVD mortality with traditional risk factors and a psychosocial personality trait

3.2 If any aspect of the Research Project, e.g., biological assays and/or genetic analyses, is to be performed by an entity other than Recipient as permitted by section 4.2, such entity is to be named below:

n/a

3.3 This DMDA covers only the Research Project cited in section 3.1 of this DMDA. Recipient must submit a separate DMDA for each Research Project for which Data and/or Materials are requested.

4. Non-transferability. This DMDA is not transferable.

4.1 Recipient and Recipient's PI agree that substantive changes made to the Research Project, and/or appointment by Recipient of another Principal Investigator and/or transfer of Recipient's PI to another institution or other entity to complete the Research Project, require execution of a separate DMDA. Except as provided in section 4.2 below, Recipient may not distribute Data or Materials to any other individual or entity, regardless of the intended use of such Data or Materials. However, nothing in this section precludes Recipient from publishing results of the Research Project through the usual channels of scientific publication.

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4.2 Recipient and Recipient's PI may transfer or cause to be transferred Materials to an institution or institutions or other entities not affiliated with Recipient but with which Recipient has either a fee-for-service or subcontract agreement or specific authorization from the NHLBI for performance of assays and/or genetic analyses for the Research Project as identified in section 3.2. A separate DMDA is not required if the derived data are either returned to the Recipient and Recipient's PI or are deposited for Recipient and Recipient's PI in a publicly accessible database authorized by the NHLBI upon completion of the assays. No Data are to be provided to such institutions or other entities unless a separate DMDA has been approved by The JHS and NHLBI.

5. Conduct of Research Project. Recipient's PI is responsible for the conduct of the Research Project and shall be responsible for assuring that any co-investigator(s) comply with the terms of this DMDA.

6. Publication. Prompt publication of the results of the Research Project is encouraged. The JHS and NHLBI request that the Recipient's PI provide to the authorized representative for the JHS Coordinating Center (named below) a copy of any abstract ten (10) days in advance of submission for publication and any manuscript or other disclosure document thirty (30) days in advance of submission for publication, in order to permit review and comment and ensure compliance with the confidentiality requirements of this DMDA.

7. Acknowledgments. Recipient and Recipient's PI agree to acknowledge the contribution of the JHS staff in any and all oral and written presentations, disclosures, and publications resulting from any and all analyses of Data or Materials.

7.1 Collaborations. If a manuscript resulting from the Research Project has Study Investigators as co-authors, then the manuscript will be reviewed by the JHS.

7.1.a If the manuscript is approved by the JHS, the Recipient and Recipient's PI agree to include the following language in an acknowledgment.

The Jackson Heart Study is supported by contracts HHSN268201300046C, HHSN268201300047C, HHSN268201300048C, HHSN268201300049C, HHSN268201300050C from the National Heart, Lung, and Blood Institute and the National Institute on Minority Health and Health Disparities, with additional support from the National Institute on Biomedical Imaging and Bioengineering.

"This manuscript has been reviewed by the JHS for scientific content and consistency of data interpretation with previous JHS publications."

7.1.b If the manuscript is not approved by the JHS and the Recipient and Recipient's PI wish to proceed to publish without inclusion of Study Investigators as co-authors, the Recipient and Recipient's PI agree to include the following language in an acknowledgment.

The Jackson Heart Study is supported by contracts HHSN268201300046C, HHSN268201300047C, HHSN268201300048C, HHSN268201300049C, HHSN268201300050C from the National Heart, Lung, and Blood Institute and the National Institute on Minority Health and Health Disparities, with additional support from the National Institute on Biomedical Imaging and Bioengineering.

"This manuscript was not approved by the JHS. The opinions and conclusions contained in this publication are solely those of the authors, and are not endorsed by the JHS or the NHLBI and should not be assumed to reflect the opinions or conclusions of either."

7.2 Other Studies. If the Research Project does not involve collaboration with Study Investigators, then the Recipient and Recipient's PI agree to include the following language in an acknowledgment.

The Jackson Heart Study is supported by contracts HHSN268201300046C, HHSN268201300047C, HHSN268201300048C, HHSN268201300049C, HHSN268201300050C from the National Heart, Lung, and Blood Institute and the National Institute on Minority Health and Health Disparities, with additional support from the National Institute on Biomedical Imaging and Bioengineering.

"This manuscript was not prepared in collaboration with investigators of the JHS and does not necessarily reflect the opinions or conclusions of the JHS or the NHLBI."

7.3 Ancillary Study Investigator Acknowledgments. If Data include data provided to the JHS by ancillary study investigators, Recipient and Recipient's PI also agree to acknowledge their contribution in any and all oral and written presentations, disclosures, and publications resulting from any and all analyses of such Data.

8. Non-Identification. Recipient and Recipient's PI agree that Materials and/or Data will not be used, either alone or in conjunction with any other information, in any effort to determine the individual identities of any of the participants from whom Data and/or Materials were obtained or derived.

9. Use Limited to Research Project. Recipient and Recipient's PI agree that Materials, their progeny, or derivatives thereof, and Resultant Data will not be used in any experiments or procedures unless said experiments or procedures are disclosed and approved as part of the Research Project.

10. Use in Human Experimentation Prohibited. Recipient and Recipient's PI agree that Materials, their progeny, and derivatives thereof will not be used in human experimentation of any kind.

11. Compliance with Participants' Informed Consent. Recipient and Recipient's PI agree that Data and/or Materials, their progeny, and derivatives thereof will not be used for any purpose contrary to a participant's applicable signed informed consent document(s). Recipient and Recipient's PI agree to consult with Study Investigators and ascertain, specifically and in detail, the terms and conditions of applicable JHS informed consent documents.

12. No Distribution; Avoidance of Waste. Recipient and Recipient's PI agree to retain control over Data, Materials and their progeny, and derivatives thereof. Recipient and Recipient's PI further agree not to transfer Data, Materials and their progeny, and derivatives thereof, with or without charge, to any other entity or individual, except for Data and/or Materials as provided for in section 4.2 above. Recipient and Recipient's PI agree to make reasonable efforts to avoid contamination or waste of Materials.

13. Resultant Data to be Provided to the JHS and NHLBI. Recipient and Recipient's PI agree to provide the JHS with a report every twelve (12) months during the term of this DMDA. The report shall include a description of the activities performed and Resultant Data obtained during the twelve (12) months before the reporting date. Recipient and Recipient's PI agree that the JHS and NHLBI, in accordance with the NIH Data Sharing Policy, may distribute all such Resultant Data through established NHLBI procedures to all institutions requesting access for their identified qualified scientific investigators to such Resultant Data and that submit to NHLBI a signed DMDA comparable to this DMDA. Recipient and Recipient's PI will provide all Resultant Data in the precise electronic format specified by NHLBI or the JHS. If errors in family structure, especially paternity, are identified, Recipient and Recipient's PI agree to contact the Coordinating Center Authorized Representative (named below), at the time such errors are identified, to receive detailed instructions as to how to provide such information and to whom. Recipient and Recipient's PI further agree to refrain from any disclosure of such identified errors to anyone other than individual(s) specifically identified and authorized by the JHS and NHLBI.

14. Costs/No Warranties. Cost for Materials distribution will be determined on a case by case basis. Costs are subject to change following written notification from the JHS with the approval of NHLBI. NO WARRANTIES, EXPRESS OR IMPLIED, ARE OFFERED AS TO THE MERCHANTABILITY OR FITNESS FOR ANY PURPOSE OF THE MATERIALS AND/OR DATA PROVIDED TO RECIPIENT UNDER THIS AGREEMENT.


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15. Recipient's Responsibility for Handling Materials. Recipient and Recipient's PI acknowledge that Materials may carry viruses, latent viral genomes, and other infectious agents. Recipient and Recipient's PI agree to treat Materials as if they were not free of contamination, and affirm that Materials will be handled by trained persons under laboratory conditions that afford adequate biohazard containment. By accepting Materials, Recipient assumes full responsibility for their safe and appropriate handling.

16. Non-Endorsement, Indemnification. Recipient and Recipient's PI agree not to claim, infer, or imply United States Government endorsement of the Research Project, the entity, or personnel conducting the Research Project, or any resulting commercial product(s) except as described in section 7.

Recipient and Recipient's PI agree to hold harmless the United States Government, the JHS, and all investigator(s) who generated Data and Materials, and the agents and employees of each of them for all liabilities, demands, damages, expenses, and losses arising out of Recipient's use for any purpose. 

Except where prohibited by law, Recipient agrees to defend and indemnify the United States Government, the JHS, and all investigator(s) who generated Data and Materials, and the agents and employees of each of them for all liabilities, demands, damages, expenses, and losses arising out of Recipient's use for any purpose. 

17. Accuracy of Data. Recipient agrees that the United States Government and the JHS are not responsible for the accuracy of Data or the provenance or integrity of Materials provided.

18. Recipient's Compliance with Recipient IRB's Requirements. Recipient certifies that the conditions for use of the Data and/or Materials in conjunction with the Research Project have been reviewed by the Recipient's Institutional Review Board (IRB) or similar human subjects oversight body in accordance with Department of Health and Human Services regulations at 45 CFR Part 46. Recipient agrees to comply fully with all such conditions and with the participants' informed consent documents, and any additional conditions that may be imposed by the JHS IRB(s). Recipient agrees to report promptly to the JHS and NHLBI any unanticipated problems or proposed changes in the Research Project. Recipient also agrees to report to Recipient's IRB any unanticipated problems or changes in the Research Project that involve additional risks to participants or others. Recipient remains subject to applicable state and local laws and regulations and institutional policies that provide additional protections for human subjects.

19. Recipient's Responsibility to follow Data Security Best Practices. Recipient is aware of computer and data security best practices and will follow them for receipt, storage and use of Data and Resultant Data. An example of best practice guidelines can be found in http://www.ncbi.nlm.nih.gov/projects/gap/pdf/dbgap_2b_security_procedures.pdf.

20. Amendments. Amendments to this DMDA must be made in writing and signed by authorized representatives of all parties.

21. Termination. This DMDA shall terminate at the earliest of: the completion of the Research Project; five (5) years after the effective date of this DMDA; abandonment of the Research Project; or violation by Recipient of any provisions of this DMDA not remedied within 30 days after the date of written notice by the NHLBI and JHS of such violation. Upon termination of this DMDA:

- (a) If Data provided to Recipient include Center for Medicare and Medicaid Services (CMS) data, Recipient agrees to destroy all copies of all Data received from the JHS and consult with the JHS and the NHLBI regarding the disposition of all remaining Materials. Recipient will verify that the JHS data have been destroyed in a written or electronic communication to the JHS Coordinating Center.

(b) If Data provided to Recipient do not include Center for Medicare and Medicaid Services (CMS) data, Recipient agrees to consult with the JHS and the NHLBI regarding the disposition of all remaining Data and/or Materials.

22. Disqualification, Enforcement. Failure to comply with any of the terms of this DMDA may result in disqualification of Recipient from receiving additional Data and/or Materials. The United States Government and/or the JHS may have the right to institute and prosecute appropriate proceedings at law or in equity against the Recipient for violating or threatening to violate the confidentiality requirements of this DMDA, the limitations on the use of the Data or Materials provided, or both. Proceedings may be initiated against the violating party, or legal representatives, and assigns, for a restraining injunction, compensatory and punitive damages, mandamus, and/or any other proceeding at law or in equity, including obtaining the proceeds from any intellectual property or other rights that are derived in whole or in part from the breach of the confidentiality requirements or use limitations of this agreement. In addition, Recipient and Recipient's PI acknowledge and agree that a breach or threatened breach of the confidentiality requirements or use limitations of this DMDA may subject Recipient and Recipient's PI to legal action on the part of JHS participants, their families, or both.

23. Representations. Recipient and Recipient's PI expressly certify that the contents of any statements made or reflected in this document are truthful and accurate.

24. Prior Distribution Agreements. By execution of this DMDA, Recipient certifies its good faith belief that it is in compliance with the terms and conditions of all its existing DMDAs with the JHS and/or the NHLBI.

Required Signatures begin on the next page

RECIPIENT'S PRINCIPAL INVESTIGATOR AND RECIPIENT'S AUTHORIZED REPRESENTATIVE:

Kiana R. Luckett Robinson grad student
Name of Recipient's Principal Investigator and Title

[Redacted]
Surface Mail Address of Recipient's Principal Investigator

[Redacted]
Email Address of Recipient's Principal Investigator

[Redacted] n/a
Telephone Number of Recipient's Principal Investigator and Fax Number

Kiana R. Luckett Robinson 1-24-14
Signature of Recipient's Principal Investigator and Date

Name of Recipient Corporation/Institution (select non-profit OR for-profit)
The University of Southern Mississippi
organized under the laws of (State/Country): MISSISSIPPI / USA

with a principal address at: 118 College Drive, Hattiesburg, MS 39406-0001

Gordon Cannon VPP
Name of Recipient's Authorized Representative and Title

Gordon Cannon 2-27-14
Signature of Recipient's Authorized Representative and Date

COORDINATING CENTER FOR THE JACKSON HEART STUDY (JHS)

ADOLEO CANON 2/27/2014
Name of JHS Coordinating Center Authorized Representative and Title

A Canon 2/27/2014
Signature of JHS Coordinating Center Authorized Representative and Date

NHLBI (for Materials only):
Name of NHLBI's Authorized Representative and Title
Signature of NHLBI Authorized Representative and Date

This Distribution Agreement is entered into as of: 2/28/14 (effective date)
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ADDENDUM TO DATA AND MATERIALS DISTRIBUTION AGREEMENT BETWEEN THE UNIVERSITY OF SOUTHERN MISSISSIPPI AND JACKSON HEART STUDY

1. The second sentence in Section 14 is a disclaimer of warranties provision. The Attorney General of Mississippi has opined that a state agency may not agree to disclaim warranties in a contract. (See attached AG opinion, Davis, 1993) The second sentence should be deleted.
2. The second paragraph of Section 16 is a hold harmless provision. The Attorney General has opined that a state agency may not agree to hold harmless another party to a contract. (See attached AG opinion Smith, 2002) This paragraph should be deleted.
3. The third paragraph of Section 16 is an indemnification provision. The Attorney General has opined that a state agency may not agree to indemnify another party to an agreement. (See attached AG opinion Stringer, 2006) This paragraph should be deleted.

APPENDIX C

JHS REVISED LIFE ORIENTATION TEST (LOT-R)



Second Year Questionnaire

FORM CODE: AF2
VERSION A 5/29/2001ID NUMBER: CONTACT YEAR: LAST NAME: INITIALS:

INSTRUCTIONS: This form should be completed during the second year annual follow-up call. ID Number, Contact Year, and Name must be entered above. Whenever numerical responses are required, enter the number so that the last digit appears in the rightmost box. Enter leading zeroes where necessary to fill all boxes. If a number is entered incorrectly, mark through the incorrect entry with an "X". Code the correct entry clearly above the incorrect entry. For "multiple choice" and "yes/no" type questions, circle the letter corresponding to the most appropriate response. If a letter is circled incorrectly, mark through it with an "X" and circle the correct response.

"Now I'm going to read a series of statements. For each one, tell me how much it is like you. For example, tell me whether the statement is a lot like you, somewhat like you, a little like you, or not at all like you."

A lot like me	Somewhat like me	A little like me	Not at all like me
---------------	------------------	------------------	--------------------

- | | | | | |
|---|---|---|---|---|
| 1. In uncertain times I expect the best | A | B | C | D |
| 2. If something can go wrong for me, it will..... | A | B | C | D |
| 3. I'm always optimistic about my future | A | B | C | D |
| 4. I hardly ever expect things to go my way | A | B | C | D |
| 5. I rarely count on good things happening to me | A | B | C | D |
| 6. Overall, I expect more good things to happen than bad..... | A | B | C | D |

"Now I have some questions about your work or job situation."

7. [DO NOT ASK; RECORD FROM AFU ITEM #32A:
"PLEASE TELL ME WHICH OF THE FOLLOWING BEST
DESCRIBES YOUR EMPLOYMENT STATUS?"]Homemaking A
Employed B ——— Go to Item 9
Unemployed C
Retired D
8. Have you worked for pay in the past? Yes Y
Go to Item 24 — No N
9. [IF "EMPLOYED" OR "RETIRED" SAY]: "If you are not currently working, please answer these questions in relation to your main job over your lifetime."
[OR, IF "HOMEMAKING" OR "UNEMPLOYED" SAY]: "Please answer these questions in relation to your main job over your lifetime."
How satisfied (are/were) you with your job?
(Are/Were) you satisfied, dissatisfied, or neither?Satisfied A
Dissatisfied B
Neither C
10. During the past year, how often were you in a situation where you faced job loss or layoff?
Were you actually laid off, constantly faced with job loss or lay off, faced this possibility more than once, faced this possibility once, or never faced with job loss or lay off? Actually laid off A
Constantly faced with job loss or lay off B
Faced this possibility more than once C
Faced this possibility once D
Never faced with job loss or lay off E

11. Sometimes people have jobs that they want to keep. When thinking about your job (now/when you were working), how likely (is it/was it) that during the (next couple of years/last couple of years you worked) you (will/would) keep your current job? Would you say very likely, somewhat likely, not too likely, not at all likely, or you don't care to keep your job?
- | | |
|---------------------------------|---|
| Very likely | A |
| Somewhat likely | B |
| Not too likely | C |
| Not at all likely | D |
| You don't care to keep your job | E |
12. If you were to lose your main job, what do you think your chances (would be/would have been) of finding another job that paid about the same? Would you say very good, good, fair, or poor?
- | | |
|-----------|---|
| Very good | A |
| Good | B |
| Fair | C |
| Poor | D |

"I would like to read you a few things that may be true about your work. Please tell me how strongly you agree or disagree with each of these statements; that is, whether you strongly agree, somewhat agree, somewhat disagree, or strongly disagree."

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
----------------	----------------	-------------------	-------------------

- | | | | | |
|---|---|---|---|---|
| 13. I (have/had) very little chance to decide how I do my work..... | A | B | C | D |
| 14. My work (requires/required) working very fast | A | B | C | D |
| 15. My work (requires/required) a lot of physical effort..... | A | B | C | D |
| 16. I (have/had) enough time to get my work done | A | B | C | D |
| 17. I (get/got) to do a variety of different things | A | B | C | D |

18. At your workplace, (do/did) you participate in making decisions about such things as the products or services offered, the total number of people employed, budgets, and so forth?..... Yes Y
No N
- 19a. As an official part of your job, (do/did) you supervise work of other employees, have responsibility for or tell other employees what work to do? Yes Y
 Go to Item 20 — No N
- 19b. (Do/Did) you hold a managerial position at your place of employment?..... Yes Y
 Go to Item 20 — No N
- 19c. Would that (be/have been) a top, upper, middle or lower managerial position?..... Top A
Upper B
Middle C
Lower D
20. (Does/Did) someone else supervise your work?..... Yes Y
 Go to Item 24 — No N
21. (Is/Was) your immediate supervisor Black, White, or of another ethnicity or race? Black B
White W
Another ethnicity or race O
22. Do you think your job (is/was) one that Black people tend to get more than people of other ethnic groups?..... Yes Y
No N

23. (Is/Was) your work group all Black, mostly Black, about half Black and half White, mostly White, or all White?
- | | |
|---------------------------------|---|
| All Black | A |
| Mostly Black | B |
| About half Black and half White | C |
| Mostly White | D |
| All White | E |
| Other | F |

ADMINISTRATIVE INFORMATION

24. Date of data collection:
- | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | / | | | / | | | | |
| m | m | | d | d | | y | y | y | y |
25. Method of data collection:
- | | |
|------------|---|
| Computer | C |
| Paper form | P |
26. Code number of person completing this form:
- | | | |
|--|--|--|
| | | |
|--|--|--|

Second Year Questionnaire Form Instructions
AF2 Version A, 12/07/1999
QxQ Date 02/25/2001

I. GENERAL INSTRUCTIONS

The Second Year Questionnaire (AF2) form is appended to the routine annual follow up (AFU) interview form and is asked ONLY during the second annual call two years after the baseline clinic examination. These questions are intended to capture additional information regarding participant orientation to life by asking about optimism (LOT) and additional information on socioeconomic (SES) status by asking about job satisfaction and work control factors (JOB). The interviewer must be certified and should have a working knowledge of the annual follow-up procedures. S/he should also be familiar with the data entry procedures for electronic version forms and understand the document titled "General Instructions for Completing Paper Forms" prior to completing this form. ID Number, Contact Year and Name should be completed as described in that document.

I. SPECIFIC INSTRUCTIONS

A. Life Orientation (LOT)

Read to the Participant:

"Now I am going to read a series of statements. For each on, tell me how much it is like you. Remember that we are interested in how you view things 'in general' across all types of life situations. Please take your 'best guess' when you are not certain which answer best describes you. There are no right or wrong answers to any of these statements."

- 1-6. The purpose of these items is to record the participant's general approach to life. For each item, ask the respondent if it is A LOT LIKE ME, SOMEWHAT LIKE ME, A LITTLE LIKE ME, or NOT LIKE ME AT ALL.

B. Job Satisfaction and Work Environment/Control (modified Karasek) (JOB)

Read to the participant:

"Now I have some questions about your work or job situation. If you are not currently working, please answer them in relation to your job over a lifetime."

7. The purpose of item 7 is to record the participant's overall satisfaction with their current or lifetime job. Record SATISFIED, DISSATISFIED, or NEITHER.
8. The purpose of item 8 is to record how often during the past year the participant faced the possibility of losing or being laid off of their job. Record if the respondent was ACTUALLY LAID OFF, CONSTANTLY faced the possibility of lay-off or job loss, FACED POSSIBILITY MORE THAN ONCE, FACED POSSIBILITY ONCE, or NEVER faced the possibility of job lay-off or loss.
9. The purpose of item 9 is to record the participant's best estimate that they will keep or stay in the job they are currently have or had over their lifetime for the next several years. The intent is to obtain the participant's best estimate of job stability in the foreseeable future. Record if the potential for staying as VERY LIKELY, SOMEWHAT LIKELY, NOT TOO LIKELY, NOT AT ALL LIKELY, or that the respondent DOES NOT CARE TO KEEP JOB.
10. The purpose of item 10 is to record the participant's best estimate of obtaining another similar paying job should they lose the current or lifetime job. The intent of this question is to obtain the participant's best estimate of their 'marketability.' Record the respondent's estimate as VERY GOOD, GOOD, FAIR, or POOR.
11. The purpose of item 11 is to record selected information about the participants actual work situation. The item is a multiple item question with four possible choices for each item. Read each item asking the participant to tell you the extent to which s/he agrees with the item from STRONGLY AGREE, SOMEWHAT AGREE, SOMEWHAT DISAGREE or STRONGLY DISAGREE.
12. The purpose of item 12 is to record whether the participant participates in workplace decision-making regarding personnel, product lines or budgets. Record YES or NO.
13. The purpose of item 13 is to record whether the participant has responsibilities for supervising other employees as a part of their regular job. Record YES or NO. SKIP to Item 14 if NO.
- 13a. The purpose of item 13a is to record whether respondents with supervisory responsibilities hold a management position at their place of work. Record YES or NO. SKIP to Item 14 if NO.
- 13.b. The purpose of item 13b is to record the level of the management position help by respondents in managerial positions at their place of work. Record TOP, UPPER, MIDDLE, or LOWER.

14. The purpose of item 14 is to record whether the participant's work is supervised by someone else. Record YES or NO. SKIP to Item 16 if NO.

NOTE: The final three questions refer to ethnic-related job issues and MAY be considered sensitive by the respondent. Care must be taken to ask these questions in a nonjudgmental manner.

15. The purpose of Item 15 is to record the ethnicity of the participant's work supervisor. Record BLACK, WHITE, OTHER, or NO SUPERVISOR (if NO to item 14).
16. The purpose of item 16 is to record the respondent's belief that his/her job is more likely to be held by Blacks than by persons of other races or ethnic backgrounds. Record YES or NO.
17. The purpose of item 17 is to record the overall ethnic composition of the participant's work group. The interviewer may clarify that "work group" refers to those persons with whom the participant works most closely to do his/her job on a daily basis. Record ALL BLACK, MOSTLY BLACK, HALF BALCK AND HALF WHITE, MOSTLY WHITE, or ALL WHITE.

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