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## Exploration of Gratitude in Cardiovascular Health: Mediators, Medication Adherence and Psychometrics

Lakeshia A. Cousin  
*University of South Florida*

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Exploration of Gratitude in Cardiovascular Health: Mediators, Medication Adherence and  
Psychometrics

by

Lakeshia A. Cousin

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy  
Department of Nursing  
College of Nursing  
University of South Florida

Major Professor: Harleah Buck, Ph.D., RN, FPCN, FAAN  
Christina Bricker, Ph.D., APRN, FNP-BC, FAHA  
Laura Redwine, Ph.D.  
Kevin Kip, Ph.D., FAAAS, FAHA

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Keywords: Cardiovascular Disease, Heart Failure, Self-Efficacy, African Americans

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## **DEDICATION**

To my grandmother, Mattie Lee Ford.

Your spirit lives on.

## **ACKNOWLEDGMENTS**

I want to express a special appreciation to my advisor and dissertation chair, Dr. Harleah Buck. I'm thankful for your invaluable advice and time spent on developing me into an up-and-coming Nurse Scientist. I would also like to thank Dr. Christina Bricker, Dr. Laura Redwine, and Dr. Kevin Kip, for serving as members of my dissertation committee. Your constructive feedback and suggestions enhanced my dissertation study, challenged my analytical abilities, and allowed me to grow as an independent researcher. Thanks to Dr. Janice Zgibor for serving as my outside chairperson for my dissertation defense and providing a valuable contribution to the success of my presentation. At last, I would like to thank the Florida Education Fund for granting me the McKnight Doctoral Fellowship and providing the support that I needed to thrive in the Ph.D. program.

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## **ABSTRACT**

The purpose of this dissertation was to explore the effect of gratitude on cardiovascular health outcomes using mediators, medication adherence, and psychometrics. The specific aims were to (1) establish the state of the science for gratitude and cardiovascular health outcomes via a state-of-the-science literature review, (2) explore mediators affecting gratitude and medication adherence using a structural equation model in patients with cardiovascular disease, and (3) analyze the psychometric properties of the Gratitude Questionnaire-6, a self-report questionnaire designed to assess individual differences to express dispositional gratitude, to provide evidence for the validity and reliability of the instrument in African Americans at risk for cardiovascular disease for future studies.

In the first specific aim, a state-of-the-science review presented thirteen studies that provided preliminary evidence on the physical and mental benefits of gratitude on cardiovascular health outcomes. Current studies (n=8) showed that individuals who practiced gratitude experienced reduced inflammatory biomarker index score (CRP, TNF- $\alpha$ , IL-6, and sTNFr1), decreased diastolic blood pressure, lower heart rate and reduced levels of hemoglobin A1C. However, few studies (n=5) centered around cardiovascular health behaviors (diet, medication adherence, and exercise). The second aim was addressed using a structural equation model to determine if self-efficacy mediates the relationship between gratitude and medication adherence in patients with cardiovascular disease. Our analyses found an indirect effect of gratitude on medication adherence through self-efficacy was significant ( $b = 0.16$ ;  $p < .05$ ), reinforcing our hypothesis. Lastly, the third aim was addressed with a psychometric evaluation of the Gratitude

Questionnaire-6, which included determination of internal consistency reliability, factor structure and construct validity by hypothesis testing in participants at risk for cardiovascular disease. The Gratitude Questionnaire-6 is a valid and reliable tool to measure dispositional gratitude in African American individuals at risk for cardiovascular disease. This dissertation study provided preliminary evidence that dispositional gratitude may influence self-efficacy, thereby improving cardiovascular health behaviors and outcomes such as medication adherence.

*Keywords:* cardiovascular disease, African Americans, gratitude, self-efficacy, psychometric testing

## **CHAPTER ONE:**

### **INTRODUCTION**

Cardiovascular Disease (CVD) is the leading cause of death worldwide, representing 31% of all global deaths (World Health Organization, 2019). In the United States, over 121.5 million adults are diagnosed with CVD, and the prevalence continues to rise over time with the aging population and projected increases in obesity and diabetes and poor self-management (Benjamin et al., 2019). Cardiovascular disease, a group of disorders of the heart and blood vessels (i.e., heart failure, hypertension, and coronary artery disease), are influenced by unhealthy environments, behaviors (i.e., medication non-adherence), and modifiable risk factors (i.e., hypertension) that can impair cardiovascular health (Benjamin et al., 2019). Poor cardiovascular health is a national burden with an estimated total cost to the United States of \$315.4 billion; the additional emphasis is needed on primary prevention and improving cardiovascular health (Pilkerton, Singh, Bias, & Frisbee, 2015).

The American Heart Association's (AHA) 2020 Strategic Impact Goals emphasize the importance of cardiovascular health. Ideal cardiovascular health, defined by AHA, is the absence of clinical manifestations of CVD and maintaining optimal levels of seven health metrics (Life's Simple 7®) (Benjamin et al., 2019). These health metrics measure seven factors (physical activity, diet, blood pressure, total cholesterol, smoking, adiposity, and fasting glucose). Better cardiovascular health, classified by these AHA health metrics, are associated with improved prognosis after myocardial infarction, lower risk of atrial fibrillation, and higher positive psychological functioning such as dispositional optimism (Benjamin et al., 2019).

Positive psychological factors can have a crucial impact on cardiovascular disease and Life's Simple 7® health metrics. Optimism is the favorable element most consistently linked to superior cardiovascular outcomes (Hernandez et al., 2018). Moreover, ideal health behaviors and health factors are independently associated with lower CVD risk (Benjamin et al., 2019). A new concept of “positive cardiovascular health” creates a new focus on health promotion in addition to the treatment of established CVD (Benjamin et al., 2019). Despite increasing data that higher positive psychological functioning such as optimism is related to improved cardiovascular health, very few studies explore additional positive attributes such as gratitude. Remarkably, no gratitude studies have yet examined the relationship between gratitude and any of AHA Life's Simple 7® health metrics.

However, the role of gratitude has experienced a surge in research in other areas besides CVD over the past decade (O'Connell, O'Shea, & Gallagher, 2016). Recent evidence supports the physical and mental health benefits of being grateful, which has spurred investigations of methods to improve healthy behaviors by employing gratitude (Jackowska, Brown, Ronaldson, & Steptoe, 2016; Krause, Emmons, Ironson, & Hill, 2017; Mills et al., 2015; O'Connell & Killeen-Byrt, 2018; O'Connell et al., 2016; Redwine et al., 2016). Gratitude is related to various clinically relevant phenomena, including positive affect, adaptive personality characteristics, positive relationships, subjective and eudemonic well-being, health, and physical functioning (Wood, Froh, & Geraghty, 2010).

The definition of gratitude is multidimensional, and there is a lack of agreement about the nature of the concept (Wood et al., 2010). For example, in scientific literature, gratitude is labeled as an emotion, a personality trait, an attitude, a moral virtue, a habit, or a coping response (Emmons & McCullough, 2003). Although the concept of gratitude in cardiovascular health is

indistinct and remains understudied, gratitude is potentially a positive psychological attribute linked to improved cardiovascular health. Feelings of gratitude are experienced following an acute coronary syndrome may improve prognosis, though fewer studies exist compared to optimism (Lærum, Johnsen, Smith, & Larsen, 1988; McCullough, Emmons, & Tsang, 2002). However, there is literature suggesting gratitude may have a positive impact on cardiovascular health through the mechanism of self-care.

Cardiovascular health is improved by greater adherence to self-care (Riegel et al., 2017). Gratitude may impact self-care through self-efficacy. Self-efficacy, defined as a person's belief in their ability to exercise control over health habits, is the primary determinant of self-care among patients with CVD, which in turn can impact cardiovascular health (Riegel, Dickson, & Faulkner, 2016). Dispositional gratitude potentially influences self-efficacy resulting in improved self-care (Millstein et al., 2016). A recent study links gratitude and self-efficacy with improved health behaviors in CVD patients (Millstein et al., 2016). Few studies examine the relationship of gratitude and self-efficacy on health behaviors such as medication adherence, which is a critical self-care behavior in CVD management. Gratitude was associated with greater medication adherence and lower self-efficacy with medication non-adherence in ACS patients and patients with heart failure (Millstein et al., 2016; Wu, Song, & Moser, 2015). Therefore, increasing gratitude and self-efficacy may encourage better cardiovascular health behaviors, including medication adherence.

Although improving cardiovascular health is a key population goal of AHA for all Americans, African Americans have poorer overall cardiovascular health than non-Hispanic whites, and CVD mortality is also higher (Carnethon et al., 2017). Evidence suggests that interventions targeting at improving medication adherence along with behavioral-education

strategies are needed in this population (Ogedegbe et al., 2012). Recent evidence shows that higher gratitude is associated with higher levels of protective factors and lower levels of risk in African American adolescents (Ma, Kibler, & Sly, 2013). However, nothing is known about this in African American adults. Efforts to increase gratitude may be of potential clinical value in reducing CVD risk. However, there are currently no studies that test the impact of gratitude on cardiovascular outcomes in the African American adult population. Several factors impact this identified gap – 1) lack of clear conceptualization of gratitude, 2) lack of mechanistic understanding of the relationships between gratitude and other variables, and 3) lack of validated instruments to measure gratitude in African Americans. Understanding the conceptualization, mechanisms, and measurement of gratitude in this population will help improve overall cardiovascular health.

### **Purpose**

Therefore, the overall purpose of the dissertation is to build the science of gratitude on cardiovascular health in African Americans. This study will address the previously identified gaps. The dissertation project will be presented using a manuscript approach. The aims of this dissertation study are to (1) establish the state of the science for gratitude and cardiovascular health outcomes via a state-of-the-science literature review (manuscript #1), (2) explore mediators affecting gratitude and medication adherence using a structural equation model (SEM) in patients with CVD (manuscript #2), and (3) analyze the psychometric properties of the Gratitude Questionnaire-6 (GQ-6) by McCullough et al. (2002), a self-report questionnaire designed to assess individual differences to express dispositional gratitude (manuscript #3), to provide evidence for the validity and reliability of the instrument in African Americans at risk

for CVD for future cardiovascular studies. To our knowledge, this is the first psychometric analysis of the GQ-6 in this population.

### **Manuscript Aims**

**Aim 1.** The first manuscript will explore gratitude studies found in the literature in which cardiac outcomes were measured using a state-of-the-science literature review. Data sources from this review included PubMed, PsycINFO, and Web of Science. The analysis of the studies will be broken down into themes regarding the effect of gratitude on cardiovascular health outcomes.

**Aim 2.** The second aim (manuscript #2) is to examine associations between gratitude, cardiac-specific self-efficacy, and medication adherence in adult asymptomatic heart failure patients (Mills et al., 2015). SEM will be used to test the hypothesized mediation model (Gunzler, Chen, Wu, & Zhang, 2013; Hayes & Rockwood, 2017). Gratitude and self-efficacy will be specified as latent constructs to account for measurement error and another variability unrelated to our constructs of interest (Schreiber, Nora, Stage, Barlow, & King, 2006; Tomarken & Waller, 2005). Medication adherence will be an observed variable. The following hypothesis will be tested: (1) Self-Efficacy mediates the relationship between gratitude and medication adherence.

**Aim 3.** The objective of the third aim (manuscript #3) is to test the validity and reliability of the GQ-6 in African Americans at risk for heart disease. The sample of this study will include African Americans in the community and will report in evidence for the validity and reliability of the instrument in this new population. Correlation analyses will be performed to test for convergent and divergent validity. The following hypotheses will be tested: (1) GQ-6 scores will be negatively correlated with depressive symptoms, as measured by the Patient Health



Questionnaire-9 (PHQ-9) (divergent validity), (2) GQ-6 scores will be positively correlated with spiritual well-being, as measured by the FACIT-Sp-Non-Illness: Functional Assessment of Chronic Illness Therapy - Spiritual Well-Being Scale (FACIT-Sp), and (3) GQ-6 scores will be positively correlated with positive affect, as measured by the Positive and Negative Affect Schedule (PANAS) (convergent validity). Factor analysis will be used to test if the six questions in the GQ-6 result in a similar factoring structure as the original psychometric work (McCullough et al., 2002). If they do not, modification indices will be used to determine the best structure. The GQ-6 scores will demonstrate reliability through strong internal consistency using Cronbach alpha. Chapter Five will conclude this dissertation with an overall summary of findings from the included manuscripts and the conclusions derived from these studies. Additionally, in this chapter, implications for practice, as well as future directions for research in this population, are proposed.

### **Theoretical Framework**

Expressing gratitude can motivate individuals to engage in positive behavior (Armenta, Fritz, & Lyubomirsky, 2017). A theoretical framework that supports gratitude as a motivator of self-improvement is the Broaden-and-Build Theory of Positive Emotions (Fredrickson, 2001). The broaden-and-build theory states that positive emotions, such as gratitude, widen (broadens) the array of thoughts and action a person experiences, which in turn strengthens (builds) that individual's physical, social and intellectual resources that lead to improved health (Fredrickson, 2001, 2004) (see figure 1). According to Fredrickson (2004), this occurs through people's thought-action repertoire. Gratitude encourages the creativity, resilience, and exploration that develops personal resources such as self-efficacy or self-care and promote personal growth.

Over time, this broadened behavior begins to accumulate and triggers an “upward spiral” toward successful health outcomes (Fredrickson, 2004) (see figure 1).

### **Upward Spiral Theory of Lifestyle Change**

A new theoretical framework developed from the Broaden-and-Build theory that applies to this dissertation is the Upward Spiral Theory of Lifestyle Change (Van Cappellen, Rice, Catalino, & Fredrickson, 2018). Van Cappellen et al. (2018) theory explains how positive affect can help long-term adherence to positive health behaviors (see figure 2). The inner loop of this spiral model classifies nonconscious intentions as a central mechanism of behavioral maintenance (Van Cappellen et al., 2018). Positive affect such as gratitude during health behaviors increases salience for cues associated with those behaviors, therefore, guiding attention to everyday decisions to repeat those behaviors (Van Cappellen et al., 2018). The outer loop embodies the evidence from Fredrickson (2001, 2004)’s Broaden-and-Build theory, that positive affect builds endogenous resources, which in turn, intensify the positive affect experienced during positive health behaviors and strengthen the nonconscious motives. Both theoretical models support the relationships among the proposed dissertation variables that will be presented in the following chapters.

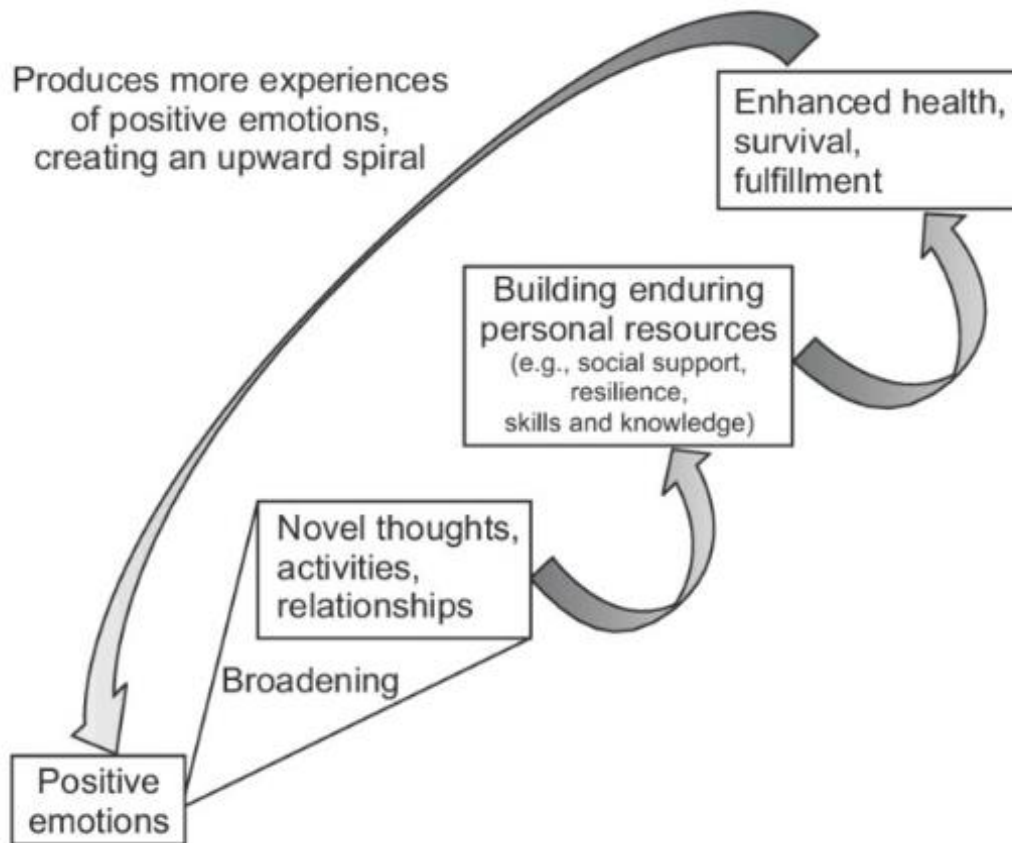
### **Definition of Key Terms**

**Gratitude** – the practice of appreciating the positive aspects of life (Wood et al., 2010).

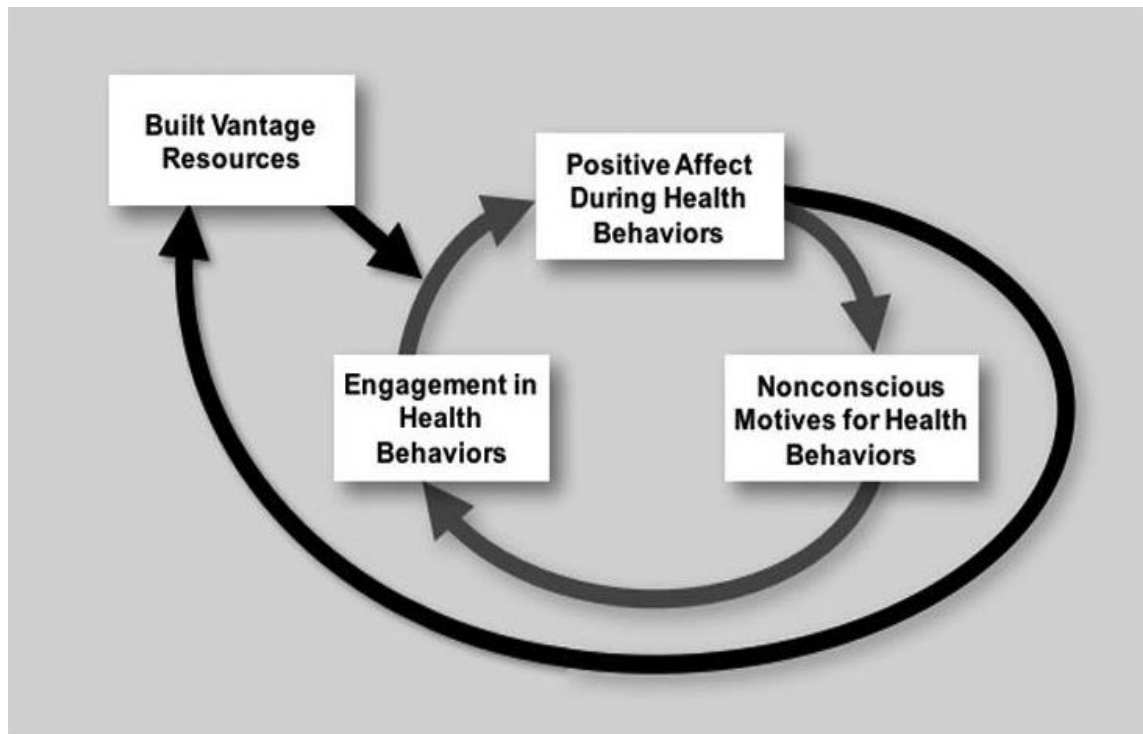
**Self-Efficacy** - defined as a person’s belief in their ability to exercise control over one’s health habits and their ability to perform them effectively (Bandura, 2004).

**Heart Failure Self-Care** - a decision-making process that patients use in choosing behaviors that maintain physiological stability, and response to the symptoms when they occur (Riegel et al., 2016).

**Medication Adherence** - defined as taking less than 80% of prescribed doses, or taking too many dose (Burkhart & Sabate, 2003). It is associated with an escalated risk of poor health, adverse clinical episodes, and poor mortality.



**Figure 1.1.** Model of the Broaden-and-Build Theory of Positive Emotions



**Figure 1.2.** Model of the Upward Spiral Theory of Lifestyle Change

## **CHAPTER TWO:**

### **EFFECT OF GRATITUDE ON CARDIOVASCULAR HEALTH OUTCOMES: A STATE-OF-THE-SCIENCE REVIEW**

Cardiovascular disease is the leading cause of morbidity and mortality worldwide, and by 2035, more than 130 million adults in the U.S. population are projected to have some form of CVD (Benjamin et al., 2019). CVD is a costly chronic disease, with total costs expected to increase to \$1.1 trillion in 16 years. The global burden of CVD highlights the importance of understanding better mechanisms that may lead to better cardiovascular health outcomes. This aligns with the American Heart Association's strategic plan to improve the cardiovascular health of all Americans by 20% and diminish death from CVD by 20% through means such as positive psychological functioning (Benjamin et al., 2019). In a recent study, Hernandez et al. (2018) found that greater positive psychological functioning was associated with improved cardiovascular health outcomes (Benjamin et al., 2019; Hernandez et al., 2018). However, very few studies exist that examine positive psychological attributes such as gratitude on cardiovascular health outcomes (i.e., objective health biomarkers and positive cardiac health behaviors).

To date, cardiovascular research has primarily focused on the relationship between negative psychological factors (depression and anxiety) and cardiovascular health outcomes (Holt et al., 2013; Meijer et al., 2011; Roest, Martens, de Jonge, & Denollet, 2010; Roest, Martens, Denollet, & de Jonge, 2010). It is well known that negative psychological factors such as depression and anxiety have a crucial impact on CVD outcomes (Holt et al., 2013; Kyrou et

al., 2017; Meijer et al., 2011). However, lesser-studied are the relationships between positive psychological factors and cardiovascular health outcomes. What is known in the few studies examining this, is that positive psychological attributes, such as gratitude are related to improved cardiovascular health outcomes in those with and without known CVD (Celano et al., 2017; Huffman, Beale, et al., 2016; Jackowska et al., 2016; Mills et al., 2015; Millstein et al., 2016; Redwine et al., 2016; Sultan, Fatima, & Kanwal, 2018).

Gratitude is defined as a trait focusing on and appreciating the positive aspects of life (Wood et al., 2010). Over the past two decades, prior research has shown the theoretical link between gratitude and physical health (Hill, Allemand, & Roberts, 2013; Lavelock et al., 2016). Incorporating gratitude into cardiovascular health practices may contribute to improving CVD outcomes. In CVD patients (acute coronary syndrome and heart failure), gratitude has been linked with reduced inflammatory biomarkers and lower levels of markers of endothelial dysfunction known to be associated with adverse cardiovascular health outcomes (Celano et al., 2017; Redwine et al., 2016). Similarly, gratitude has been examined following an acute coronary syndrome event and shown to increase adherence to diet, medication adherence, and stress reduction (Millstein et al., 2016), suggesting that it may have similar effects on other CVDs.

### **Purpose**

To date, the preliminary evidence on the physical and mental benefits of gratitude remains understudied, and more empirical evidence is needed to advance the science of positive cardiovascular health. Therefore, the objective of this paper is to review the current state of the science on gratitude studies that focus on cardiovascular health outcomes (biomarkers and adherence) and identify gaps in the literature. To the best of our knowledge, this state-of-the-

science review will be the first to examine the effects of gratitude solely on cardiovascular health outcomes.

## **Methods**

An integrative review method was chosen for this state-of-the-science literature search on gratitude and cardiovascular health through July 2019. Provided that science of gratitude and cardiovascular health is a developing phenomenon, we chose an integrative review since it is the most comprehensive type of review method for the concurrent inclusion of experimental and non-experimental research (Whittemore & Knafl, 2005). We utilized the Whittemore and Knafl (2005)'s structured framework: 1) specify the review purpose, 2) literature search, 3) data evaluation, 4) data analysis, and 5) presenting the results. A detailed understanding of the impact of gratitude on cardiovascular health will help set the foundation to design improved holistic, non-pharmacological interventions for better cardiovascular health outcomes.

### **Search Methods and Criteria**

An exhaustive literature search strategy with no date restriction was conducted with a medical librarian reference. The following databases were searched: PsycINFO, PubMed, and Web of Science. The search was developed based on an integrative review of gratitude studies that focused solely on cardiovascular health outcomes. Only English articles were reviewed and included a broad boolean search term of “gratitude AND heart” to capture as many studies as possible. The sorting and appraisal of articles were performed using the Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) guidelines by Moher, Liberati, Tetzlaff, and Altman (2009) (see figure 2.1). Titles and abstracts were assessed for relevancy and duplicate articles removed. Inclusion criteria included the use of human subjects and gratitude studies related to cardiovascular health outcomes. Exclusion criteria entailed animal studies,



dissertations, conference proceedings, poster or abstract only, commentaries, book reviews, and editorials or letters. Finally, a full-text review of the articles which screened in during the title and abstract screening step was performed.

The search produced 234 articles, and after removing 95 duplicates, 138 articles were screened for relevancy with 102 excluded based on title and abstract (Figure 2.1). Reasons for exclusion at the full-text review are listed in figure 2.1. The inclusion and exclusion criteria were then applied during the full-text analysis of 36 articles. During the screen, another 24 articles were excluded, resulting in 13 studies related to gratitude and CVD health outcomes for final analysis.

### **Data Extraction**

The final sample of studies was evaluated and read in full with relevant data obtained and tabulated. The literature review displayed in Table 2.1 displays the authors, purpose, research design, empirical indicators, and findings used to assess the impact of gratitude on CVD and health behaviors. Two independent reviewers extracted the data independently from the included studies and any discrepancies were resolved through discussion before analysis to address the state of the science related to gratitude and cardiovascular health outcomes. Each gratitude study was evaluated on how gratitude improved CVD outcomes in the adult population.

### **Results**

The final sample of 13 studies (n=3,824) included both experimental and non-experimental research, mostly from the United States (10 studies; 77%). Other countries represented include UK (1 study; 7%), Korea (1 study; 8%) and Singapore (1 study; 8%). The 13 studies, included two randomized control trials, four cohort studies, five cross-sectional studies, and two qualitative studies. The most common diagnoses in this study were stage B HF and

acute coronary syndrome (ACS). The primarily older, white male sample characteristics are reported in Table 2.2.

### **Biomarkers of Cardiovascular Health**

Eight of the studies examined relationships between dispositional gratitude and subclinical biomarkers of cardiovascular health (Celano et al., 2017; Hartanto, Lee, & Yong, 2019; Huffman, Beale, et al., 2016; Jackowska et al., 2016; Krause et al., 2017; Kyeong, Kim, Kim, Kim, & Kim, 2017; Mills et al., 2015; Redwine et al., 2016). Four studies included four commonly studied prognostic markers associated with inflammation: high sensitivity C-reactive protein (hsCRP), Interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF- $\alpha$ ), and soluble intracellular adhesion molecule-1 (sICAM-1; an endothelial adhesion molecule that mediates pathways responsible for vascular inflammation) and also heart rate variability (Hartanto et al., 2019; Huffman, Beale, et al., 2016; Mills et al., 2015; Redwine et al., 2016). Additional biomarkers included endothelial dysfunction (n=1) (Celano et al., 2017), diastolic blood pressure (n=1) (Jackowska et al., 2016), hemoglobin A1C (n=1) (Krause et al., 2017) and heart rate (n=1) (Kyeong et al., 2017).

Across study examination suggests the immaturity of the gratitude science in CVD. There were mixed findings depending on the sample (a type of CVD or healthy population), and the biomarker measured. In a cohort of post-ACS patients, Huffman, Beale, et al. (2016) examined associations of baseline gratitude with subsequent physical activity, prognostic biomarkers associated with inflammation: hsCRP, TNF- $\alpha$ , sICAM-1, marker associated with overall mortality risk after ACS: N-terminal pro-B-type natriuretic peptide (NT-proBNP), and cardiac rehospitalization (N=164). Gratitude was measured at three-time points - baseline, two weeks after an ACS, and six months follow up. At each time point, gratitude was not associated with

physical activity, hsCRP, TNF- $\alpha$ , sICAM-1, NT-proBNP , or cardiac rehospitalizations (Huffman, Beale, et al., 2016). On the other hand, Celano et al. (2017) measured gratitude and markers of endothelial function in the same cohort of post-ACS patients and found gratitude was associated with lower levels of markers of endothelial dysfunction.

In a randomized control trial by Redwine et al. (2016) with Stage B HF patients, gratitude journaling was associated with improved dispositional gratitude scores, reduced inflammatory biomarker index score (CRP, TNF- $\alpha$ , IL-6, and sTNFr1) over time, and increased heart rate variability compared to a control group. In another group of Stage B asymptomatic HF patients, gratitude was related to a reduction in inflammatory biomarkers (including CRP, TNF- $\alpha$ , IL-6, IFN-gamma & ST2), fewer depressive symptoms, and improved sleep quality (Mills et al., 2015).

Jackowska et al. (2016) found in response to a brief gratitude intervention a greater decrease in diastolic blood pressure ( $-2.00$  mmHg, CI (0.05 to 3.88),  $p = 0.041$ ) after modification for age, BMI and baseline diastolic BP value in a group of healthy women. In another group of 32 healthy volunteers, the effects of gratitude and resentment on mental well-being were explored using a functional magnetic resonance imaging and heart rate and found the average heart rate was lower during the gratitude intervention than during the resentment intervention (Kyeong et al., 2017). An additional objective measure of health, hemoglobin A1C, is an indicator of blood sugar control (Krause et al., 2017). Krause et al. (2017) found that stronger feelings of gratitude are associated with lower levels of hemoglobin A1C in a sample of healthy adults. In the last group of 1,054 midlife adults from the biomarker project of the Midlife in the United States, Hartanto et al. (2019) found individuals with low dispositional gratitude and higher socioeconomic status was significantly associated with lower levels of IL-6.

## **Adherence to Health Behaviors**

The relationship between gratitude and health behavior adherence was examined in five studies (Huffman, DuBois, et al., 2016; Legler et al., 2019; Millstein et al., 2016; Sacco, Park, Suresh, & Bliss, 2014; Sultan et al., 2018). Similar to the findings on biomarkers, four studies reported positive results, while one study had mixed findings. Millstein et al. (2016) found optimism and gratitude following an ACS event were related to a higher subsequent self-reported adherence to critical cardiac health behaviors such as diet, exercise, medication adherence, and stress reduction. Huffman, DuBois, et al. (2016) conducted a qualitative study in 34 patients following an ACS in the hospital and three months later. They found that gratitude while frequently expressed in response to open-ended questions and structured probes at both timepoints, was rarely associated with actual cardiac health behavior completion. However, one study incorporated a positive psychological intervention that increased gratitude and found a decrease in coronary heart disease symptoms (CAD Symptoms Check List), suggesting that the participants were adhering to cardiac health behaviors and thus experiencing fewer symptoms (Sultan et al., 2018). These studies provide preliminary support for further examination of whether interventions focusing more on enhancing health behaviors and improving symptoms for CVD patients using gratitude are warranted.

## **Discussion**

This state-of-the-science review on gratitude studies that focus on CV related health outcomes provides preliminary evidence on the physical and mental benefits of gratitude, identifies gaps in the literature and suggests that more studies are needed on the impact of gratitude on health outcomes in CVD patients. After reviewing the literature, we found the gratitude studies uncovered by our search focused more on biomarkers of health than on

improving cardiovascular health behaviors and symptoms. Overall, participants who practiced gratitude experienced reduced markers of inflammation, decreased diastolic blood pressure, lower heart rate and reduced levels of hemoglobin A1C (Celano et al., 2017; Huffman, Beale, et al., 2016; Jackowska et al., 2016; Millstein et al., 2016; Redwine et al., 2016). Furthermore, improvement in CVD outcomes was demonstrated in healthy patients as well as those with CVD suggesting that gratitude is a possible preventative strategy in CVD. The 2019 report update from the recommends CVD prevention through the promotion of “positive cardiovascular health” in addition to the treatment of established CVD (Benjamin et al., 2019). Their goal is to improve the cardiovascular health of all Americans by 20% and reduce CVD by 20% in 2020 (Benjamin et al., 2019). This new positive health concept has created a new focus on health promotion in addition to the treatment of established CVD. Positive cardiovascular health, made up of positive affect and cardiovascular health, highlights the role that psychological functioning may play along the life course of CVD (Labarthe et al., 2016).

What was found when we conducted an across study analysis was a science in its infancy. The presence of mixed findings depending on the sample (the type of CVD or healthy population) and the biomarker measured suggests the need for an increase in the amount and rigor of this research for promising areas of CVD management. When the findings from this review are compared with the larger gratitude literature, only one study by Moieni et al. (2018) examined the role of gratitude on inflammatory biomarkers (cytokines) in a non-CVD population. In contrast to our study analysis, Moieni et al. (2018) found no effect of gratitude on inflammatory cytokines in a sample of 76 healthy women. These results, along with our literature review findings, suggest further work is needed to understand the association between gratitude and biomarkers of health.

Similarly, cardiac health behaviors, when measured, demonstrated mixed findings, particularly for health behavior completion. On the other hand, compared to a larger body of evidence in non-CVD populations suggests that gratitude is mediated by mental health and healthy behaviors (Hill et al., 2013; O'Connell & Killeen-Byrt, 2018; O'Connell et al., 2016). Several gratitude interventions have been conducted in non-clinical populations or those without chronic diseases. For example, gratitude significantly predicts less depression and anxiety symptoms in the general population (Wood, Maltby, Gillett, Linley, & Joseph, 2008). Depression and anxiety are known as negative psychological stressors that can lead to the progression of CVD. Gratitude is negatively associated with depressive symptoms and remains a unique predictor of lower depressive symptoms longitudinally (Sirois & Wood, 2017). When individuals experience better physical health due to better mental health, they have more propensity for healthy behaviors such as physical activity, avoiding unhealthy practices (i.e., dysfunctional eating), and healthier sleeping patterns (Hill et al., 2013; Wolfe & Patterson, 2017).

### **Gaps in the Literature**

Significant gaps in the literature were found in this review. These gaps fall into several categories, such as improving ideal health behaviors and more diverse samples. Most of the gratitude studies support better cardiovascular outcomes (i.e., biomarkers of health), and only four studies exist on improving health behaviors and symptoms. The AHA's 2020 Strategic Impact Goals emphasize the importance of enhancing cardiovascular health behaviors (Benjamin et al., 2019). Ideal health behaviors defined by AHA (physical activity, diet, exercise, blood pressure management) can contribute to cardiovascular health and are independently associated with lower CVD risk (Benjamin et al., 2019). Gratitude is linked to improved cardiovascular

outcomes and can mediate increased participation in better health behaviors (Millstein et al., 2016). However, there is a lack of gratitude studies that support this theory. Recent evidence supports other positive psychological states that contribute to improved cardiovascular outcomes. In a recent study by Hernandez et al. (2018), dispositional optimism is associated with better AHA cardiovascular health behavior. However, no studies have yet examined the relationship between gratitude and improving AHA cardiovascular health metrics.

While major efforts are underway to improve population-wide cardiovascular health, the burden of this chronic disease remains high in the African American population. African Americans have poorer overall cardiovascular health than non-Hispanic whites, and CVD mortality is also higher (Carnethon et al., 2017). Ideal cardiovascular health behaviors defined by the AHA are suboptimal among African Americans, which leads to a higher risk of CVD (Brewer et al., 2018). African Americans with higher levels of multiple stressors are less likely to achieve optimal cardiovascular health (Brewer et al., 2018). Positive psychological health interventions such as gratitude to reduce stress levels may be pertinent in enhancing health behaviors and outcomes of African Americans (Carnethon et al., 2017). Recent evidence shows that greater gratitude is associated with higher levels of protective factors and lower levels of risk in African American adolescents (Ma, Kibler, & Sly, 2013). However, nothing is known about the relationships among gratitude and CVD outcomes in African American adults. Gratitude-based interventions contribute an important research area in this field. Future exploratory research will help determine if enhancing gratitude in African Americans would suggest that it is a dispositional quality that may be cultivated and developed.

## **Limitations**

This review is subject to several limitations. First, the majority of the studies in the review were observational and occurred at one point in time and can be viewed as too subjective. Second, four studies from this review are related to the GRACE study, which may unduly weight their findings (Celano et al., 2017; Huffman, Beale, et al., 2016; Legler et al., 2019; Millstein et al., 2016). Similarly, this observational study had a mostly white male sample from a single institution with a moderate sample size, which could limit generalizability. For the intervention studies, most of the objective findings were assessed in the days after the experimental manipulation, so the data shed minimal light on more prolonged effects of gratitude paradigm on CVD outcomes. Lastly, the sample in this review is mostly white, so findings cannot be extrapolated to a more diverse population.

## **Implications for Clinical Practice and Research**

First of all, there are presently a limited amount of gratitude studies providing evidence that gratitude impacts not only subjective and objective measures of health as well as actual health behaviors. However, there has been a minimal emphasis on interventions to increase positive affect in CVD patients despite current evidence that gratitude is associated with superior cardiac outcomes. More rigorous studies are needed to account for the effect of gratitude on CVD. Secondly, when considering the relationship between gratitude and health behaviors, it is crucial to focus on intermediary mechanisms like self-efficacy that facilitate the relationship between gratitude, well-being, and health behaviors like cardiovascular self-care. Positive psychological attributes, such as gratitude, raises perceived self-efficacy, then increase well-being (Bandura, 2008). The hypothesis of the relationship between self-efficacy and gratitude is supported by the agentic perspective of Bandura's (1986) social cognitive theory. Higher self-



efficacy and gratitude is associated with improved well-being, while lower self-efficacy and ingratitude is a barrier to healthier behaviors. Therefore, future studies incorporating gratitude and self-efficacy are needed. Thirdly, the findings in this study support theoretical predictions of the broaden-and-build theory and prior work that gratitude studies have the potential to improve well-being and physical health. (Fredrickson, 2001, 2004; Wood et al., 2010). Experiences of gratitude broaden ones' mindset in ways that, over time can accumulate and compound to build biological resources (i.e., reduced inflammatory biomarkers, decreased blood pressure, and lower heart rate) as well as improved resources (i.e., increased self-efficacy and medication adherence).

### **Conclusion**

The objective of this paper was to review the current state of the science on gratitude studies that focus on cardiovascular health outcomes and identify gaps in the literature. We found that more research is needed to understand the role of gratitude in CVD patients. In sum, in this first state-of-the-science review, we determined that gratitude may improve biomarkers (hsCRP, TNF- $\alpha$ , sICAM-1) related to CVD morbidity, such as reduced inflammation. However, by far, the least amount of evidence in the present review focused on the relationship between gratitude and cardiovascular health behaviors. While fewer studies support gratitude's relation to adherence, we presented evidence in favor of improved adherence to cardiovascular health behaviors, in turn, decreased CVD symptoms. We conclude that more interventions to improve ideal cardiovascular health behaviors in diverse sample populations are needed. These interventions can be provided in clinical practice to increase gratitude, which may subsequently improve cardiovascular health. Furthermore, additional research will help refine the mechanisms necessary to further the science behind gratitude and enhance the link to cardiovascular health outcomes.

**Table 2.1***Gratitude Studies Related to Cardiovascular Outcomes*

Authors	Study Designs	Purpose	Cardiac Outcomes related to Gratitude
Celano et al. (2017)	Cohort study	Examined relationships between psychological constructs and markers of inflammation, endothelial function, and myocardial strain in a cohort of post-acute coronary syndrome (ACS) patients.	Gratitude was associated with lower levels of endothelial dysfunction, independent of depressive and anxiety symptoms.
Hartanto, Lee, and Yong (2019)	Cross-sectional study	Examined the moderating role of dispositional gratitude in the relationship between socioeconomic status and inflammation risk (interleukin-6) as an indicator of health	Gratitude significantly moderated the relationships between socioeconomic status and interleukin-6
Huffman, Beale, et al. (2016)	Cohort study	Examined the prospective effects of optimism and gratitude, measured 2 weeks post-ACS, on: (1) subsequent physical activity, (2) levels of inflammatory and other prognostic biomarkers, and (3) rates of cardiac readmission, over the next 6 months.	Baseline gratitude was associated with TNF- $\alpha$ in all three models.
Huffman, DuBois, et al. (2016)	Qualitative Study	Explored link between gratitude and cardiovascular health behaviors that are associated increased post-ACS survival.	Gratitude was expressed most frequently after an ACS, both in the hospital and at three months
Jackowska, Brown, Ronaldson, and Steptoe (2016)	Randomized blinded trial	Examined whether a brief subjective well-being intervention would have favorable effects on cardiovascular and neuroendocrine function and on sleep.	Gratitude group had a greater decrease in ambulatory diastolic BP
Krause, Emmons, Ironson, and Hill (2017)	Cross-sectional study	Explored if feelings of gratitude in general as well as feeling grateful to God are specifically associated with a key biomarker of health – hemoglobin A1c (HbA1c).	Higher gratitude was associated with lower levels of HbA1c.
Kyeong, Kim, Kim, Kim, and Kim (2017)	Cross-sectional study	Explored the effects of gratitude and resentment on mental well-being	Gratitude intervention had significantly lower average HR than the resentment intervention.

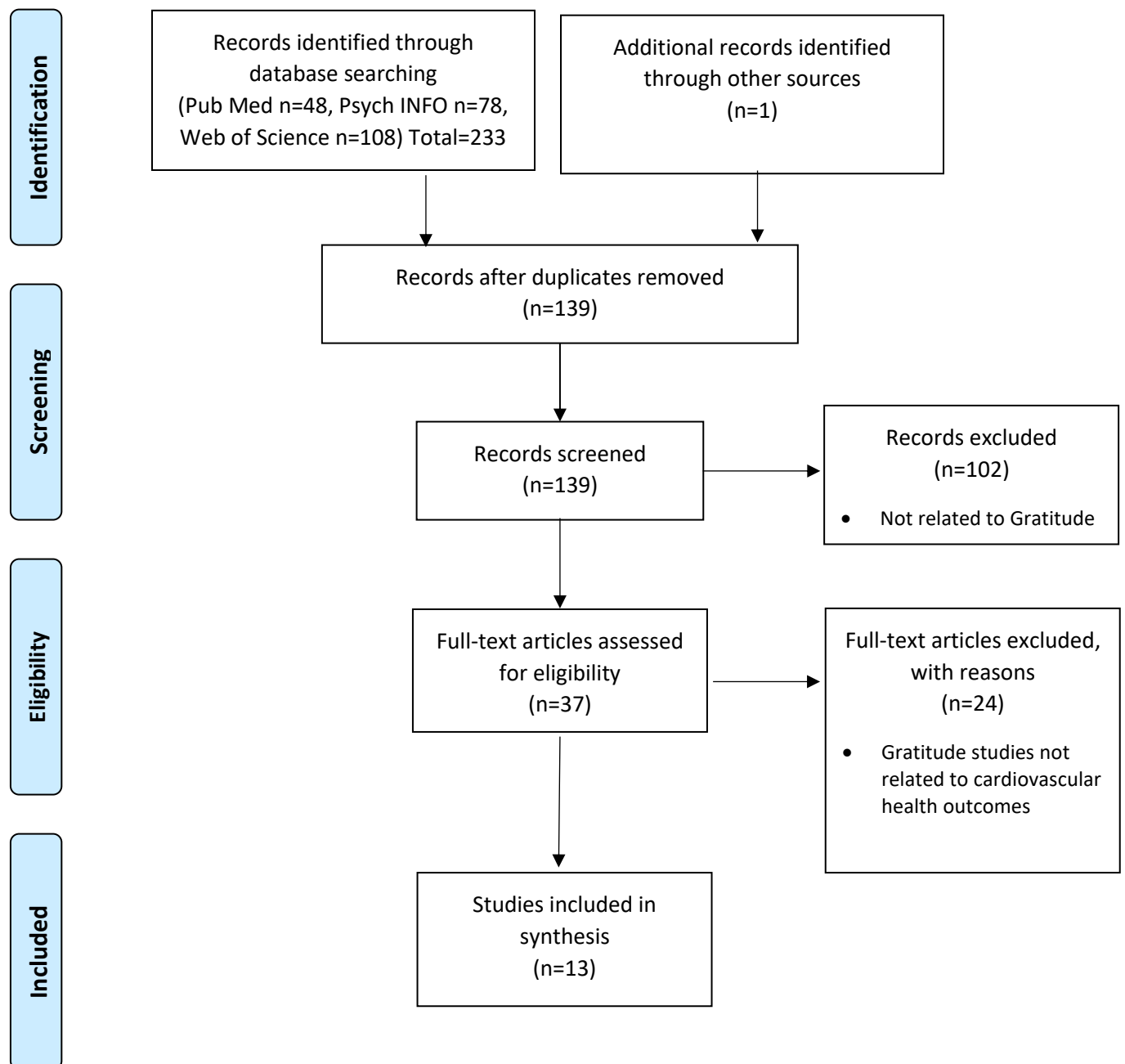
**Table 2.1 (Continued)**

Legler et al. (2019)	Cohort study	Examined the association of gratitude with medical outcomes of ACS patients	Gratitude at 2 weeks post ACS event was associated with increased physical activity six months later. Gratitude was associated with increased self-reported medical adherence at six months
Mills et al. (2015)	Cross-sectional study	Examined associations between spiritual wellbeing, gratitude, and physical and mental health in stage B HF patients	Gratitude was related to better mood and sleep, more self-efficacy, and lower fatigue and inflammation
Millstein et al. (2016)	Cohort study	Examined the effects of optimism and gratitude on self-reported health behavior adherence, physical functioning and emotional well-being after an acute coronary syndrome (ACS)	Gratitude at 2 weeks was associated with subsequent self-reported adherence to medical recommendations at 6 months
Redwine et al. (2016)	Randomized blinded trial	Examined whether gratitude journaling improved biomarkers related to HF prognosis.	Gratitude intervention was associated with reduced inflammatory biomarker index score over time and increased parasympathetic HRV responses during the gratitude journaling task, compared with TAU.
Sacco, Park, Suresh, and Bliss (2014)	Qualitative Study	Explored the experiences of people living with advanced heart failure (HF) to determine the extent to which (1) psychosocial resources relevant to HF patients were qualitatively reported, and (2) to determine the extent to which psychosocial resources were correlates of subsequent well-being as assessed by validated quantitative measures.	HF participants could identify gratitude through highly distressing circumstances.
Sultan, Fatima, and Kanwal (2018)	Cross-sectional study	Explored management of coronary heart disease (CHD) symptoms through enhancement of positive emotions (gratitude, optimism, and happiness)	Higher gratitude and lower CHD symptoms were found in patients randomly assigned to a positive psychological intervention

**Table 2.2***Sample Characteristics*

Author	N	Mean age (SD)	Gender (% of male)	Race (% white)
Celano et al. (2017)	164	61.5 (10.6)	84.0%	84.0%
Hartanto, Lee, and Yong (2019)	1,054	58.0 (11.6)	45.3%	N/A
Huffman, Beale, et al. (2016)	164	61.5 (10.6)	84.0%	84.0%
Huffman, DuBois, et al. (2016)	34	63.4 (11.9)	64.7%	64.7%
Jackowska, Brown, Ronaldson, and Steptoe (2016) *	119	26.0 (N/A)	00.0%	67.5%
Krause, Emmons, Ironson, and Hill (2017)	1,775	47.3 (17.7)	43.0%	84.0%
Kyeong, Kim, Kim, Kim, and Kim (2017)	32	22.5 (2.5)	46.9%	N/A
Mills et al. (2015)	186	66.4 (10.3)	95.3%	N/A
Legler et al. (2019)	152	61.8 (10.7)	83.0%	84.0%
Millstein et al. (2016)	164	61.5 (10.6)	84.0%	84.0%
Redwine et al. (2016) *	70	66.43 (8.4)	95.2%	73.7%
Sacco, Park, Suresh, and Bliss (2014)	111	N/A	60.3%	55.0%
Sultan, Fatima, and Kanwal (2018)	127	48.6 (N/A)	100.0%	N/A

\*Note – Gratitude group



**Figure 2.1.** PRISMA 2009 Flow Diagram

**CHAPTER THREE:**

**A STRUCTURAL EQUATION MODEL OF GRATITUDE, SELF-EFFICACY, AND  
MEDICATION ADHERENCE IN STAGE B HEART FAILURE PATIENTS**

For the nearly 6.5 million American adults currently living with heart failure (HF), consistent and persisting self-care can slow down the progression of this chronic, debilitating disease (Benjamin et al., 2019). Self-care behaviors are sub-optimal worldwide, and interventions that focus on psychosocial factors that can improve specific health behaviors (i.e., self-efficacy and medication adherence) may be more effective than traditional patient education programs (Jaarsma et al., 2013). Gratitude is a psychosocial factor that evokes emotion directed toward appreciating the positive aspects of life, influences self-efficacy which in turn may improve self-care (Bandura, 2008; Riegel et al., 2016; Wood et al., 2010). Recent literature has linked gratitude to both self-reported adherence behaviors such as medication adherence, and increased self-efficacy (Mills et al., 2015; Millstein et al., 2016). However, the science of gratitude is in its infancy and development of testable models of how gratitude may be linked to well-being and health behaviors are needed to develop efficacious interventions.

Self-efficacy, defined as a person's belief in their ability to exercise control over their behaviors, including healthy habits (Bandura, 1977, 2004) impacts HF patient outcomes (Riegel et al., 2016). Improving self-efficacy is an evidence-based approach to improving health outcomes in HF (Bandura, 1977, 2004). HF patients with greater self-efficacy have improved medication adherence resulting in improved health outcomes (Wu et al., 2015). Evidence suggests that positive psychosocial attributes play an essential role in self-efficacy (Bandura,

Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003; Kavanagh & Bower, 1985). In recent years, studies have emerged suggesting that gratitude and self-efficacy are strongly related to improved health behaviors in HF patients (Klompstra, Jaarsma, & Strömberg, 2018; Lufei, Kupzyk, & Barnason, 2017; Mills et al., 2015; Redwine et al., 2016; Tovar et al., 2016; Wu et al., 2015). Though, limited research exists examining the relationship of gratitude and self-efficacy in relation to health behaviors, such as medication adherence.

Medication non-adherence, defined as taking less than 80% of prescribed doses or taking too many doses is associated with an escalated risk of poor health, adverse clinical episodes, and reduced mortality (Burkhart & Sabate, 2003). Medication non-adherence is a global problem, and as the prevalence of cardiovascular diseases (CVD) rises worldwide, non-adherence may prove a notable cause of poor health in this population (Roth et al., 2017). Medication adherence is a critical self-care behavior for patients with HF to prevent progression of this chronic disease. Gratitude and self-efficacy are motivating psychosocial factors, where gratitude has been associated with greater medication adherence, and lower self-efficacy is linked with medication non-adherence (Millstein et al., 2016; Wu et al., 2015).

Developing and testing a model of gratitude, self-efficacy, and medication adherence will help advance the understanding of relationships between motivating psychosocial factors and physical health and result in opening new avenues of study. Providing conceptual clarity and empirical support can facilitate further understanding of how self-efficacy may mediate the relationship between gratitude and health-related variables such as medication adherence. Findings may inform the development of interventions that increase gratitude and self-efficacy to motivate patients to improve medication adherence. Therefore, the aim of this study is to

determine if self-efficacy mediates the relationship between gratitude and medication adherence in asymptomatic HF patients.

## **Design and Methods**

### **Study Design and Setting**

A secondary analysis of cross-sectional data examined associations among gratitude, cardiac-specific self-efficacy, and medication adherence in asymptomatic HF patients. In the parent study by Mills et al. (2015), a sample of 186 men and women with asymptomatic HF were recruited from the cardiology clinics at the University of California San Diego Medical Centers (UCSD) and the Veterans Affairs San Diego Healthcare System in San Diego, California (VASDHS). The parent study examined associations among gratitude, spiritual well-being, sleep, mood, fatigue, cardiac-specific self-efficacy, and inflammation in adults with asymptomatic heart failure. Participants gave written informed consent to join the study. The protocol was approved by the UCSD and VASDHS Institutional Review Boards and carried out by the Declaration of Helsinki principles (Mills et al., 2015).

### **Study Sample**

The inclusion criteria for the parent study were (1) adults over age 18; (2) diagnosis of “Stage B” HF by the American College of Cardiology/American Heart Association (ACC/AHA), (3) receiving optimal treatment according to their cardiologist, (4) an echocardiogram within the past 12 months displaying structural heart disease based on recommendation and cutoffs from the American Society of Echocardiography guidelines, and (5) left ventricular ejection fraction <55% (Lang et al., 2006). For this analysis, our sample consisted of 153 patients. We removed 29 patients from the original sample, who received a journaling intervention designed to increase their gratitude (Redwine et al., 2016).



## Measures

**Gratitude.** Gratitude was measured using the Gratitude Questionnaire 6-item form (GQ-6), a well-validated, self-administered 6-item scale designed to measure dispositional (trait) gratitude (Froh et al., 2011; McCullough et al., 2002). The concept measured by the GQ-6 reflects four facets of dispositional gratitude: (a) intensity, (b) frequency, (c) span, and (d) density (McCullough et al., 2002). Each item is rated on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree). Scores range from 6 to 42, with higher scores implying a greater level of dispositional gratitude and lower scores indicating a decreased disposition in gratitude (McCullough et al., 2002; Sumi, 2017). In our sample, the Cronbach's alpha for the GQ-6 was 0.79.

**Self-efficacy.** Self-efficacy was measured using the Cardiac Self-Efficacy Scale – Maintain Function subscale (CSE – MF) (Sullivan, Lacroix, Russo, & Katon, 1998). The 13-item Cardiac Self-Efficacy Scale is a cardiac-specific measure of a person's belief in their capacity to perform actions that relate to the symptoms and challenges imposed by their cardiovascular disease (CVD) (Berkhuysen, Nieuwland, Buunk, Sanderman, & Rispen, 1999). The CSE-MF assesses a person's confidence that he/she can maintain physical functioning (five items) (Sullivan et al., 1998). The CSE-MF has high internal consistency and sound convergent and discriminant validity (Sullivan et al., 1998). In our sample, the Cronbach's alpha for the CSE-MF was 0.84.

**Medication adherence.** Medication adherence was measured using the Morisky Medication Adherence Scale (MMAS-8) (Morisky, Ang, Krousel-Wood, & Ward, 2008). The MMAS-8 consists of 8 items, the first 7 of which are yes/no questions, and the last contain a 5-point Likert-scale rating (Morisky et al., 2008). Item scores can range from 0 to 8, with higher

scores indicating better medication adherence and lower scores indicating worse medication adherence (Morisky et al., 2008). Items were scored according to the MMAS-8 manual obtained from the original author, Dr. Donald Morisky. The items were summed to create a total score after multiple imputations were applied to for missing data in the individual items (see Missing Data section).

## **Data Analysis**

**Missing data.** Not accounting for missing data can bias the results of statistical analyses and lead to improper inferences. To account for missing data in our sample, we used multiple imputations, which provides unbiased results when data are missing at random and less biased results when data are not missing at random (Baraldi & Enders, 2010). For the multiple imputation processes, we included all the GQ-6, CSE-MF, and MMAS-8 items individually. We also incorporated specific demographic variables that may be related to missing data, including participants' age, sex, race, ethnicity, marital status, BMI, current smoker status, heart failure risk, antidepressant medication status, and medication compliance for that day. Multiple imputations were conducted in *R* 3.4 using the *mice* package (R Core Team, 2017; Van Buuren, 2011). A total of 100 multiply imputed datasets were generated.

**Statistical analysis.** Descriptive statistics for all variables, except the MMAS-8 total score (see medication adherence section), were based on the complete data only (i.e., without multiple imputations). Structural equation modeling (SEM) was used to test our mediation model (Gunzler et al., 2013; Hayes & Rockwood, 2017). Gratitude and self-efficacy were specified as latent constructs to account for measurement error and another variability unrelated to our constructs of interest (Schreiber et al., 2006). Medication adherence was specified as an observed variable. The SEM analysis was conducted on the multiply imputed datasets, and the results were

pooled in *R* 3.4 using the *lavaan* and *semTools* packages (Rosseel, 2012; Rosseel et al., 2015). Maximum likelihood estimation and bootstrapped standard errors were used. To assess model fit, we report the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA) based on the suggestion of Schreiber and colleagues for one-time analyses (Schreiber et al., 2006).

## **Results**

### **Participants**

The mean age of the patients was 66 years ( $SD = 11$ ), and 95% of the patients were men. Most patients were White (79%), Black (12%), or Asian (6%). Half of the patients were currently married (59%), 16% were divorced, 14% were single, 5% were widowed, 4% were separated, and 2% were living with a partner. Regarding health demographics, about 27% were at high risk for “Stage C” symptomatic heart failure ( $BNP > 65$ ), 13% were current smokers, and the mean BMI was 30 ( $SD = 6$ ). Most patients reported taking their medications as prescribed (85%). Table 1 provides descriptives for the GQ-6 items, the CSE-MF items, and the MMAS-8 total score.

### **Self-Efficacy Mediates Gratitude’s Association with Medication Adherence**

The factor loadings for the gratitude and self-efficacy latent variables are reported in Table 2. The relationship between gratitude and medication adherence was mediated by self-efficacy. As Figure 1 illustrates, the standardized regression coefficient between gratitude and self-efficacy was statistically significant, as was the standardized regression coefficient between self-efficacy and medication adherence. The standardized indirect effect was  $(.47)(.31) = .16$ . The SEM results indicate that the indirect effect of gratitude on medication adherence through self-efficacy was significant ( $b = 0.16$ ;  $p < .05$ ), supporting our main hypothesis. The direct

effect of gratitude on medication adherence was not significant after accounting for the indirect effect of self-efficacy. The model fit was acceptable (CFI = .92, TLI = .90, RMSEA = .08).

Therefore, patients who reported more gratitude had higher self-efficacy, which was related to better medication adherence.

## **Discussion**

The primary aim of this study was to examine self-efficacy as a mediator of the relationship between gratitude and medication adherence in HF patients. Very few studies have examined the mechanisms by which gratitude influences health behaviors, including self-care. The present investigation found that gratitude was related to increased self-efficacy, which was associated with improved medication adherence in HF patients. Our research extends findings from over the past two decades, of models of theoretical links among gratitude, physical health, and well-being (Hill et al., 2013; Lavelock et al., 2016; Wood et al., 2010). Gratitude intervention research suggests that grateful people report fewer physical health symptoms, improved sleep behaviors and better adherence to medical recommendations, but further research is needed to determine why gratitude is associated with improved health (Digdon & Koble, 2011; O'Connell, O'Shea, & Gallagher, 2016; Wood, Joseph, & Maltby, 2009). When considering the relationship between gratitude and well-being, it is crucial to focus on intermediary mechanisms like self-efficacy that facilitate the connection between gratitude, well-being, and health behaviors like HF self-care.

Positive psychosocial attributes, such as gratitude, can raise perceived self-efficacy, which then increases well-being (Bandura, 2008). Our hypothesis of the relationship between self-efficacy and gratitude is supported by the agentic perspective of Bandura (1986)'s social

cognitive theory. Higher self-efficacy and gratitude is associated with improved well-being, while lower self-efficacy and ingratitude is a barrier to healthier behaviors.

Although we did not examine socio-demographic factors as contributors to the model, they should be further investigated in future studies in order to more fully understand the environmental relationships that can influence health behaviors. We theorized that the connection between gratitude and health is a concept that is influenced by socio-demographic factors, increased self-efficacy beliefs, and interpersonal relationships. For instance, age is an essential demographic factor in studying patients with CVD, such as HF. After 65 years of age, HF incidence approaches 10 per 1,000 population, and 43.7 million older adults (60 years of age or older) are living with CVD (Mozaffarian et al., 2016). In our study of HF patients, as an example, the sample was majority male (95%), white (79%), and the mean age was 66 years old. Gratitude interventions enhance well-being in older adults in those in the parent study (Hill et al., 2013; Killen & Macaskill, 2015; Mills et al., 2015). The older population living with CVD may benefit from a gratitude intervention to improve self-efficacy and medication adherence. The unique finding of this study is incorporating self-efficacy beliefs and intrapersonal variables as predictors of gratitude. Grateful patients with CVD who have higher self-efficacy may positively impact behaviors leading to coronary prevention or rehabilitation. In our study, higher cardiac self-efficacy and gratitude led to improved adherence, and this is also supported by prior work in older patients living with CVD (Millstein et al., 2016). Also, utilizing intrapersonal variables such as cognitive reappraisal can help with emotion regulation. Further studies are needed on the mediating effects of self-efficacy between gratitude and medication adherence before this theory can elevate to the level of a useful integrative model of gratitude and health.

Lastly, we tested our hypothesis to determine if higher self-efficacy leads to healthier behaviors in asymptomatic HF patients. Our mediation model determined that self-efficacy mediates gratitude's association with medication adherence (see Figure 1). The findings of this study are supported by the parent study where gratitude was associated with better sleep, less depressed mood, less fatigue, and better self-efficacy to maintain cardiac function (Mills et al., 2015). Our study adds to these results by recognizing additional variables such as medication adherence, can also have an impact on HF self-care.

### **Limitations**

This study involved a secondary analysis of existing cross-sectional data, and the study sample is limited. Comprised mainly of older white males, the restricted nature of this study population may limit the generalizability of the study findings. Our analysis was only cross-sectional, and therefore, any causal inferences suggested by our findings are limited by a lack of temporal precedence and experimental control (Shadish, Cook, & Campbell, 2002). Even so, our study provides a basis for future intervention strategies involving gratitude, especially for those living with CVD.

### **Implication for Research**

There are many studies of self-efficacy in cardiovascular patients to determine its relevance to behaviors involved in heart disease prevention or rehabilitation (Sullivan et al., 1998). To date, few studies have been conducted to determine the correlation between self-efficacy, gratitude, and medication adherence in patients living with CVD. More rigorous studies are needed in diverse populations to account for self-efficacy as a mediator of gratitude and other health-related variables. Self-efficacy is an important component in CVD risk reduction, and

more research can help determine its role in controlling coronary symptoms and maintain function (Sullivan et al., 1998).

One diverse population that can benefit from cardiovascular risk reduction in hypertensive African Americans. Hypertension (HTN) is the leading risk factor for multiple CVDs, including heart failure, stroke, and coronary artery disease across various populations (Benjamin et al., 2019). The prevalence of HTN among African Americans in the United States is among the highest in the world (Carnethon et al., 2017). HTN is the most significant risk factor for the cardiovascular health of African Americans, and the most significant area of opportunity for the prevention of the disease if effectively managed (Carnethon et al., 2017). Recent studies show the association between self-efficacy and hypertension self-care activities among African American adults (Schoenthaler, Ogedegbe, & Allegrante, 2009; Warren-Findlow, Seymour, & Huber, 2012). In hypertensive African Americans, positive-affect interventions led to significantly higher medication adherence (Ogedegbe et al., 2012). Moreover, greater gratitude is associated with higher levels of protective factors and lower levels of risk in African American adolescents (Ma et al., 2013). We recommend further studies that include our proposed variables and repeat testing of the model to build the science of gratitude in health.

### **Conclusion**

This study provided conceptual clarity of gratitude in health-related literature and found evidence that self-efficacy mediated the relationship between gratitude and medication adherence in asymptomatic HF patients. Based on the available evidence of gratitude and health, it can be concluded that there is a need to improve self-care activities among patients living with CVD. More importantly, how self-efficacy can improve gratitude interventions across diverse populations. Self-efficacy plays a vital role in person-centered care in several cardiovascular

populations (Fors, Ulin, Cliffordson, Ekman, & Brink, 2015; Sullivan et al., 1998). The concept of self-efficacy is crucial in promoting health behaviors improving functional status in CVD patients, including HF self-care and medication adherence. Medication adherence can mediate the relationship between heart failure symptoms and cardiac event-free survival (Jia-Rong & Moser, 2018). Given what is known about self-efficacy's association with gratitude and medication adherence, our theoretical model provides a greater understanding of this relationship for future studies across the broad spectrum of CVD and related risk factors.



**Table 3.1***Descriptive Statistics for GQ-6, CSE-MF, MMAS-8*

Variable	<i>N</i>	<i>Mean</i>	<i>SD</i>	Skew	Kurtosis
GQ-6 item 1	153	6.26	1.06	-1.76	3.17
GQ-6 item 2	153	5.78	1.41	-1.46	1.83
GQ-6 item 3 <sup>a</sup>	152	5.53	1.61	-1.08	0.29
GQ-6 item 4	152	5.69	1.34	-1.32	1.58
GQ-6 item 5	153	6.03	1.22	-1.72	3.09
GQ-6 item 6 <sup>a</sup>	153	5.12	1.85	-0.78	-0.68
CSE-MF item 1	152	3.57	1.12	-0.66	-0.22
CSE-MF item 2	153	3.73	1.03	-0.65	-0.04
CSE-MF item 3	127	3.37	1.26	-0.46	-0.72
CSE-MF item 4	141	2.86	1.39	-0.02	-1.28
CSE-MF item 5	151	3.12	1.35	-0.17	-1.18
MMAS-8 total <sup>b</sup>	153	6.82	1.22	-1.28	1.94

*Notes.* Descriptive statistics for gratitude (GQ-6), self-efficacy (CSE-MF), and medication adherence (MMAS-8). All descriptives are based on the complete data only (i.e., without multiple imputations), except for the MMAS-8. *N* = number of observations; *SD* = standard deviation.

<sup>a</sup> Item is reverse scored.

<sup>b</sup> Descriptives for MMAS-8 total scores are based on the multiply imputed datasets. The expected value across all datasets is reported for each descriptive statistic.

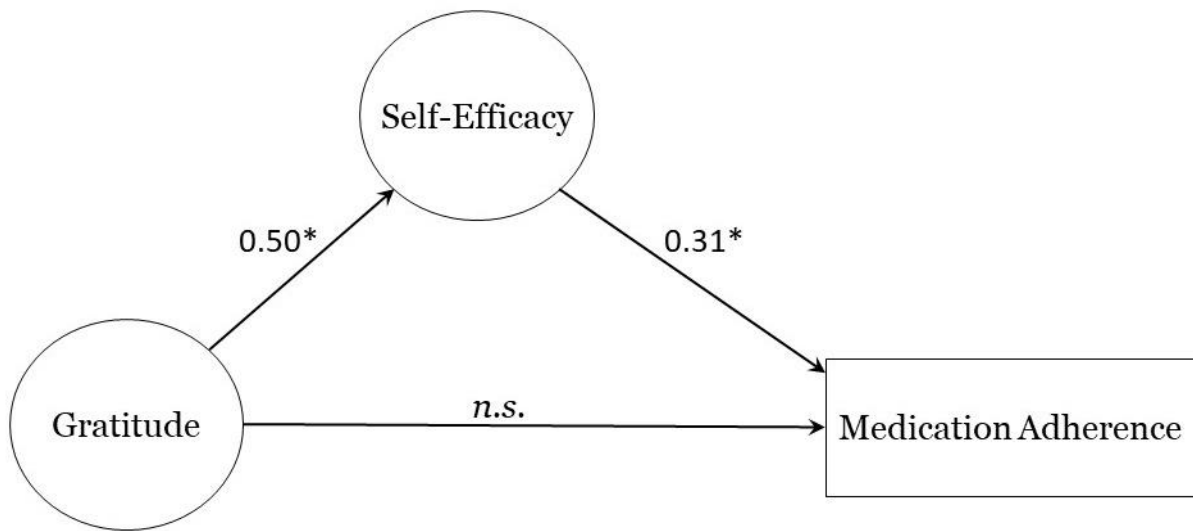
**Table 3.2***SEM Factor Loadings for Gratitude and Self-Efficacy Latent Variables.*

Gratitude		Self-Efficacy	
Item	Factor Loading	Item	Factor Loading
GQ-6 item 1	1 <sup>b</sup>	CSE-MF item 1	1 <sup>b</sup>
GQ-6 item 2	1.35	CSE-MF item 2	0.80
GQ-6 item 3 <sup>a</sup>	0.63	CSE-MF item 3	0.90
GQ-6 item 4	1.06	CSE-MF item 4	0.81
GQ-6 item 5	0.82	CSE-MF item 5	0.69
GQ-6 item 6 <sup>a</sup>	1.16		

*Notes.* Results from the hypothesized SEM mediation. Factor loadings are based on the unstandardized solution. All loadings are statistically significant,  $p < .05$ .

<sup>a</sup> Item is reverse scored.

<sup>b</sup> Item loading is fixed at 1 for model identification.



**Figure 3.1.** Path diagram for the SEM mediation of gratitude, self-efficacy, and medication adherence.

*Notes.* Results of the structural equation model for self-efficacy mediating the relationship between gratitude and medication adherence. Coefficients are based on the unstandardized solution. The test of the indirect effect was also statistically significant ( $b = 0.16, p < 0.05$ ).

\* = statistically significant,  $p < .05$

*n.s.* = not statistically significant,  $p > .05$ .

**CHAPTER FOUR:**  
**PSYCHOMETRIC TESTING OF THE GRATITUDE QUESTIONNAIRE-6 IN**  
**AFRICAN AMERICANS AT RISK FOR CARDIOVASCULAR DISEASE**

Cardiovascular disease is the leading global cause of death, resulting in more than 17.9 million deaths per year and is anticipated to grow to more than 23.6 million by 2030 (Benjamin et al., 2019). In recent efforts to reduce CVD risk, the American Heart Association expanded the focus to CVD prevention through the promotion of positive cardiovascular health in addition to the treatment of established CVD (Benjamin et al., 2019). Although significant efforts are underway to improve population-wide cardiovascular health, the burden of this chronic disease remains high in the African American population (Carnethon et al., 2017). Negative psychological factors such as depression and stress are prevalent among African Americans and maybe a contributing factor to CVD (Brewer et al., 2018; Sims et al., 2017). Positive psychological attributes, such as gratitude are associated with improved cardiovascular outcomes and surges in spiritual well-being (Mills et al., 2015; Millstein et al., 2016; Redwine et al., 2016).

A growing body of theoretical research by Fredrickson (2004); Wood et al. (2010) suggest that gratitude may be a driving force of successful life outcomes such as well-being that broadens and builds over time (Fredrickson, 2004; Wood et al., 2010; Wood, Joseph, & Maltby, 2008; Wood et al., 2009; Wood, Maltby, et al., 2008). Gratitude is defined in scientific literature as (a) an emotional response to other's kindness, (b) a mood that focuses on what is cherished in life, or (c) a trait reflecting in a broader life's orientation toward appreciating others (McCullough et al., 2002; Wood et al., 2010). Gratitude has emerged from the Positive

Psychology movement and provided a beneficial influence on well-being across cultures (Magallares, Recio, & Sanjuan, 2018). Recent evidence shows that greater gratitude is associated with higher levels of protective factors and lower levels of risk in, African American adolescents (Ma et al., 2013). However, nothing is known about the relationships among gratitude, depression, spiritual well-being, and positive affect in African American adults. Assessing these relationships is important since an increase in negative psychological factors such as depression is a relevant risk factor for developing CVD and spirituality is associated with better cardiovascular health (Mwendwa et al., 2013; Yaghoobzadeh, Soleimani, Allen, Chan, & Herth, 2018). Efforts to increase gratitude and spiritual well-being may be of potential clinical value in preventing CVD risk. Therefore, in terms of promoting positive cardiovascular health, it is imperative to explore whether positive emotions such as gratitude are negatively associated with depression.

The most widely used instrument to measure gratitude that has been validated in several diverse populations is the Gratitude Questionnaire-6 (GQ-6), comprised of six items (McCullough et al., 2002). The GQ-6 is a self-report questionnaire that is designed to assess distinct differences in people's dispositional gratitude in everyday life (McCullough et al., 2002). The measures by the GQ-6 reflects four domains of dispositional gratitude: (a) intensity, (b) frequency, (c) span, and (d) density (McCullough et al., 2002). The original psychometric analysis of the GQ-6 was conducted in adult and young populations and resulted in reports of adequate construct validity and reliability (McCullough et al., 2002). To date, the GQ-6 has been tested in different samples across the world including Chinese, Taiwanese, Filipino, Dutch, Chilean, and Spain (Chen, Chen, Kee, & Tsai, 2009; Froh et al., 2011; Jans-Beken, Lataster, Leontjevas, & Jacobs, 2015; Kong, You, & Zhao, 2017; Langer, Ulloa, Aguilar-Parra, Araya-

Véliz, & Brito, 2016; Magallares et al., 2018; Valdez, Yang, & Datu, 2017; Zeng, Ling, Huebner, He, & Lei, 2017). However, no psychometric testing has been completed in a sample of participants of African descent. To our knowledge, this will be the first psychometric study using an African American sample. This study will help determine if the GQ-6 measures gratitude in African Americans at risk for CVD similarly to the original sample of young, white college students.

### **Purpose and Specific Aims**

Thus, the purpose of this analysis is to test the validity and reliability of the GQ-6, in African Americans, which is currently untested. The data from this dissertation will build the foundation for future gratitude studies by raising awareness about gratitude as the main factor in the development of spiritual well-being. Moreover, psychometric analysis of the GQ-6 in an African American sample will help determine if the construct of gratitude measures well in this population.

The three specific aims of this study are to (1) assess the reliability of the GQ-6 using Cronbach's coefficient, (2) test the construct validity of the GQ-6 using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) of the GQ-6 as a single-factor model , and (3) examine convergent and divergent validity to assess the relationship between GQ-6 with the Patient Health Questionnaire-9 (PHQ-9) (depressive symptoms), Positive and Negative Affect Scale (positive affect), and the FACIT-Sp-Non-Illness: Functional Assessment of Chronic Illness Therapy - Spiritual Well-Being Scale (FACIT-Sp) (spiritual well-being) (Kroenke, Spitzer, & Williams, 2001; McCullough et al., 2002; Peterman, Fitchett, Brady, Hernandez, & Cella, 2002; Watson, Clark, & Tellegen, 1988).

We hypothesized that (1) GQ-6 scores will demonstrate reliability through strong internal consistency using Cronbach's alpha, (2) factor analysis will confirm the six questions from the original psychometric work is influenced by the latent variable, gratitude and (3) GQ-6 scores will be negatively correlated with depressive symptoms, as measured by the PHQ-9, GQ-6 scores will be positively correlated with positive affect, as measured by the PANAS, and GQ-6 scores will be positively correlated with spiritual well-being, as measured by the FACIT-Sp.

## **Methods**

### **Design and Sample**

The sample consisted of 298 community-dwelling African Americans at risk for heart disease (see inclusion criteria). This cross-sectional study was conducted via anonymous online and physical surveys. The participants were recruited between June 6 – July 31, 2019, via convenience sampling through social media, distributing flyers to churches, hair salons, and barbershops in the southeastern United States. Additionally, in person, the principal investigator identified potential participants at the Florida Department of Health in Pinellas County, Florida, and the Pinellas County Urban League. Inclusion criteria were: (a) adult age 18 years or older; (b) self-report of African-American descent; (c) self-report with one of the following risk factors for heart disease: high blood pressure, high blood cholesterol, diabetes and prediabetes, smoking, overweight, or having a family history of early heart disease (50 years of age or less).

The dissertation study is titled, *The Grateful Heart and Soul* study, and was approved by the University of South Florida Human Subjects Institutional Review Board (IRB #Pro00040664). Participants completed demographic survey (age, gender, risk factor for CVD, race, education, religious affiliation, income, and primary care provider visit within 12 months) and scores on the GQ-6 (gratitude), PHQ-9, PANAS (positive affect), and FACIT-Sp (spiritual

well-being). The participants took an average of 13 minutes to complete the entire set of questionnaires.

## **Measures**

**The Gratitude Questionnaire-6 (GQ-6).** The GQ-6, a well-validated, self-administered 6-item scale is designed to measure dispositional (trait) gratitude (Froh et al., 2011; McCullough et al., 2002). The concept measured by the GQ-6 reflects four facets of dispositional gratitude: (a) intensity, (b) frequency, (c) span, and (d) density (McCullough et al., 2002). Each item is rated on a seven-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). Scores range from 6 to 42, with higher scores implying a greater level of dispositional gratitude and lower scores indicating a decreased disposition in gratitude (McCullough et al., 2002). The internal consistency of the GQ-6 in our sample was moderate, with a Cronbach's  $\alpha$  of 0.729.

**The Patient Health Questionnaire-9 (PHQ-9).** The Patient Health Questionnaire-9 (PHQ-9) is a nine-item self-report instrument for determining criteria-based diagnoses of depressive symptoms over the past two weeks (Kroenke et al., 2001). The PHQ-9 scores each of the nine Diagnostic and Statistical Manual of Mental Disorders-IV as "0" (not at all) to "3" (nearly every day), and total scores range from zero to 27 (Kroenke et al., 2001). A major depressive episode is diagnosed using a diagnostic algorithm or a summary score (Kroenke et al., 2001). In our study, we utilized the summary score method. During the informed consent process, if the participant had feelings of depressive symptoms after our survey with the PHQ-9, they were notified to contact their primary care provider or licensed mental health provider. The PHQ-9 demonstrates high reliability and structural validity (Du, Yu, Ye, & Chen, 2017). In our sample, the coefficient  $\alpha$  was high with  $\alpha$  at 0.884.



**The Positive and Negative Affect Scale (PANAS).** The Positive and Negative Affect Scale (PANAS) is a 20-item Likert scale that contains two mood scales, one that measures positive affect and the other that measures negative affect and are shown to be highly internally consistent, and stable (Watson et al., 1988). In our sample, we utilized the 10-item positive affect scale. Positive affect scores range from 10-50, with higher scores representing higher levels of positive affect (Watson et al., 1988). The internal consistency of PANAS (positive affect) score in our sample was high with  $\alpha$  of 0.933.

**The FACIT-Sp-Non-Illness: Functional Assessment of Chronic Illness Therapy.** A modified version for non-illness (FACITsp12) is a 12-item scale designed to assess spiritual wellbeing in a population without chronic illness (Peterman et al., 2002). The FACITsp12 measures spiritual wellbeing experienced over the past seven days (0 = not at all to 4 = very much) (Peterman et al., 2002). Scores range from 0 – 48; higher scores demonstrate an increase in spiritual well-being. Internal consistency reliability coefficient ranged from .81 to .88, and convergent validity estimates show moderate to strong correlations with other measures of spirituality and religiousness (Peterman et al., 2002). In this cohort, the coefficient  $\alpha$  for FACIT-Sp was 0.928.

### **Data Analysis**

Descriptive statistics, frequencies, means with standard deviations were used to characterize the participants and scores of the questionnaires (see Table 1). From the original sample of 298 cases, the dataset was randomly divided into two separate and independent subsamples using SPSS version 26 (IBM Corporation, 2019). The first sample contained 149 cases for EFA. The second sample of 149 was used as an independent, holdout sample for CFA. While this procedure resulted in two smaller samples, it was essential to analyze the data using both

EFA and CFA with this sample of African American participants. It was not appropriate to solely use CFA, as the structure of the GQ-6 in African Americans had not been previously established using an EFA approach.

Although the sample sizes were smaller than desirable for these analyses, they are similar to another recent psychometric test of the GQ-6 in Filipino participants (Valdez et al., 2017). Valdez et al. (2017) conducted both EFA and CFA of the GQ-6 on 383 cases and randomly divided the sample into EFA ( $n = 192$ ) and CFA ( $n = 191$ ) with statistically significant results. Moreover, MacCallum, Widaman, Preacher, and Hong (2001) recommends a ratio of subjects to variables of 4:1 or larger for adequate sample size and a stable factor solution (MacCallum et al., 2001). In our EFA sample, the subjects to variables ratio were 25:1 for the GQ-6.

**Reliability (Aim 1).** For the first aim, Cronbach's  $\alpha$  was calculated for the GQ-6 to determine reliability for the entire sample of 298 participants. Corrected item-total correlations were analyzed to ensure all correlation coefficients were above 0.3 and below 0.9 (Field, 2018). According to Field (2018), the items with corrected item-total correlation lower than 0.30 indicate that the item is measuring a construct different from the scale as a whole. However, if the inter-items correlation coefficient is too high (over 0.9), a problem of multicollinearity can arise.

**Construct validity (Aim 2).** The underlying structure of the GQ-6 was explored using both EFA and CFA for the second aim. EFA was performed on the first sample ( $n = 149$ ) using SPSS version 26, after confirming that the data was suitable for factor analysis. Sampling adequacy was determined by a Kaiser-Meyer-Olkin (KMO) measure above 0.5 (Field, 2018). Bartlett's test of sphericity was selected to evaluate if correlations between items are significant enough to conduct a factor analysis (Field, 2018). A significant level of 0.5 is deemed adequate.

Initially, a principal components analysis (PCA) with a direct oblimin rotation was used to extract the factors on the items of the GQ-6. The number of factors to retained was guided by three decision rules: Kaiser's criterion (eigenvalues above 1), analysis of the scree plot, and the use of Horn's parallel analysis (Horn, 1965). Parallel analysis is considered one of the most accurate methods in estimating the number of components (Hubbard & Allen, 1987; Zwick & Velicer, 1986). Thus, eigenvalues exceeding the value of one are compared with a randomly generated data set of the same size using software developed by Watkins (2000) and studied for further investigation.

CFA using maximum likelihood estimation was conducted on the second holdout sample ( $n = 149$ ) using AMOS version 26 to evaluate the model fit (Arbuckle, 2019). The multivariate normality test was verified through Mardia's coefficient. Bootstrapping using the Bollen-Stine procedure in AMOS was utilized to handle non-parametric data (Byrne, 2001). Similarly to the procedure followed in the initial validation of the GQ-6 by McCullough et al. (2002), we examined the chi-square, comparative fit index (CFI), and standardized root-mean-square residual (SRMR) statistics (Bentler, 1995). The SRMR is less sensitive to distribution and sample size, and Hu and Bentler (1998) recommend to use this method in combination with CFI when using the maximum likelihood estimation. For the CFI, values between .90 and .95 indicate reasonable fit and values between .95 and 1.00 indicate good fit (Tabachnick & Fidell, 2013). Hu and Bentler (1998) suggest that SRMR values less than .05, although values as high as .10 are acceptable.

**Convergent and divergent validity (Aim 3).** In our last aim, correlation analyses were performed to test for convergent and divergent validity. Spearman's correlation coefficient was utilized to minimize the effects of violations of assumptions (positively skewed data), and

confidence intervals were derived empirically using a bootstrapping procedure in SPSS version 26 (Field, 2018). Statistical analyses were performed using SPSS version 26 and AMOS version 26 (Arbuckle, 2019; IBM Corporation, 2019). A priori  $\alpha$  level of greater or equal to 0.05 was used to determine significance.

## **Results**

### **Descriptive Statistics**

Participants at risk for CVD were primarily female (68.8%) and aged  $43 \pm 14$  years on average (Table 1). A majority of these participants self-reported a CVD risk factor of being overweight (44.6%) or high blood pressure (23.2%). Over half of the sample graduated from college (21.8%) or had a graduate degree (37.6%). A majority of the sample self-reported as Christian (82.9%), and visited their primary care provider within 12 months (82.6%). Total GQ-6 scores were moderately high, with an average score of  $37 \pm 5$ . Positive affect (PANAS) and Spiritual Well-Being (FACIT-Sp) were also moderately high, with an average score of  $36 \pm 9$  and  $37 \pm 10$ , respectively. Average depression severity scores from the PHQ-9 was  $6 \pm 6$ , which is classified as mild depressive symptoms.

### **Reliability (Aim 1)**

The Cronbach  $\alpha$  value for the GQ-6 was 0.729 for the total instrument. The value exceeded the recommended value of 0.70, indicating acceptable internal consistency. Analysis of the item-total correlations ranged from 0.319 to 0.595, and removal of individual items of the GQ-6 will not improve the overall reliability of the scale.

### **Construct Validity (Aim 2)**

**Exploratory factor analysis.** First, the sample ( $n = 149$ ) was assessed for suitability for factor analysis. The Bartlett's Test of Sphericity was highly significant ( $\chi^2 (15) = 228.85$ ,  $p <$

.001) and the KMO measure of sampling adequacy value of .772 supported the factorability of the matrix. Anti-image correlation values for individual items were all greater than or equal to 0.68, which is above the acceptable level of 0.50 (Field, 2018). The communalities of the instrument were adequate, except for item 1. Since the instrument only contains a few items, lower communalities are accepted.

The PCA revealed only one factor exceeding one, explaining 47.42% of the variance. The first factor exceeded the criterion value obtained from the Parallel Analysis. A review of the scree plot also reinforced a one-factor solution in line with the original scale. Since only one factor was extracted, the solution cannot be rotated. The results of saturation weights are listed in Table 2. The extraction of the one-factor solution in this sample replicated the original instrument and provided evidence of a one-factor structure of the GQ-6 in AFRICAN AMERICANS at risk for CVD.

**Confirmatory factor analysis.** After the EFA, a CFA using maximum likelihood estimation was conducted on the second sample ( $n = 149$ ). When the sample revealed evidence of multivariate kurtosis (positively skewed), we selected the use of the Bollen-Stine bootstrapping procedure in AMOS to address the issue, and the model fit was better with 191 samples (Bollen-Stine bootstrap  $p = .05$ ). The Bollen-Stine bootstrapping procedure did not make any correction to the standard errors given in our dataset that were nonnormally distributed. To accept or reject the model tested, we utilized the following fit indexes:  $\chi^2$ , CFI, and SRMR. The model yielded a statistically significant chi-square,  $\chi^2(8, n = 149) = 18.16, p < 0.05$ . The CFI, which is less sensitive to sample size, was large (.94), and the SRMR was .06 with errors of items three and six correlated (reversed items of ingratitude) indicating that the one-factor model is a reasonable fit to the data (Figure 1).

### **Convergent and Divergent Validity (Aim 3)**

The relationship between the GQ-6 with the PHQ-9 (depressive symptoms), PANAS (positive affect), and FACIT-Sp (spiritual well-being) scores were examined using Spearman's correlation coefficient for the total sample (N = 298) of adults. GQ-6 scores were significantly correlated with the PHQ-9, PANAS, and FACIT-Sp (see Table 3).

### **Discussion**

The goal of this study was to validate the GQ-6 in a sample of African Americans at risk for CVD. As far as we know, this is the first study to present the psychometric properties of the GQ-6 for African Americans of the general population. More cross-cultural studies such as this one will add generalizability of questionnaires such as the GQ-6, to measure gratitude. For example, the mean score obtained on the GQ-6 in our sample was higher than the reported samples in the original study (McCullough et al., 2002).

Our results supported the GQ-6 was a reliable instrument with Cronbach's  $\alpha$  of 0.729. In our sample, the GQ-6 presented similar reliability to other validation studies, with Cronbach's alphas between .70 and .80 (Chen et al., 2009; Langer et al., 2016; Magallares et al., 2018; Zeng et al., 2017). Results from the EFA yielded a one-factor structure consistent with the factor structure of the original scale from McCullough et al. (2002) and other GQ-6 validations with adults across different countries (Jans-Beken et al., 2015; Kong et al., 2017; Magallares et al., 2018).

Furthermore, in terms of construct validity, the six-item one-factor CFA indicated that the model was a good fit with errors of item three ("when I look at the world, I don't see much to be grateful for") and item six ("long amounts of time can go by before I feel grateful to something or someone.") correlated. Correlated errors may arise from items that are very similarly worded

or reverse-worded (Brown, 2015). In our sample, the correlated errors resulted from item three and six being reversed-worded items. Previous studies of the validation of the GQ-6 in China and Spain also encountered similar correlated errors due to similarly worded item content (Kong et al., 2017; Magallares et al., 2018). In the Chinese and Spanish samples, they shared the same correlated error of item four (“I am grateful to a wide variety of people”) and item five (“as I get older, I find myself better able to appreciate the people, events, and situations that have been part of my life history”).

The GQ-6 was correlated with several related constructs (depressive symptoms, positive affect, and spiritual well-being) to test for evidence of convergent and divergent validity in our sample. We found that gratitude is positively correlated with positive affect and spiritual well-being, and negatively correlated with depressive symptoms in this sample of African Americans. The findings in this study support theoretical predictions reported by Wood et al. (2010) earlier that dispositional gratitude has the potential to improve overall well-being, and foster positive feelings. In our sample of predominantly Christian black women who are obese or have high blood pressure, spiritual well-being was significantly correlated with gratitude. Recent studies show that faithfulness to spiritual practices (i.e., gratefulness to God) in black women who are obese with high blood pressure may yield more adherence to hypertension medication regimens and a reduction in other CVD risk factors (diet, exercise) (Abel & Greer, 2017; DeHaven et al., 2011).

As detailed in our introduction, depression is a significant contributing risk factor of CVD in African Americans. In our sample, participants reported mild depressive symptoms. Over time, depressive symptoms can negatively impact the cardiovascular system. Dispositional depression and hostility are associated with inflammatory markers of CVD in African Americans

(Mwendwa et al., 2013). However, gratitude can be a significant contributor in reducing depressive symptoms. Dispositional gratitude can foster protective factors against stress, depression, and serves as a psychological resource in decreasing CVD-related health risk from socioeconomic stressors (Hartanto et al., 2019; Wood, Maltby, et al., 2008). Lastly, the results from this study suggest that further interdisciplinary research in gratitude is needed to better understand its contribution to the improvement of overall cardiovascular health in minority populations.

### **Limitations**

The limitations of this study include participants not randomly selected, which may lead to a selective sampling of adults, and the GQ-6 is a self-reported instrument that may introduce social desirability bias in the data. This data collection problem was addressed by recruiting in diverse areas instead of one location, including the Pinellas County Urban League, Florida Department of Health, community centers, community events, churches throughout Florida for a heterogeneous sample of gender, age, education, employment status, and religious affiliation.

### **Conclusion**

The adaptation of the GQ-6 in African Americans at risk for CVD showed excellent psychometric properties, similar to the original study and prior validations across the world. This instrument was determined to be a reliable and valid measure of dispositional gratitude. More importantly, this instrument can contribute to clinical studies to improve well-being, positive affect, and reduce depressive symptoms that can impact CVD risk factors in African Americans.



**Table 4.1***Sample Characteristics (N=298)*

Variable	f (%) or mean $\pm$ SD
Age in years	43 $\pm$ 14
Gender	
Female	205 (68.8)
Male	93 (31.2)
Cardiovascular Disease (CVD) Risk Factor	
High blood pressure	69 (23.2)
High cholesterol	12 (4.0)
Prediabetes/diabetes	45 (15.1)
Smoking	15 (5.0)
Overweight	133 (44.6)
Early family history of CVD	24 (8.1)
Education	
Some high school (no degree)	11 (3.7)
Grade 12 or GED	17 (5.7)
College 1-3 years	66 (22.1)
College graduate	65 (21.8)
Some graduate school	27 (9.1)
Graduate degree	112 (37.6)
Religious Affiliation	
Jewish	2 (.7)
Muslim	1 (.3)
Christian	247 (82.9)
Not Religious	48 (16.1)
Salary	
Less than \$40,000	75 (25.2)
\$40,000-\$59,999	69 (23.2)
\$60,000-\$79,999	51 (17.1)
\$80,000-\$99,999	30 (10.1)
\$100,000-\$119,000	35 (11.7)
\$120,000-\$139,000	14 (4.7)
\$140,000-\$159,000	6 (2.0)
\$160,000-\$179,000	3 (1.0)
\$180,000-\$199,000	6 (2.0)
More than \$200,000	8 (2.7)
Primary care visit within 12 months	246 (82.6)
Gratitude Questionnaire – 6 (Dispositional Gratitude)	37 $\pm$ 5
FACIT-Sp-Non-Illness (Spiritual Well-Being)	37 $\pm$ 10
The Patient Health Questionnaire (Depressive Symptoms)	6 $\pm$ 6
The Positive and Negative Affect Scale (Positive Affect)	36 $\pm$ 9

Abbreviations: SD, Standard deviation, GED, General Educational Development

**Table 4.2**

*Exploratory Factor Analysis of the One-Factor Solution of the GQ-6 by Principal Components Analysis\* (n = 149)*

Gratitude Questionnaire-6 (GQ-6) Items	Component 1
1. I have so much in life to be thankful for.	.487
2. If I had to list everything that I felt grateful for, it would be a very long list.	.808
3. When I look at the world, I don't see much to be grateful for.	.617
4. I am grateful to a wide variety of people.	.778
5. As I get older, I find myself better able to appreciate the people, events, and situations that have been part of my life history	.697
6. Long amounts of time can go by before I feel grateful to something or someone.	.695

\*Note. Only one component was extracted. The solution cannot be rotated. Items 3 & 6 are reversed.

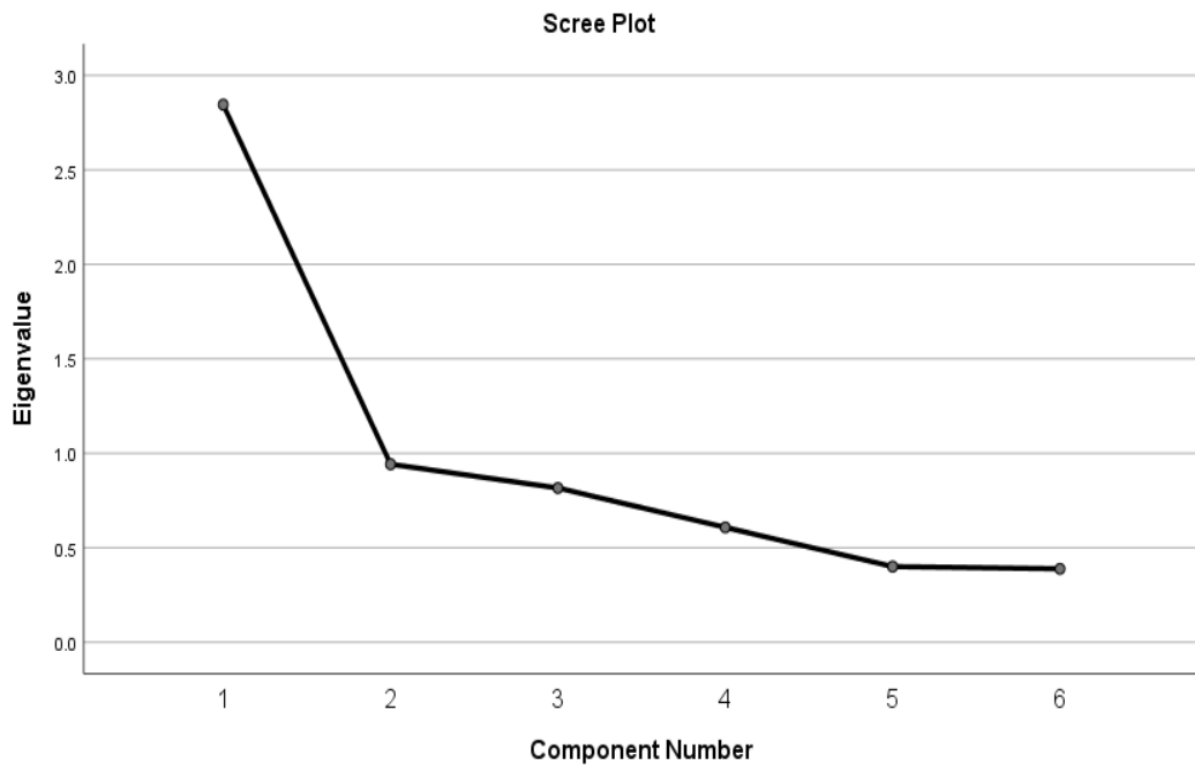
**Table 4.3**

*Correlations Between the Gratitude Questionnaire-6 (GQ-6) and Other Constructs (N = 298)*

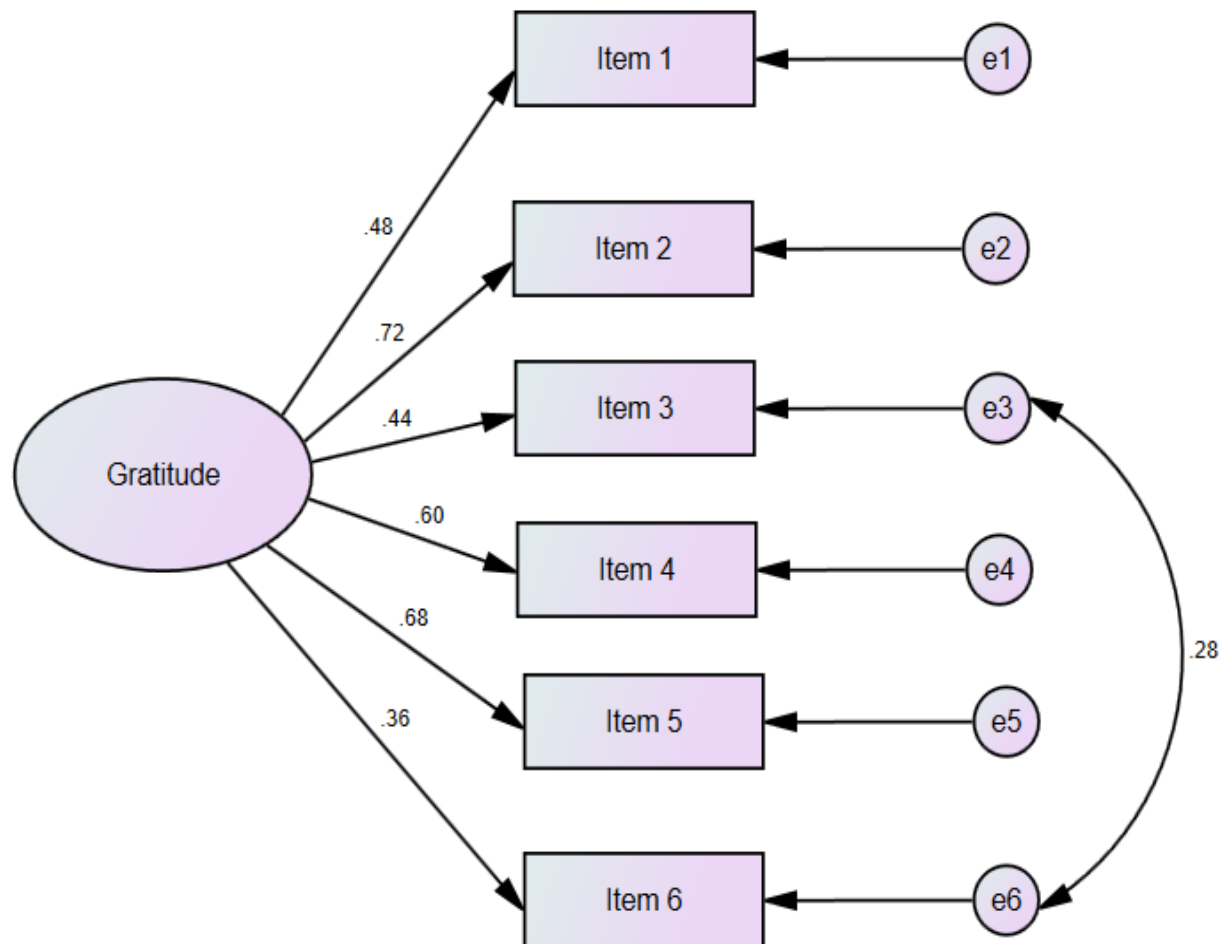
Scale	Correlation with GQ-6
Positive Affect (PANAS)	.482** [.379, .573]
Spiritual Well-Being (FACITsp12-NI)	.608** [.519, .685]
Depressive Symptoms (PHQ-9)	-.378** [-.475, -.277]

Note. PANAS = The Positive and Negative Affect Schedule; FACITsp12-NI = Functional Assessment of Chronic Illness Therapy – Spiritual Well-being, a modified version for non-illness; PHQ-9 = Patient Health Questionnaire-9

ns = not significant ( $p > 0.05$ ),  $*p < .05$ .  $**p < .01$ . BCa bootstrap 95% CIs reported in brackets.



**Figure 4.1.** Scree plot of the Gratitude Questionnaire-6 (GQ-6) supporting a one-factor solution.



**Figure 4.2.** First Order CFA. Standardized estimations of the model. The values of the arrows are the standardized regression coefficients ( $\beta$ ). Items 3 and 4 are correlated reverse items of the GQ-6 (reverse-scored).

## **CHAPTER FIVE:**

### **CONCLUSIONS**

The purpose of this dissertation was to develop the science of gratitude in cardiovascular health in African Americans. This was accomplished by addressing gaps identified across the totality of prior gratitude studies. Cardiovascular disease impacts millions of Americans, and despite recent advances in reducing risk, racial/ethnic disparities persist in the United States (Carnethon et al., 2017). African Americans experience a higher prevalence of CVD risk factors (hypertension, obesity, and diabetes mellitus) at an earlier onset than non-Hispanic whites; more studies are needed to improve overall cardiovascular health. While research exists on the benefits of positive psychological functioning such as optimism on reducing CVD risk, very few studies have explored the impact of gratitude on cardiovascular health. Thus, the outcomes from the three manuscripts will help advance the science and add to the relevant discourse on reducing CVD risk factors among African Americans.

The three manuscripts support the dissertation hypotheses introduced in chapter one. The first manuscript (aim #1) was a state-of-the-science review of gratitude and cardiovascular health outcomes to identify gaps in the literature. The second manuscript (aim #2) was a report of secondary data analysis in which we explored mediators affecting gratitude and medication adherence using a structural equation model in patients with CVD (Stage B heart failure). Lastly, the third manuscript (aim #3) was a report of the psychometric evaluation of the Gratitude Questionnaire-6 (GQ-6) in a sample of African Americans at risk for CVD.

## Key Findings

In the first manuscript (aim #1), we provided preliminary evidence on the physical and mental benefits of gratitude using a state-of-the-science review. To our knowledge, this was the first review to explore the effect of gratitude on cardiovascular health. In our sample ( $n = 13$ ) of primarily white men, the two most common diagnoses are acute coronary syndrome or have stage B heart failure. The existing evidence indicated that most gratitude studies ( $n = 8$ ) focus on the improvement of biomarkers of health (markers of inflammation, blood pressure, heart rate, and hemoglobin A1C) and very few studies ( $n = 5$ ) center around cardiovascular health behaviors and adherence. We found in our review that individuals who practiced gratitude experienced reduced inflammatory biomarker index score (CRP, TNF- $\alpha$ , IL-6, and sTNFr1), decreased diastolic blood pressure, lower heart rate and reduced levels of hemoglobin A1C (Celano et al., 2017; Huffman, Beale, et al., 2016; Jackowska et al., 2016; Millstein et al., 2016; Redwine et al., 2016). An important finding is that there is an improvement of CVD outcomes in healthy individuals, which suggests that gratitude may be a possible preventive strategy in reducing CVD risk. However, few studies suggest that gratitude may improve adherence behaviors (diet, medication adherence, exercise)(Millstein et al., 2016). There is limited evidence suggesting that gratitude impacts actual health behaviors, such as medication adherence.

Medication nonadherence results in progression of CVD. Gratitude and self-efficacy may be a motivating factor. The goal of the second study (manuscript aim #2) was to determine if self-efficacy mediates the relationship between gratitude and medication adherence in patients with CVD (i.e., stage B heart failure) using a structural equation model (SEM). Our analyses found that an indirect effect of gratitude on medication adherence through self-efficacy was significant ( $b = 0.16$ ;  $p < .05$ ), supporting our central hypothesis. As a result, it can be said that

gratitude influences self-efficacy which in turn improves medication adherence in patients with heart failure.

In our last manuscript (aim #3), we examined whether the Gratitude Questionnaire- 6 measures gratitude in African Americans. African Americans have a higher CVD risk than their white counterparts; additional strategies may be needed to promote better CV health behaviors (Carnethon et al., 2017). Unfortunately, no validated measures of gratitude in African Americans are available to test this hypothesis. Therefore, in our last manuscript (aim #3), a psychometric evaluation of the GQ-6 was conducted, with 298 African Americans at risk for CVD. Our study found that GQ-6 is a reliable instrument with Cronbach's  $\alpha$  of 0.729. Our results from the EFA yielded a one-factor structure consistent with the original instrument by McCullough et al. (2002), and the CFA indicated that the model was a good fit. Similarly, dispositional gratitude (GQ-6) was positively correlated with positive affect (PANAS), and spiritual well-being (FACITSp12) and was negatively correlated with depressive symptoms (PHQ-9) supporting convergent and divergent validity in this population.

### **Context of Findings**

Despite the positive findings in our scientific review (aim #1), the link between gratitude and cardiovascular health remains an understudied area of research. The small number of gratitude studies is primarily due to the recent development of positive cardiovascular health research over the past two decades. In comparison to other positive cardiovascular health studies (i.e., optimism), our findings related to gratitude involve similar population characteristics (acute coronary events and heart failure), assessment instruments, and cardiovascular outcomes related to biomarkers with poorer outcomes specifically adherence behavior. For example, in patients who experience an acute coronary event, optimism, not gratitude was prospectively and

independently associated with better physical activity and fewer cardiac readmissions (Huffman, Beale, et al., 2016). Furthermore, recent evidence suggests that optimism centers around future expectations and events, whereas gratitude is a current or past construct and less directly linked to making better health choices (Huffman, Beale, et al., 2016).

Notwithstanding the lack of evidence in the relationship between gratitude and adherence behaviors, studies suggests that gratitude or self-efficacy can help improve health behaviors such as medication adherence in CVD patients (Klompstra et al., 2018; Lufei et al., 2017; Mills et al., 2015; Tovar et al., 2016; Wu et al., 2015). Only two gratitude studies examining medication adherence in CVD patients exist in the literature (Legler et al., 2019; Millstein et al., 2016). In our second manuscript (aim #2), we were able to extend the literature with similar results by providing evidence that gratitude influences self-efficacy, which in turn improves medication adherence in HF patients. Self-efficacy, the innate ability to achieve goals, is a necessary component in practicing gratitude. When people practice self-efficacy, they are contributors to their life circumstances and are engrained in the fundamental belief that one has the power to effect changes by one's actions (Bandura, 2008). Self-efficacy is in alignment with Wood et al. (2010) gratitude theory of life orientation towards a consistent focus on the positive aspects of life to improve health. Gratitude and spiritual well-being are related to more self-efficacy which leads to healthier behaviors such as medication adherence depicted in this dissertation.

Gratitude is a multidimensional concept (McCullough et al., 2002). In recent literature examining health and well-being, dispositional gratitude had a significant impact on well-being or quality of life (Wood et al., 2010; Wood et al., 2009). The “gold-standard” instrument to measure gratitude is the GQ-6 by McCullough et al. (2002). In our final manuscript (aim #3), this psychometric evaluation was the first of our knowledge to test the psychometric properties



of the GQ-6 in African Americans at risk for CVD. Our methods and results followed previous psychometric methods of the GQ-6, and our outcomes were in agreement with the existing nine studies in the literature (Chen et al., 2009; Froh et al., 2011; Jans-Beken et al., 2015; Kong et al., 2017; Langer et al., 2016; Magallares et al., 2018; McCullough et al., 2002; Valdez et al., 2017; Zeng et al., 2017). Our sample characteristics were quite different from these earlier studies in that they included young college students, whereas our sample population expanded the science by focusing on African Americans at risk for CVD. Despite the differences in sample populations, our results yielded a one-factor structure similar to the original scale from other GQ-6 validations with adults across different countries (Jans-Beken et al., 2015; Kong et al., 2017; Magallares et al., 2018). Furthermore, the construct validity of the six-item one-factor CFA was comparable to two psychometric studies of the GQ-6 with a good model fit of correlated errors due to similarly worded item content (Kong et al., 2017; Magallares et al., 2018).

In the third manuscript, the average scores of the PHQ-9 from our sample displayed mildly depressive symptoms. Current research suggests that gratitude is related to a multiple of clinically relevant phenomena, including depression, prosociality, and physical health (Wood et al., 2010). Understanding how to build psychological capital during stressful periods can be beneficial to patients living with an illness. While research has tested the longitudinal effects of practicing gratitude, much less attention has been paid to health outcomes (Layous et al., 2017). Two longitudinal studies are noteworthy relating to gratitude and depression, a known risk factor associated with cardiovascular disease (Sirois & Wood, 2017; Wood, Maltby, et al., 2008). Much more research is needed to examine the role of gratitude in people diagnosed with clinical

disorders. An important step is to first determine if dispositional gratitude measures well in a clinical population for future studies.

### **Impact of Dissertation on the State of the Science**

Few investigators have examined the impact of gratitude on health outcomes before this groundbreaking work. Although researchers have established that gratitude has an impact on self-efficacy, medication adherence, positive affect, and spiritual well-being, none of these studies have been conducted in African Americans at risk for CVD. Previous models support the theoretical integration of gratitude, well-being, and physical health (Hill et al., 2013; Lavelock et al., 2016; Wood et al., 2010), but the evidence is lacking for a high-risk population – African Americans. Gratitude is associated with improvements in self-reported physical health and is mediated by psychological health and healthy behaviors (Hill et al., 2013), and predicts fewer physical health symptoms such as sleep disturbances, headaches, gastrointestinal problems and lower reported levels of perceived loneliness and stress (O'Connell & Killeen-Byrt, 2018; O'Connell et al., 2016). Furthermore, gratitude is culturally congruent with African Americans' spiritual practices suggesting that it is an unexamined, non-pharmacological means to effect self-care behavior change.

In this dissertation, my research findings have: 1) provided preliminary evidence on the mental and physical benefits of gratitude among CVD patients and identified gaps in the literature to suggest more evidence is needed on CVD outcomes; 2) provided a mechanism (self-efficacy) through which gratitude improves medication adherence in CVD patients; 3) established the psychometric rigor of a measure of dispositional gratitude (GQ-6) in African Americans at risk for CVD; 4) demonstrated that gratitude is positively correlated with positive

affect and spiritual well-being and negatively correlated with depressive symptoms in African Americans;

### **Limitations**

As with any dissertation, limitations must be acknowledged. In the first manuscript (aim #1), many of the studies reported in the state-of-the-art review were observational and occurred at one point in time. Four of the studies in this review were derived from the Gratitude Research in Acute Coronary Events Study, which may unduly weight our findings. The second manuscript (aim #2) was a secondary analysis of an existing data set with all the limitations inherent in this methodology. The sample consisted mainly of white men, and this may limit the generalizability of our findings to other more diverse groups. In addition, our findings were cross-sectional, and any causal inferences are limited by a lack of temporal precedence and experimental control. Lastly, in our final manuscript (aim #3), our sample was a convenience sample, which may lead to a selective sampling of adults, and all the instruments used in this dissertation were self-reported measures that introduced the potential for social desirability bias.

### **Future Direction of Research**

The present dissertation study sought to examine the effect of gratitude on CVD outcomes using mediators, medication adherence, and psychometric analysis of the GQ-6. Much research has explored and validated the theory of gratitude on well-being and physical health and the Broaden-and-Build theory (Fredrickson, 2004; Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Fredrickson & Joiner, 2018; Lavelock et al., 2016; Wood et al., 2010; Wood et al., 2009). However, to date, no research has attempted to apply these theories to African Americans at risk for CVD. Since there is a lack of evidence of gratitude and health behaviors, more studies are

needed to address this issue; especially in the African American population with medication nonadherence.

The burden of poor cardiovascular health (specifically HF and hypertension) remains high in the African American population (Carnethon et al., 2017). African Americans have the overall highest risk of developing HF and are hospitalized seven to eight times more often than whites (Bahrami et al., 2008; Davis, Liu, & Gibbons, 2003). Ethnic differences exist in HF self-care as well, including medication adherence (Artinian, Magnan, Sloan, & Lange, 2002; Woda, Belknap, Haglund, Sebern, & Lawrence, 2015). Similarly, hypertension disproportionately affects African Americans compared to whites and explained most of the racial gap in mortality (Carnethon et al., 2017). Findings demonstrated in our dissertation support evidence that gratitude influences self-efficacy, which may lead to improved medication adherence.

Future studies should aim at identifying if dispositional gratitude promotes better health behaviors such as medication adherence in African Americans living with CVD. For example, two research hypotheses are suggested from this dissertation. In the first hypothesis, self-efficacy mediates the relationship between gratitude and medication adherence in African American asymptomatic HF patients, and in the second hypothesis, a gratitude intervention will result in greater medication adherence (proximally) and blood pressure reduction (distally) compared with patient education alone over six months in a sample of African Americans.

Exploring novel ways to approach this patient-centered problem using positive psychological attributes such as gratitude may lead to improved medication adherence especially among African Americans. Improving dispositional gratitude as a cognitive-affective process may improve self-efficacy, thereby improving medication adherence resulting in improved cardiovascular health and reduction in overall cardiovascular risk. Testing each of these tenants

will advance the science of gratitude and will move cardiovascular research forward through the promotion of positive psychological health to reduce disease and disparities among African Americans.

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## **APPENDICES**

## Appendix A: Institutional Review Board Approval for Chapter Four



RESEARCH INTEGRITY AND COMPLIANCE  
Institutional Review Boards, FWA No. 00001669  
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799  
(813) 974-5638 • FAX (813) 974-7091

June 5, 2019

Lakeshia Cousin  
College of Nursing  
12901 Bruce B Downs Blvd  
MDC22  
Tampa, FL 33612

RE: **Exempt Certification**

IRB#: Pro00040664

Title: The Grateful Heart and Soul Study: A Psychometric Analysis of the Gratitude Questionnaire (GQ-6) in African Americans at Risk for Heart Disease.

Dear Ms. Cousin:

On 6/5/2019, the Institutional Review Board (IRB) determined that your research meets criteria for exemption from the federal regulations as outlined by 45 CFR 46.104(d):

(2) Research that only includes interactions involving educational tests(cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:(i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects; (ii) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or (iii) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 45 CFR 46.111(a)(7).

As the principal investigator for this study, it is your responsibility to ensure that this research is conducted as outlined in your application and consistent with the ethical principles outlined in the Belmont Report and with USF HRPP policies and procedures.

Please note, as per USF HRPP Policy, once the exempt determination is made, the application is closed in ARC. This does not limit your ability to conduct the research. Any proposed or anticipated change to the study design that was previously declared exempt from IRB oversight



must be submitted to the IRB as a new study prior to initiation of the change. However, administrative changes, including changes in research personnel, do not warrant an Amendment or new application.

We appreciate your dedication to the ethical conduct of human subjects research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kristen Salomon', followed by a horizontal line.

Kristen Salomon, Ph.D., Chairperson  
USF Institutional Review Board

## Appendix B: Recruitment Flyer for the Grateful Heart and Soul Study

USF IRB #Pro00040664



### **GRATEFUL HEART & SOUL STUDY** **MEASURING GRATITUDE IN AFRICAN AMERICANS** **AT RISK FOR HEART DISEASE**

The purpose of this study is to test a widely used survey, the Gratitude Questionnaire-6 (GQ-6), in African Americans at risk for heart disease.

To qualify for this survey, you must be 18 years or older, African American and meet ONE of the following criteria:

- ✓ High blood pressure
- ✓ High cholesterol
- ✓ Diabetes/prediabetes
- ✓ Smoking
- ✓ Overweight
- ✓ Family history of early heart disease

Link: [https://usf.az1.qualtrics.com/jfe/form/SV\\_9Fzede6PEsbi1m](https://usf.az1.qualtrics.com/jfe/form/SV_9Fzede6PEsbi1m)



Scan here to take the survey!



**UNIVERSITY OF  
SOUTH FLORIDA**  
A PREEMINENT RESEARCH UNIVERSITY

**How do you define  
gratitude?**

---

**Are you 18 years or  
older?**

---

**Are you African  
American and at risk  
for heart disease?**

---

**Take this 15-minute  
survey!**

---

**Your Opinion  
Matters!**



**Lakeshia Cousin, MS, APRN**  
PhD Candidate  
Principal Investigator  
[lcousin@health.usf.edu](mailto:lcousin@health.usf.edu)

## **ABOUT THE AUTHOR**

Lakeshia Cousin is a native of St. Petersburg, Florida. She is a second-career nurse and initially received a Bachelor of Science degree in Business Administration from Florida A&M University and worked in corporate finance before transitioning to her destined career as a Nurse Scientist. Mrs. Cousin received a Bachelor of Science degree in Nursing and a Master of Science in Adult-Gerontology Primary Care Nursing, both from the University of South Florida College of Nursing. She is also a board-certified Adult-Gerontology Primary Care Nurse Practitioner with six years of nursing experience.

During the Ph.D. program, she received the prestigious McKnight Doctoral Fellowship and studied the role of contextual factors such as gratitude, on cardiovascular disease self-care. Mrs. Cousin co-authored multiple publications and presented at various research conferences and awarded numerous awards during her nursing career, including the Summer Genetics Institute Fellowship at the National Institute of Nursing Research and the International Rising Stars of Scholarship and Research Award at the Sigma Theta Tau International (Sigma) 30th International Conference in Calgary, Alberta, Canada. Also, she has served as a Clinical Nurse Researcher at the University of South Florida College of Nursing for three years in oncology research. Mrs. Cousin will begin her postdoctoral career in training as a Behavioral Oncology Postdoctoral Fellow at Moffitt Cancer Center in Tampa, Florida.