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Diabetes Self-Management Problems of Older, Low-Income African American Women

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Walden University
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Abstract

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Dissertation Proposal Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Type 2 diabetes disproportionately affects low-income African American women, age 50 and older: 30% to 40% of this population has this chronic disease. Two significant factors affecting poor diabetes practice adherence are food insecurity and depression; another is obesity. The purpose of this quantitative correlational study was to determine if either food insecurity or depression significantly affect Type 2 diabetes self-management practices; and/or if food insecurity significantly influences practice adherence indirectly, through the mediator of depression, while controlling for obesity. The research questions were aligned with the theoretical pathways posited in Matthews's reserve capacity model (RCM) and used the most current national data from the 2015 BRFSS dataset. The results of the linear regression models indicated that as hypothesized, depression was significantly associated with poor practice adherence; contrary to hypotheses, food insecurity and obesity were not. The lack of significance between food insecurity and depression eliminated the need to test for mediation. While correlational analyses revealed a significant association between obesity and depression, this relationship was no longer detected in linear regression analyses. An unanticipated finding was the significant relationship between education and Type 2 depression self-management practices, a relationship that maintained significance even with the entry of depression. Results from this study can inform the development of interventions aimed at enhancing Type 2 diabetes self-management practice adherence among low-income older African American women.

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Dedication

I would like to dedicate this reseach to my mother, siblings, and friends, whose encouragement and support insired me to endure during this academic milestone, and to the loving memories of my father, Hosie (HB) Day and sister, Nita Day. I miss both of you dearly.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

Type 2 diabetes presents significant health and mental health risks for low-income African American women, particularly those aged 50 and older (Strings, Ranchold, Laraia, & Nuru-Jeter, 2016). This population is at increased risk for developing severe diabetes-related health complications due to poor and inconsistent diabetes self-management practices (Centers for Disease Control and Prevention [CDC], 2015; Gucciardi, Chan, Manuel, & Sidani, 2013; Gucciardi, Vahabi, Norris, Del Monte, & Farnum, 2014; Hartman et al., 2015). Diabetes self-management practices are self-care behaviors (e.g., regular exercise, daily glucose monitoring, checking feet for sores or irritations, and having had diabetes self-management education) that help to manage diabetes, reduce the physical and psychological effects of Type 2 diabetes, and can ultimately improve quality of life (Chen, Cheadle, Johnson, & Duran, 2014; Sharma, 2017). Researchers studying health disparities have increasingly recognized the importance of evidence-based diabetes self-management interventions as essential to the health of this population (Springfield et al., 2015). While over a decade of health disapirity empirical literature exists on the antecedents of poor or lack of diabetes self-management practices, empirical work examining the interplay between food insecurity, depression, and obesity on Type 2 diabetes self-management practices among low-income older African American women is markedly absent in the literature.

In this study, I utilized 2015 Behavioral Risk Factor Surveillance System (BRFSS) data from 350 African American women with Type 2 diabetes who had an annual income of $25,000 or less and were 50 years of age or older. The 2015 BRFSS dataset met all of the study data requirements: (a) a sample that was restricted to a certain age, income, and gender but needed to be of a size that was large enough to ensure sufficient power; (b) psychometrically sound

instruments of very specific yet diverse health constructs; and (c) a multi-item measure of Type 2 diabetes self-management scale, as opposed to a single item. Use of 2015 BRFSS data allowed for the examination of the relationships between (a) food insecurity and Type 2 diabetes self-management practices; (b) depression and Type 2 diabetes self-management practices; and (c) food insecurity, depression (as a mediator), and Type 2 diabetes self-management practices. The results of the study have the potential to inform and guide the creation and implementation of both grassroots and federal health promotion initiatives, leading to social changes that reduce health disparities in a very high risk and often overlooked population.

The purpose of this chapter is to provide a comprehensive yet concise overview of the study. The first section of the chapter is the background, which provides the empirical literature foundation for the study. The second and third sections of the chapter pertain to the public health problem that the study addressed and the purpose of the study, respectively. I will summarize the guiding theoretical framework of the study, Matthews's (2005) reserve capacity model (RCM). Sections subsequent to the theory concern the study research questions, nature of the study, and definitions of key terms. I will cite the study assumptions, scope and delimitations, limitations, and study significance. A summary section concludes the chapter.

Background

As a chronic illness, Type 2 diabetes prevents the body from properly metabolizing sugar due to its inadequate production or processing of insulin (CDC, 2015; National Diabetes Education Program [NDEP], 2015). Type 2 diabetes disproportionately affects African American older adult females, especially those of low-income status (Cheng et al., 2013; McNabb, Quinn, & Tobian, 2014). As of 2013, 25-30% of African American women ages 50 and older had Type 2 diabetes, twice the rate for African American males and Caucasian males and females

(McNabb et al., 2014). This rate increases to 40% for African American women ages 65 and older (McNabb et al., 2014). These statistics indicate that Type 2 diabetes and its management are significant issues for this vulnerable population.

The degree and severity of Type 2 diabetes-related health problems in low-income older adult African American females are striking when compared to same-age counterparts. In comparison to their low-income White peers, this population is more likely to have more diabetes complications, and these complications are likely to be more severe (Blaum et al., 2010; Gucciardi et al., 2014; Kerr et al., 2007; Ma et al., 2013). They are three times more likely than White females, ages 50 or older, to develop the diabetes-related health complications of retinopathy, peripheral neuropathy, and renal failure (American Psychological Association [APA], 2015). African American females are also more likely to develop more geriatric syndromes, including chronic pain and urinary incontinence, in comparison to their peers (Feil, Zhu, & Sultzer, 2012; Jack, Jack, & Hayes, 2012; Wilson et al., 2012; Zulman, Rosland, Choi, Langa, & Heisler, 2012). They are also at greater risk than their White and Asian peers of developing diabetes-related dementia (Karter et al., 2015).

This collection of issues frames coping as a priority. Many programs might help older adults manage their diabetes, including self-management (Cutrona et al., 2014), which can greatly enhance positive health outcomes and quality of life for the at-risk population (Jack, Liburd, Tucker, & Cockrell, 2014). Researchers have shown, however, that low-income African American older adult women rarely practice diabetes self-management, compared with their counterparts of other races (Cutrona et al., 2014; Gucciardi et al., 2013, 2014; Jack et al., 2012). In turn, the factors leading to this trend require more attention.

Past researchers have shown that contextual and individual factors both play a role in influencing diabetes self-management behaviors in this population (Cutrona et al., 2014; Franklin et al., 2012; Gucciardi et al., 2013, 2014; Hewitt et al., 2011; Jack et al., 2012, 2014; Quirk et al., 2013; Tsenkova, Albert, Georgiades, & Ryff, 2012; Zahodne, Nowinksi, Gershon, & Manly, 2014). One significant factor is food insecurity, which is the lack of access to affordable, high-quality food necessary for an active and healthy life without reduced or disrupted eating behaviors (Seligman, Davis, Schillinger, & Wolf, 2010; Seligman, Jacobs, Lopez, Tschann, & Ferndandez, 2012). Another factor is depression. Often linked to obesity and poor health outcomes and more prevalent in African American older adult females than males, depression is an individual factor that can lead to poor self-management practices for diabetics (Blaum et al. 2010; Kerr et al., 2007; Kim, Kim, Cho, & Park, 2012; Zulman et al., 2012).

A third individual risk factor for poor diabetes self-management practices is overweight and obesity, which is frequently comorbid with not only food insecurity but also depression (Compton, 2014; Dipnall et al., 2015). The comorbidity of overweight/obesity with Type 2 diabetes can lead to ambiguous statistical results, a factor that has led to the methodological recommendation to statistically control for overweight/obesity, which was part of the methodology of the current study (Jack et al., 2012; Kerr et al., 2007). By controlling for overweight/obesity, researchers may create a clearer understanding of the relationships between food insecurity, depression, and diabetes self-management (Franklin et al., 2012).

In general, older African American low-income females are likely to perceive diabetes self-management practices as lacking in cultural relevance and importance (Bhattacharya, 2012; Quandt et al., 2013). Furthermore, this population tends to benefit from culturally congruent diabetes self-management interventions (Kong et al., 2014; Lancaster, Carter-Edwards, Grilo,

Shen, & Schoenthaler, 2014; Thompson, 2015; Timmons, 2015). Therefore, it is important to follow a guiding theoretical framework that is culturally sensitive and thus more meaningful, relevant, and applicable to the study sample and better suited to the development of culturally congruent health interventions (Matthews, 2005). As a result, I chose Matthews's (2005) reserve capacity model (RCM) as a guiding framework. The premise of RCM is that stress can indirectly influence health and health behavior outcomes by influencing one's reserve capacity—or ability to cope with the health problem(s)—and one's emotional state. In aligning with the RCM, the participants in the study were low-income or below 200% of the official poverty threshold (Roberts et al., 2014).

Advances in medical treatments and new medications can enhance health outcomes and quality of life for older adult African American women with Type 2 diabetes (APA, 2015; Gucciardi et al., 2014; Jack et al., 2012). Substantial public health campaigns have promoted self-management skills to reduce the severity of Type 2 diabetes and to prevent or delay the numerous unhealthy outcomes associated with it in African American populations and other ethnic groups most affected by health disparities (Gucciardi et al., 2014; Nguyen, Taylor, Peterson, & Chatters, 2013). Despite the public health advocacy efforts and educational interventions aimed at enhancing diabetes self-management practices, African American women over the age of 50 often experience an array of challenges in self-managing Type 2 diabetes (Gucciardi et al., 2013, 2014; McNabb et al., 2014; Musselman et al., 2014). When considered together and within the context of Type 2 diabetes, food insecurity, depression, and poor diabetes self-management practices can greatly reduce the quality of life of older adults who live in poverty (Ahn, Smith, Dickerson, & Ory, 2012; Nguyen et al., 2013). The researchers above provided the impetus for in-depth research on the above factors linked to the proliferation of

Type 2 diabetes in this population and clarifying the shortcomings of past diabetes self-management measures.

Problem Statement

The problem that I addressed in this study concerned Type 2 diabetes self-management challenges experienced by low-income older African American women that ultimately contributed to the development of diverse and severe diabetes-related health problems (Nguyen et al., 2013). With the increasing likelihood of those 65 living another 20 years, and increasing numbers of Americans 50 years or older—both of which place financial burdens on the healthcare industry and the individuals' quality of life—gerontology, psychology, and public health researchers have advocated for increased studies of chronic health issues among older adults, especially those of color (Hinrichsen, 2010; Hurd, Martorell, Delavande, Mullen, & Langa, 2013; Mullings, 2014). Studies of African American older adults have examined relationships between food insecurity and depression (Black, Johnson, & VanHoose, 2015; Ivers & Cullen, 2011; Quirk et al., 2013), depression and diabetes self-management practices (Baum et al., 2010; Kerr et al., 2007), and food insecurity and diabetes self-management practices (Billimek & Sorkin, 2012; Gucciardi et al., 2013, 2014; Seligman et al., 2010, 2012).

Despite these efforts, there has not been a comprehensive examination of whether food insecurity and depression are related to diabetes self-management practices, controlling for shared variance, and if depression mediates between food insecurity and diabetes self-management practices in low-income African American older adult females. Furthermore, scholars examining diabetes self-management practices have tended to focus on one type of practice. Glycemic control has received much of the empirical attention, while the body of research has not utilized more psychometrically sound scale measurements that capture the full

construct of diabetes self-management practices (Musselman et al., 2014; Papelbaum et al., 2011; Seligman et al., 2012). In addition, a lack of research on the comorbidity of food insecurity and depression may have hampered the effectiveness of self-management interventions.

Purpose

The purpose of this quantitative study was two-fold. The first purpose was to study whether food insecurity and depression are significantly associated with diabetes self-management practices in the high-risk group of African American older adult females. The second purpose was to extend the body of public health literature to determine if depression acts as a mediator between food insecurity and the diabetes self-management practices in this same population. Because of the often significant associations between overweight/obesity and Type 2 diabetes, diabetes self-management practices, and food insecurity (Allison, Edlen-Nezin, & Clay-Williams, 2014; Drong, Lindgren, & McCarthy, 2012), I statistically controlled for overweight/obesity as a covariate.

Research Questions and Hypotheses

To investigate these lines of inquiry, I posed the following research questions and accompanying hypotheses:

RQ1. Does household food insecurity, as measured by the BRFSS food insecurity item, significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI?

$H1_o$. Household food insecurity, as measured by the BRFSS food insecurity item, does not significantly relate to diabetes self-management practices, as measured by the BRFSS

DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

$H1_a$. Household food insecurity, as measured by the BRFSS food insecurity item, does significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

RQ2. Does depression, as measured by the BRFSS Psychological Distress Scale (PDS), significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI?

$H2_o$. Depression, as measured by the BRFSS PDS, does not significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

$H2_a$. Depression, as measured by the BRFSS PDS, does significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

RQ3. Does depression, as measured by the BRFSS PDS, significantly mediate between household food insecurity, as measured by the BRFSS food insecurity item, and diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI?

$H3_o$. Depression, as measured by the BRFSS PDS, does not significantly mediate between household food insecurity, as measured by the BRFSS food insecurity item, and diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

$H3_a$. Depression, as measured by the BRFSS PDS, does significantly mediate between household food insecurity, as measured by the BRFSS food insecurity item and diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

Conceptual Framework

The conceptual framework that guided this study was the reserve capacity model (RCM). Matthews (2005) developed the RCM as a "broad organizing framework" to explain health disparities among ethnic minority populations via associations between low SES-related stress, psychosocial variables, and health outcomes (p. 783). Importantly, Matthews posited that the RCM provides a sound framework in which to study psychosocial mediators. According to the RCM, low socioeconomic status can impact health outcomes directly as well as indirectly via influences and interactions with stressors, reserve capacities, emotional and cognitive factors, and intermediate behaviors (Matthews, 2005). Matthews also postulated that low SES could frequently incur numerous chronic stressors, which can, over time, thwart one's reserve capacities—or personal resources that could buffer stress.

The majority of researchers that have utilized the RCM with samples of African American women have primarily focused on the involvement of stress and psychosocial processes with regard to cardiovascular risk and the development of coronary heart disease

(Bennett, Buchanan, Jones, & Spertus, 2014; Everson-Rose et al., 2006; Gebreab et al., 2012; Ghaed & Gallo, 2007; Myers, 2009). I will dicuss this literature in more detail in Chapter 2. Few scholars have utilized Matthews's (2005) RCM to explain processes related to diabetes self-management practices. To date, no researchers have explored food insecurity, a euphemism for low SES as well as stress, which can wear down one's buffering abilities, through the RCM; however, food insecurity can result in poor emotional and cognitive functioning and even poor health outcomes (Matthews & Gallo, 2011). In addition, researchers have identified depression as an emotional factor that can lead to poor health management behaviors (Matthews & Gallo, 2011; Zahodne et al., 2014). The dependent variable of diabetes self-management practices represents the health outcomes factor.

The theory tested in this study was Matthews's (2005) RCM, a health disparity theory that posits that stress resulting from poverty and stress-related emotions and cognitions, such as those that result from depression, can directly influence health and health behaviors. I utilized a theoretically valid sample of African American older adult women of low-income status. The first and second research questions were aligned to address the direct associations posited by the RCM by examining if the independent variables of food insecurity, an indicator of poverty, and depression, a stress-related emotional and cognitive state, are significantly associated with the dependent variable of diabetes self-management practices, a health behavior. I structured the third research question to test the indirect associations postulated in the RCM, by assessing if food insecurity, an indicator of poverty, was significantly associated with depression, treated as a mediator, which significantly influences diabetes self-management practices. In general, the unique aspect of this study was determining whether depression was more theoretically sound as a direct predictor of diabetes self-management practices (along with food insecurity) or as a

mediator between food insecurity and diabetes self-management practices. As obesity has been consistently associated with the development of Type 2 diabetes, depression, and diabetes self-management, and can theoretically represent a health behavior outcome, it will be controlled for as a covariate. I used 2013 archival data from the BRFSS dataset. I performed advance statistical analyses, specifically hierarchical linear regression methods that involve mediation, to specifically explore the relationships posited in Matthews's (2005) RCM.

Nature of the Study

In this quantitative study, I utilized a correlational research design guided by the scientific method (Bowling, 2014). A quantitative approach was appropriate for this study because (a) research hypotheses have been posed; (b) data were numerical and came from self-report surveys shown to be valid and reliable; and (c) hypothesis testing entailed the use of inferential parametric statistics (Bowling, 2014). The research design was correlational, as I examined associations between naturally occurring variables (Bowling, 2014). The correlational research design was distinctly different from correlational statistics; the correlational research design refers to studies that examine relationships between variables, often complex relationships such a mediating and moderating effects (Bowling, 2014). Complex correlational research designs often utilize hierarchical linear regression analyses for hypothesis testing, which I used in this study, as described in greater depth in Chapter 3.

Unique to this study, I used a theoretically appropriate group (African American older adult females with Type 2 diabetes) to test Matthews's (2005) RCM. Within this group of participants, I measured food insecurity, the independent variable, via the BRFSS indicator of household food insecurity, "How often in the past 12 months would you say you were worried and stressed about having enough money to buy nutritious meals?" I measured the independent

and mediating variable of depression using the BRFSS PDS. The dependent variable in this study was diabetes self-management practices, which I measured using the BRFSS DSMS scale. Because obesity has been consistently associated with the development of Type 2 diabetes, depression, and diabetes self-management (Allison et al., 2014; Gucciardi et al., 2013; Kerr et al., 2007; Zulman et al., 2012), I controlled for obesity as a covariate. BMI was the measure of overweight/obesity. I structured the research questions so that hierarchical linear regression (HLR) analyses, using SPSS 23.0 complex sampling techniques, are the most appropriate statistics. I conducted mediation for regression following the recommendations of Baron and Kenny (1986) and in accordance with complex sampling techniques outlined by the CDC (2014a).

Definitions

Depression. Depression is a medical illness that negatively influences individuals' emotional, physical, and cognitive states. The primary symptoms of depression are feelings of extreme sadness and marked loss of interest in activities (APA, 2014).

Diabetes self-management. These include self-care behaviors (e.g., regular exercise, daily glucose monitoring, checking feet for sores or irritations, and having had diabetes self-management education) that help to manage diabetes, reduce the physical and psychological effects of Type 2 diabetes, and can ultimately improve quality of life (Chen et al., 2014; Sharma, 2017).

Food insecurity. The United States Department of Agriculture (2014) defined food insecurity as the "limited or uncertain availability of nutritionally adequate and safe foods or limited ability to acquire acceptable foods in socially acceptable ways" (para. 3).

Low-income. The federal government has defined this condition as being below 200% of the official poverty threshold, as indicated by an annual household income of less than $25,000 for a family of four (Roberts et al., 2014).

Overweight/Obesity. The CDC (2014b) defined obesity as having a BMI that is 25 kg/m2 or greater. BMI is calculated by weight/height x 703. The BRFSS uses BMI as an indicator of overweight/obesity (CDC, 2014b).

Assumptions

I utilized 2015 BRFSS archival data in this study. These data are in the public domain. The lack of my involvement in data collection enhanced my ability to maintain objectivity. Furthermore, I established *a priori* hypotheses in accordance with the scientific method. The study required the use of advanced statistical analyses (i.e., hierarchical linear regression) to draw more objective conclusions, as opposed to interviews or focus groups, which might increase subjectivity on the part of the investigator (Bowling, 2014).

Methodological assumptions typically apply to recruitment and data collection processes (Bowling, 2014). One methodological assumption was that the sample of low-income African American older adult females in the BRFSS was representative of the population. The BRFSS study designers utilized a multi-stage probability sample, which increased the likelihood that the sample was representative of the population (CDC, 2014a). As such, generalizations can be made about the population of African American older adult females in America. Another methodological assumption was that participants answered truthfully and honestly on survey questions. While BRFSS data are self-reported, the data are comprehensively reviewed, analyzed, and adjusted for unusual responses, and data are weighted to represent the population of adults, ages 50 and older, in America (CDC, 2014a). Based on the complex procedures

involved in data collection and cleaning, it was likely that untruthful responses were controlled for and the data removed from the dataset. Another methodological assumption was that participants gave informed consent. The BRFSS website provides documentation of the IRB and informed consent procedures and memoranda that no individual identifiers are revealed and that the data have been purged of any identifying information.

Scope and Delimitations

The study was limited to low-income African American females, ages 50 and older, with Type 2 diabetes as collected in the BRFSS dataset. I used data from 2014, the most recent data, in this study. I selected the participants based on low-income status or below 200% of the office poverty threshold, indicated by an annual household income of less than $25,000 (Roberts et al., 2014). I chose this specific sample due to (a) the high rates of Type 2 diabetes, food insecurity, depression, and obesity observed in this group; (b) the relevance of this sample to the scope of Matthews's (2005) reserve capacity model (RCM); and (c) the increasing emphasis on the development of health interventions for elderly populations in America (Kaiser Family Foundation, 2012). This study was also limited to self-reported data obtained from the HRS, which precludes the use of an experimental research design and allows only for the testing of associations between study variables. The use of a probability sample did allow for the generalizability of results to other samples of African American females ages 50 and older with Type 2 diabetes. Results, however, cannot be generalized to non-African American females or males ages 50 and older, with Type 2 diabetes, nor to African American females who do not have Type 2 diabetes.

Limitations

Some study limitations can be observed in the measurement of variables and data analysis. For example, the BRFSS measure of food insecurity was a single item. The BRFSS instruments are annually reviewed by a group of researchers to ensure measurement validity and reliability (CDC, 2014b), and the reliability and validity of the BRFSS measures have most recently been supported by a systematic review of the research that used BRFSS data by Peirannunzi, Hu, and Balluz (2013). Thus, while I was limited to the BRFSS instruments, there is a documented history that the instruments are valid and reliable (CDC, 2014b). To account for this limitation, I tested the inter-item reliability of the scaled instruments of depression and diabetes self-management practices by calculating Cronbach's alphas. A final limitation was the use of a quantitative correlational research design: as the design was not experimental, cause-and-effect cannot be determined (Bowling, 2014).

Significance

There are numerous contributions the study might make to the existing public health research on African American health disparities, food insecurity, depression, and diabetes self-management practices. Researchers studying African American health disparities have tended to focus on the general adult African American population (Bhattarcharya, 2012), with little attention given to low-income African American older adult females. The results of this study may increase awareness of food insecurity, depression, and diabetes self-management practices within this high-risk population. While obesity was a covariate in this study, results might also increase awareness of obesity rates among African American older adult females (Allison et al., 2014; Wilson et al., 2012). Moreover, controlling for obesity may result in a better understanding of the relationships between food insecurity, depression, and diabetes self-management practices

(Franklin et al., 2012; Ivers & Cullen, 2011). The increased awareness of these issues can lead to culturally congruent health interventions for low-income older adult African American females aimed at decreasing rates of Type 2 diabetes and depression and enhancing diabetes self-management practices (Jack et al., 2012). The increased awareness of these issues might also lead to culturally congruent health interventions for low-income older adult African American females that might address the issue of food insecurity among this population. It may also increase awareness of issues that have policy implications, especially as they relate to services provided by Medicaid, which has developed initiatives for the management of Type 2 diabetes among individuals over 65 (Kaiser Family Foundation, 2012). The development of such programs and initiatives can ultimately lead to the reduction of healthcare costs for the treatment of diabetes, which increased from $174 billion in 2007 to $245 billion in 2012 (ADA, 2014; NDEP, 2015).

Summary

The purpose of this chapter was to introduce and elaborate upon the study topic and premise, including the research questions and hypotheses, the research design, and the conceptual framework. The increase in the self-management of Type diabetes promotes positive social change in the quality of care and the reduction in health care costs. A daily regimen of education and support provide the essentials of managing Type 2 diabetes (Power et al., 2015). Hence, it is critical to aid individuals diagnosed with diabetes and prevent additional health problems associated with the disease. The guiding conceptual model and relevant literature are further discussed in Chapter 2.

Chapter 2: Literature Review

In Chapter 2, the review of current literature, I will present an exhaustive overview of the literature related to Type 2 diabetes and health-related problems in low-income older adult African American females. This chapter is divided into six sub-sections. In the first sub-section, I will describe the search strategy used to cull the needed peer-reviewed journal articles. The second sub-section covers the Reserve Capacity Model that guides this research. In the third sub-section, I will provide the underpinnings for Type 2 diabetes self-management practices. The fourth, fifth, and sixth sub-sections include the review of literature regarding the relationships between Type 2 diabetes self-management and depression, food insecurity, and obesity, respectively.

In comparison to their low-income White peers, African American women are likelier to have more diabetes complications, and these complications are likely to be more severe (Blaum et al., 2010; Gucciardi et al., 2014; Kerr et al., 2007; Ma et al., 2013). African American women are three times more likely than White females aged 50 or older to develop the diabetes-related health complications of retinopathy, peripheral neuropathy, and renal failure (American Psychological Association [APA], 2015). African American women are also more likely to develop geriatric syndromes, including chronic pain and urinary incontinence, in comparison to their peers (Feil et al., 2012; Jack et al., 2012; Wilson et al., 2012; Zulman et al., 2012). They are also at greater risk than their White and Asian peers of developing diabetes-related dementia (Karter et al., 2015). These trends illustrate that Black women face more formidable challenges related to Type 2 diabetes than the rest of the population.

In general, beyond facing more severe complications, African Americans are also at significant risk for poor management of Type 2 diabetes (NDEP, 2015). This risk increases for

African American women who are age 50 or older, live in poverty, are food-insecure, and have depression (Bengle et al., 2010; Cutrona et al., 2014; Rovner, Castin, & Harris, 2013; Seligman et al., 2010, 2012). Older adult African American women with Type 2 diabetes are also likely to be obese, a condition associated with elevated levels of depression, food insecurity, and poor management of Type 2 diabetes (Allison et al., 2014; Drong et al., 2012; Kulie et al., 2011). Self-management for diabetes is a critical element of self-care and is characterized by behavior aimed at reducing the physical and psychological effects of Type 2 diabetes and improving quality of life (Gucciardi et al., 2011, 2012, 2014; Sharma, 2017). The most common self-management practices examined in the literature are glycemic control and medication adherence (Nguyen et al., 2013); other practices include engaging in a regular fitness/exercise schedule, following a diabetic meal plan, and following healthy foot care practices (NDEP, 2015).

Women who are older are also more at risk than their male peers for developing health problems associated with Type 2 diabetes (Jack et al., 2012; Wilson et al., 2012). While African American females age 65 can expect to live another 15 years, those with Type 2 diabetes are likely to have a poor quality of life during these remaining years (Kulie et al., 2011; United States Administration on Aging [USAA], 2014). Neglecting to consistently engage in self-care practices to manage Type 2 diabetes, which can potentially alleviate or prevent health problems associated with this disease, can ultimately increase healthcare costs for the individual and society as a whole (Myers, 2009). The health, quality of life, and financial concerns for this demographic created the impetus for this study. To this end, the results of this research should contribute to the body of literature on health disparities of African Americans: physical, mental, and behavioral. The study had two goals: to learn whether food insecurity and depression are significantly related to Type 2 diabetes self-management practices and to determine if depression

mediates between food insecurity and diabetes self-management practices of this group, controlling for obesity. In this study, I utilized the most recent archival data from the 2014 Behavioral Risk Factor Surveillance System (BRFSS). I chose this dataset because it utilized a national sample of African American women aged 50 or older with Type 2 diabetes who live in poverty, and it contained items that measure diabetes self-management practices, obesity, depression, and food insecurity.

Literature Search Strategy

The literature search for this study centered on peer-reviewed journal articles in the fields of gerontology, healthcare, public health, epidemiology, sociology, and psychology. I first limited the search to studies published between 2011 and 2015. However, there were few available studies published on the selected population during this period. Therefore, the time period was expanded to include research published between 2008 and 2015. The search for articles initiated with the use of two web portals, ProQuest and EbscoHost, and the databases contained in each. The primary ProQuest databases used were Nursing and Allied Health Sources, Health Management, and Research Library: Health & Medicine. The primary EbscoHost databases that I utilized for the review and selection of peer-reviewed articles were MEDLINE, PsycARTICLES, PsychINFO, and SocINDEX. I also retrieved numerous peer-reviewed journal articles using the Google Scholar search engine.

The search for relevant peer-reviewed articles involved entering individual and combinations of terms relevant to the current study. I entered numerous combinations of the following terms: *gerontology, biodemography, cultural psychology, older adults, chronic disease, African American females ages 50 and older, women's' health, poverty, low-income status, low socioeconomic status, Type 2 diabetes, diabetes mellitus, diabetes self-management*

practices, evidence-based diabetes self-management interventions, diabetes health complications, glycemic control, metabolic control, diabetes medication nonadherence, physical activity, cultural congruence, quality of life, food, food insecurity, depression, dysthymia, clinical depression, internalizing symptoms, mental health, physical health, obesity, overweight, comorbidity of overweight/obesity with Type 2 diabetes, health disparities, older adult women of color, and *Behavioral Risk Factor Surveillance System (BRFSS).*

Searching the literature was an iterative process. The initial search yielded a total of 112 peer-reviewed research article records. The initial search did not find any additional records outside of peer-reviewed journals. Of these 112 articles, six were duplicates. Of the remaining articles, 20 were not appropriate for the following four reasons:

1. They were empirical studies (n = 9) conducted with samples not relevant to the current study (e.g., young women, men, not African American, not a low SES sample, without Type 2 diabetes).
2. They were evaluation studies (n = 7) testing the efficacy of interventions for individuals with or at risk for developing Type 2 diabetes.
3. They were research studies (n = 3) conducted outside of the United States.
4. One was a commentary on published literature.

I organized the remaining 86 full-text articles for potential inclusion by topic (i.e., depression, food insecurity, obesity, and associations between these constructs and Type 2 diabetes management practices). I excluded two studies on Type diabetes self-management practices among young adult African American women who were pregnant; pregnant woman may experience adverse consequences. A total of 84 studies were relevant for inclusion in the literature review.

Conceptual Framework

In the following section, I will highlight the conceptual component that constitutes the framework for the current study. I selected Matthews's reserve capacity model to guide this research. This section provides a general overview of the reserve capacity model and allocates specific attention to its role in health outcome research and intervening factors in health outcomes including stressors, reserve capabilities, emotions and cognitions, and physiological intermediaries.

Reserve Capacity Model

Matthews's (2005) reserve capacity model (RCM) guided this study because it is one of few to provide specific pathways as to how low SES influences the stress activation process and reduces coping mechanisms (or reserve capacities) that would, in turn, impact health outcomes (Liu, 2013). The RCM (see Appendix A) is a complex health outcome model linking psychobiological pathways between low socioeconomic status (SES) and health outcomes (Matthews, 2005). SES can impact health outcomes directly as well as indirectly via influences and interactions with stressors, reserve capacities, emotional and cognitive factors, and intermediate behaviors (Matthews & Gallo, 2011). Matthews (2005) argued that the empirical testing of the RCM should meet three conditions: (a) SES should be related to at least one of the mediating variables; (b) the mediating variable should be directly linked to the heath outcome variable; and (c) when entering the mediating factor into a statistical model, the linkage between SES and the health outcome should be reduced.

Matthews and Gallo (2011) postulated that low SES could frequently incur numerous chronic stressors, which can, over time, thwart one's reserve capacities--or personal resources "that can otherwise buffer stress" (p. 388). Chronic stress due to low SES factors can wear down

one's buffering abilities, which can result in poor emotional and cognitive functioning and poor health outcomes (Matthews & Gallo, 2011). Researchers have identified depression as a primary intrapersonal reserve capacity factor that can lead to decreased health behavior, including health management behavior (Matthews & Gallo, 2011; Zahodne et al., 2014).

The Role of Health Outcomes in the RCM

Gallo, Cooper-Patrick, and Lesikar (1998) proposed that the RCM represented a model of health disparities "and the pathways that maintain and reinforce them" (p. 4). As the intended use of the RCM was to understand disparities in health outcomes, the health outcome construct was intentionally broad to allow for the examination of numerous outcomes (Matthews, 2005; Matthews & Gallo, 2011). Health outcomes included mortality and morbidity and most studies guided by the RCM have utilized these two types of health outcomes (Matthews et al., 2011). In the Matthews et al. (2010) review of the RCM literature, the authors selected mortality as the health outcome under examination in slightly less than a quarter (five or 23.8%) of the 21 studies. Of the remaining 16 studies that examined morbidity, cardiovascular disease was the health outcome in slightly over half of them. Metabolic syndrome was the health outcome for five studies. Other health outcomes relevant to the RCM are perceived health and health quality of life, unhealthy behaviors and health problems, and health practices related to a chronic health condition (Matthews & Gallo, 2011). Researchers have yet to use RCM to examine the relationship between depression, food insecurity, and diabetes.

Intervening Factors of the RCM

The RCM is one of few mediational models that utilize SES as the independent variable leading to both psychological and physiological factors (Matthews, 2005). The intervening

factors between SES and health outcomes are (a) stress, (b) reserve capacities, (c) emotional and cognitive factors, and (d) physiological intermediaries (Matthews, 2005). While the RCM is constructed so that the intervening factors are either present or absent, the core assumption of the RCM is that low SES leads to increased levels of stress, a reduced number of reserve capacities, negative emotions (e.g., depression, anxiety, hostility), negative cognition (rumination, self-blame), and increased physical and physiological strain and damage. All theoretical constructs were informed by prior theory and research, except reserve capacities. The RCM constructs are presented in Table 1 and discussed in the following sections.

Table 1

Reserve Capacity Model Constructs (RCM; Matthews, 2005)

RCM construct	Matthews's (2005) definitions	Direct links (from)	Direct links (to)
Stressors	Threatening, negative or demanding experiences	SES	Reserve capacities Emotions/Cognitions Physiological intermediaries
Reserve capacities	Tangible, interpersonal, and intrapersonal resources	SES	Stressors Emotions/Cognitions Physiological intermediaries
Emotions and cognitions	Psychological and cognitive states of mind	Stressors Reserve capacities	Physiological intermediaries
Physiological intermediaries	Precursors to poor or good health	Stressors Reserve capacities Emotions/cognitions	Health outcomes

Stressors. Stress, according to the RCM model, primarily pertains to the increased likelihood of experiencing threatening events--being exposed to stressors (Matthews, 2005). The presence/absence of stressors can be defined in numerous ways, as negative versus positive life events; lack of/presence of chronic or acute experiences; and increased rather than reduced demands or strains (Matthews, 2005).

Reserve capacities. Reserve capacities are resources or "generic protective influence(s)," which are influenced by low SES and the presence of stressors (Gallo et al., 1998, p. 388). There are three types of reserve capacities: (a) tangible, (b) interpersonal, and (c) intrapersonal (Matthews et al., 2008). Tangible research capacities include resources needed to function such as financial support, food, shelter, and clothing (Gallo et al., 1998; Matthews et al., 2008). Interpersonal reserve capacities pertain to social resources, most frequently as social support (Matthews et al., 2008). Intrapersonal reserve capacities coping mechanisms as well as intrapsychic factors related to adaptive coping, such as resilience, mastery, optimism, and self-esteem, and self-efficacy (Matthews et al., 2008). As reserve capacities "represent a resource (or lack thereof)," they can be operationalized as being present (social support) or absent (social conflict; Gallo et al., 1998; Matthews et al., 2005).

Emotions and cognitions. In the RCM, Matthews (2005) did not identify specific emotions and cognitions, as the importance of these variables in the model were as outcomes of low SES. According to Matthews, individuals' psychological and cognitive states of mind are influenced by low SES both directly and indirectly, through increased stressors and reduced reserve capacities (Matthews, 2005). Specifically, low SES can result in exposure to a higher number of stressors and the loss of tangle, interpersonal, and intrapersonal resources, which can lead to negative emotions (e.g., depression, anger, anxiety) and cognitions (e.g., schemas, attributions; Matthews, 2005).

Physiological intermediaries. The RCM depicts physiological intermediaries as changes in homeostasis and/or physical functioning that elevate the likelihood of negative health outcomes; they are the precursors to poor health (Matthews, 2005). Physiological intermediaries include changes in behavior, activity levels, mood, diet, physical activity, sleep, and immune and

metabolic functioning (Matthews, 2005). Matthews argued that low SES influences these physical and physiological changes indirectly, through elevated levels of stress and reduced reserve capacities. Stressors and reduced reserved capacities influence physical and physiological intermediaries directly and indirectly, by leading to negative emotions and cognitions, and directly led to health outcomes (Matthews, 2005).

Literature Review Related to Key Variables

A range of studies have been completed on the key variables of this research. In the following section, I will review pertinent areas of this research as they pertain to these variables. To begin, I will explore the reserve capacity model in greater depth and present its application in this study. Next, I will review influentiial research on the self-management of Type 2 diabetes, depression, food insecurity, and obesity.

Reserve Capacity Model

The most comprehensive body of work to date on the RCM has been the review performed by Matthews et al. (2008) of 21 studies that utilized the RCM. The health outcomes examined in nine of the studies varied. In four of these studies, the outcome was mortality, three had as an outcome metabolic disease, and two examined cardiovascular disease outcomes such as stroke and coronary artery disease (Matthews et al., 2008). The reviewed researchers measured stress was as either life events or perceived stress in seven; of the remaining two, one utilized five measures of stress, and the other study assessed childhood stress recalled by adults (Matthews et al., 2008). Researchers in nine studies measured SES as annual household income and/or education level (Matthews et al., 2008).

Results from five studies showed that stress did not significantly mediate the relationship between low SES and health outcomes, while four showed significance (Matthews et al., 2008).

Three also showed no significant linkages between low SES and health outcomes (Matthews et al., 2008). Results from the study by Gallo et al. (1998) showed a significant relationship between high SES and coronary artery disease. High SES was also significantly associated with increased levels of stress, depression, and anxiety in the Gallo et al. study. Although results showed that depression and anxiety mediated between high SES and increased risk of coronary artery diseases, stress did not have the same effect (Gallo et al., 1998). In general, it was difficult to draw clear conclusions from the Gallo et al. study, as the participants were all women. While they were age 67 and older—similar to the participants in the current study—90% were White. Moreover, the researchers measured SES by education level and not income, which suggested that education rather than SES was the factor related to coronary artery disease, stress, depression, and anxiety.

The 12 studies of additional intervening factors as potential mediators between SES and health outcomes operationalized the intervening factors in a variety of ways such as aggregate negative emotions, anxiety, and hostility. The researchers of eight studies assessed the mediational effects of depression or the control of depression between SES and health outcomes (Matthews et al., 2008). Health outcomes greatly varied across studies, but researchers in seven did examine a type of cardiovascular disease (Matthews et al., 2008). Of the remaining five studies, two examined metabolic syndrome as the health outcome; vulnerability to infectious disease was the health outcome in one study; self-reported chronic health problems were the outcomes in another, and mortality in the last (Matthews et al., 2008). Similar to the nine studies that assessed only the mediating effects of stress between SES and health outcomes, SES was most commonly operationalized as education or income level. Results from the 12 studies were equivocal, as three showed no mediation effects, regardless of how the intervening variable was

operationally defined. In a study by Nabi et al. (2008), hostility mediated between SES and mortality for men but not for women. Depression did mediate between SES and health outcomes, but only when SES was assessed as the level of education. Overall, the literature did not provide substantial support for Matthews's (2005) RCM.

In light of the above research, I employed the RCM in the current study in novel ways (See Figure 1). Type 2 diabetes was the health condition, one that has not been comprehensively addressed in RCM literature. The independent variable of food insecurity, a lack of a resource, acted as a *reserve capacity* factor (Matthews, 2005). The covariate of obesity as a *stressor* that was directly influenced by food insecurity also supported the RCM literature (Matthews, 2005). Depression was a *negative emotional and cognitive stat*e, an individual factor known to adversely influence Type 2 diabetes self-management practices (Franklin et al., 2012; Ivers & Cullen, 2011). I utilized Type 2 diabetes self-management behavior, the dependent variable, as the *health behavior intermediary* factor; in accordance with the RCM (Matthews, 2005), an intermediary factor connects stressors, reserve capacities, and negative emotional/cognitive states to the health outcomes of morbidity and mortality. The inclusion of African American women who were low income and have Type 2 diabetes allows for the inclusion of the SES factor and the health outcomes factor without having to use measurements of these constructs.

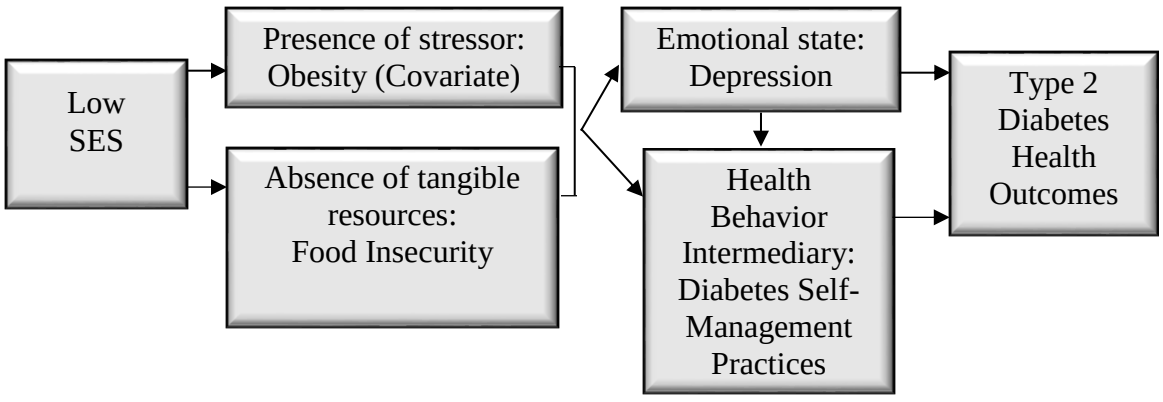

Figure 1. Application of Matthews's (2005) reserve capacity model (RCM).

Type 2 Diabetes Self-Management Practices

Scholars have shown that African American women, especially those older than 50, tend to have poor diabetes self-management skills in compared to their same-age counterparts (Cutrona et al., 2014; Hewitt et al., 2011; Wilson et al., 2012). Poor self-management of Type 2 diabetes, most common among low-income African American older adult women, is influenced by numerous factors (Cutrona et al., 2014; Gucciardi et al., 2009, 2013, 2014). African American older adult females tend to have less confidence in their ability to follow their diabetes medication regimens (Jack et al., 2012; Rovner et al., 2013) or are skeptical of the efficacy and safety of diabetes medication (Lynch, Fernandez, Lighthouse, Mendenhall, & Jacobs, 2012). Further, this population is likely to perceive diabetes self-management practices as "culturally irrelevant and impractical," and may be wary and distrustful of the formal medical system (Bhattacharya, 2012, p. 161). Other factors—namely, depression, food insecurity, and obesity—have also been associated with poor self-management of Type 2 diabetes, with significant associations seen among samples of ethnically diverse men and women.

Depression and Type 2 Diabetes Self-Management Practices

Results of studies conducted in the early 2010s have contradicted some results found in earlier studies (Dunlop, Song, Lyons, Manheim, & Change, 2003; Gallo et al., 1998) that documented higher rates of depression in White rather than African American female elders. Spence, Adkins, and Dupre (2013) examined aging and depression longitudinally in a nationally representative sample from a federal dataset of over 3,000 African American and Caucasian women between the ages of 52 and 81. African American women reported higher rates of

depression symptoms than did White women, and depression rates of African American women—but not White women—substantially increased from "middle to later life" (Spence et al., 2013, p. 449). Mair (2009) analyzed data from the Health and Retirement Study, utilizing a nationally representative sample of over 8,000 White and African American males and females age 60 and older. Results from Mair's study showed that African American women had significantly higher levels of depression symptomatology compared with White older adult males and females and African American males (Mair, 2009).

Results from the study by Tsenkova et al. (2012) documented that 20% of African American female elders as compared to 12% of White female elders with Type 2 diabetes reported clinical levels of depression. Holden, Bradford, Hall, and Belton (2013) reported that 17% of the 290 older adult African American women with chronic health problems in their study met clinical criteria for major depression. This increase of depression rates has led to one researcher to posit that African American female elders face "double jeopardy" of having both Type 2 diabetes and clinical depression (Nguyen et al., 2013, p. 105).

Researchers have consistently documented depression as an individual factor for poor self-management practices for diabetes, especially among older adults of color (Kim et al., 2012; Shim et al., 2013; Rovner et al., 2013). In a seminal study by Rovner et al. (2013) conducted with a sample of predominantly African American older adult women with Type 2 diabetes, 92% of the participants who met criteria for depression were female. Moreover, higher levels of depression were significantly associated with higher levels of perceived health risk but lower levels of adherence to diabetes self-management practices, as well as lower levels of feelings of personal control over their diabetes (Rovner et al., 2013). Results from the Rovner et al. study suggested that African American older adult women with Type 2 diabetes with depression see

themselves at risk for additional health problems but do not believe they have the ability, efficacy, and control to engage in health practices that could decrease their health complications.

Poor self-management practices can stem from functional impairments resulting from depression (Chlebowy, Hood, & LaJoie, 2013; Rovner et al., 2013; Shim et al., 2013). In a study of over 500 African American women, Shim et al. (2013) found that those with depression and Type 2 diabetes showed significant functional impairments. That is, they had reduced levels of physical functioning, poor overall health, and increased body pain; these symptoms, in turn, negatively affected their self-management practices for diabetes (Shim et al., 2013). These results align with Matthews's (2005) RCM. Evidence from other studies supported the RCM by documenting that stressors can exacerbate depression levels, which in turn can lead to poor diabetes self-management practices (Franklin et al., 2012; Ivers & Cullen, 2011). Clinical depression has also been associated with decreased medication adherence and poor glycemic control (Lamers, Jonkers, Bosma, Knotterus, & van Eijk, 2011; Papelbaum et al., 2011). Clinical depression also plays a role in neuroendocrine dysregulation, which can lead to irregular and hard-to-control glucose levels (Rovner et al., 2013).

The decision to use depression as a mediating variable stemmed from evidence from numerous studies (Billimek & Sorkin, 2012; Chlebowy et al., 2013; Musselman et al., 2014; Quirk et al., 2013) that examined depression in mediational analyses. In alignment with the RCM (Matthews, 2005), studies have shown that depression can result in poor coping mechanisms—intrapersonal reserve capacities—which are then associated with poor Type 2 diabetes self-management practices (Hunn & Craig, 2009; Liu, 2013; Rees, Karter, & Young, 2010). Some scholars have suggested that financial insecurity and lack of family support can lead to increased depression and negative outlooks on life, factors that can lead to a perceived inability to control

Type 2 diabetes and reduced medication adherence (Billimek & Sorkin, 2012; Chlebowy et al., 2013). Depression has also been shown to influence poor self-management practices among African American older adult women by decreasing their overall hygiene and self-care practices (Musselman et al., 2014; Quirk et al., 2013). That is, studies conducted with older adult African American women have shown that higher rates of depression can lead to functional impairments that, in turn, can lead to impaired glycemic control (Musselman et al., 2012) and failure to adhere to a diet recommended for diabetics (Quirk et al., 2013). Depression has also been shown to impair cognition and memory among African American women, and this impairment can negatively influence insulin testing, medication, and eating schedules (Feil et al., 2012; Musselman et al., 2014).

Culture may also play a role in depression mediational processes among older African American women, who may be more prone to developing depression due to the cultural aspects of the role the mother as matriarch plays in the African American community (Gucciardi et al., 2013; Strings, 2015). Providing a cultural context for both depression and diabetes self-management practices was the focus of a longitudinal qualitative study by Carthorn, Bailey, and Anderson (2015) conducted with six African American women aged 55 and older with Type 2 diabetes. The results described the contents of five interviews conducted over 18 months with those six African American grandmothers (Carthorn et al., 2015). The results showed that barriers led to both depression and poor self-management practices among these women (Carthorn et al., 2015). Depression emerged in the form of "self-silencing and self-sacrifice" that were seen as features of a strong matriarch (Carthorn et al., 2015, para. 37). The first barrier to successful self-management of diabetes reported by these women was having a sense of obligation to provide emotional, social, and financial support to the family, including "adult

children and estranged spouses," as well as having community and church obligations to fulfill (Carthorn et al., 2015, para. 30). These obligations were so overwhelming some women reported that they were often too exhausted, busy, or overwhelmed with stress to follow self-management practices such as taking their blood sugar count (Carthorn et al., 2015).

Another barrier to self-management practices that can lead to depression is family upheaval, such as the women's adult children returning to live with them after being released from prison (four of six) or taking over the care of their grandchildren (three of the six) (Carthorn et al., 2015). The third barrier was difficulty meeting basic needs. These needs were primarily financial, with results supporting the literature on the links between food insecurity and poor Type 2 diabetes self-management practices (Carthorn et al., 2015). Low-income African American older adult females face triple jeopardy, as they may have not only high rates of Type 2 diabetes and clinical depression but food insecurity as well (Carthorn et al., 2015).

Food Insecurity and Type 2 Diabetes Self-Management Practices

Researchers on health disparities have examined contextual and individual factors of the ethnic differences observed in diabetes self-management practices (Cutrona et al., 2014; Franklin et al., 2012; Gucciardi et al., 2014; Hewitt et al., 2011; Jack et al., 2012; Quirk et al., 2013; Tsenkova et al., 2012; Zahodne et al., 2014). A primary contextual factor is food insecurity. The USDA (2014) defined food insecurity as the "limited or uncertain availability of nutritionally adequate and safe foods or limited ability to acquire acceptable foods in socially acceptable ways" (para. 3). Food insecurity may also play a role in ethnic differences in diabetes self-management practices because it often reflects low socioeconomic status. Low socioeconomic status is a factor that has been consistently linked to poor self-management of diabetes in older adult African American women (Cutrona et al., 2014; Jack et al., 2012; Quirk et al., 2013).

Researchers have documented that this relationship is considerably stronger for African American women than it is for men (Nguyen et al., 2013; Skelly, Carlson, Leeman, Soward, & Burns, 2009). Food insecurity alters eating behaviors in numerous ways, including (a) skipping meals; (b) eating the same low-cost foods, many of which are calorie dense and nutrient poor; (c) eating smaller portions; and (d) binge eating when food is available (Franklin et al., 2012; Laraia, 2013; Seligman et al., 2010, 2012).

There is also a strong association between food insecurity and the accumulation of visceral fat, obesity, and chronic health conditions, including Type 2 diabetes, among elderly African American women (Ivers & Cullen, 2011; Laraia, 2013; Lawrence & Knol, 2012; Seligman et al., 2010, 2012). Between 10% and 46% of African American females ages 50 and older are food-insecure (Seligman et al., 2012; USDA, 2014), a factor that increases the propensity for Type 2 diabetes and creates challenges in the self-management of diabetes (Billimek & Sorkin, 2012; Gucciardi et al., 2014; Hewitt et al., 2011; Rovner et al., 2013). Seligman et al. (2012) found that 46% of the 711 African American and Hispanic low-income older adults with Type 2 diabetes in his study were food insecure.

Prior researchers (Laraia, 2013; Seligman et al., 2012) have posited that food insecurity influences Type 2 diabetes self-management practices directly and indirectly, through elevated levels of depression. While no scholars have examined the mediational role of depression between food insecurity and Type 2 diabetes self-management practices in African American older adult females living in poverty, some researchers have linked food insecurity to poor Type 2 diabetes self-management practices among older African American adults in poverty (Franklin et al., 2012; Laraia, 2013; Seligman et al., 2012). Food insecurity has also been associated with poor adherence to blood glucose monitoring (Franklin et al., 2012; Seligman et al., 2010, 2012)

and is negatively affects self-management practices for diabetes by increasing the stress response, which can lead to hard-to-control glycemic levels (Berkowitz, Baggett, Wexler, Huskey, & Wee, 2013; Franklin et al., 2012). Moreover, food insecurity may lead to increases in tobacco and alcohol use among older African American women, who use these behaviors as a means of coping with financial stress (Gucciardi et al., 2011; Roberts et al., 2014). Tobacco and alcohol use can increase Type 2 diabetes health complications, lead to difficulty in controlling glycemic levels, and can impair insulin metabolism (Gucciardi et al., 2011; Roberts et al., 2014). Stress has furthermore been shown to increase inflammation and reduce metabolism, both of which increase difficult-to-control Type 2 diabetes (Cutrona et al., 2014).

Laraia's (2013) review of the literature illustrated the effects of food insecurity on numerous outcomes, including the development of chronic diseases such as diabetes and other health-related behaviors. Having reviewed findings from over 20 studies, Laraia reported that the percentage of low-income African American adults who have diabetes and are food insecure ranges from 6% to 51%. Laraia also noted that in a national sample of White and African American adults, as the severity of food insecurity increased, so did the likelihood of developing diabetes; among those with diabetes, poor diabetes self-management can result. Studies conducted with low-income older adult African American women have shown that food insecurity is a proxy for lack of resources, as they could not afford diabetes medication or for diabetes-related materials such as test strips or insulin needles (Bengle et al., 2010; Cunningham & Carrier, 2014).

The work by Gucciardi et al. (2009) and Seligman et al. (2010) were two seminal studies that examined the relationship between food insecurity and diabetes self-management practices in a national sample of White and African American male and female adults. Gucciardi et al.

(2009) found significant associations between food insecurity and poor diabetes management practices. Similarly, Seligman et al. (2010) found that food insecurity influenced diabetes management practices via reductions in fruit and vegetable intake and increases in alcohol and tobacco use.

Other researchers examined food insecurity as a mediating variable. Roberts et al. (2014) studied over 250 African American women who were heavy drinkers and, like Seligman et al. (2010), found that heavy drinking was associated with increased levels of food insecurity risk and nutritional risk taking, which in turn resulted in negative health outcomes, including the exacerbation of Type 2 diabetes complications. In a sample of predominantly impoverished older female adults living with Type 2 diabetes, Vijayaraghavan, Jacobs, Seligman, and Fernandez (2011) found that housing instability led to food insecurity, which, in turn, led to poor diabetes self-management practices.

Obesity and Type 2 Diabetes Self-Management Practices

Type 2 diabetes and related health problems are exacerbated by obesity, "the most important . . . risk factor contributing to insulin resistance" (McNabb et al., 2014, p. 281). The rate of obesity among African American women has led to their social identification as "social dead weight" and "diseased Black women" (Strings, 2015, p. 107). National health data from 2012 showed that over half (54%) of Africa American females aged 55 to 74 years were obese, as compared to 38% of White females and 49% of Hispanic females in the same age group (CDC, 2014a). Being low-income increases obesity rates for all gender and ethnic groups, but it appears to be most pronounced in African American of older age, with data showing that between 60% to 80% of African American females aged 50 or older are overweight or obese (Allison et al., 2014; Blaum et al., 2010).

Obesity is another individual factor that has been consistently linked to increases in Type 2 diabetes and decreases in diabetes self-management practices (Jack et al., 2012; Kerr et al., 2007). African American women who were obese as children are at increased risk for developing diabetes, and obesity prevention initiatives during the childhood and adolescent years can affect positive change in adulthood (Sharma, Wagner, & Wilkerson, 2004; Sharma, 2006, 2011). Indeed, a history of childhood obesity is one cited as the reason African American women are especially at risk for developing Type 2 diabetes (McNabb et al., 2014; Sharma et al., 2006, 2011). Other reasons cited for the increased risk of developing Type 2 diabetes among African American women with obesity include (a) African American women's increased risk for weight gain in the stomach; (b) low self-efficacy regarding weight loss; and (c) the inability to exercise on a regular basis due to family and community responsibilities (Al-Khawaldeh, Al-Hassan, & Froelicher, 2012; Bhattacharya, 2012; Im et al., 2012; McNabb et al. 2014; Rahim-Williams, 2011; Samuel-Hodge, Cene, Corsino, Thomas, & Svetkey, 2013). Moreover, a larger body size tends to be more accepted among African American women (Im et al., 2012).

Obesity negatively affects poor Type 2 diabetes self-management practices in numerous ways. The reasons for increased risk of developing Type 2 diabetes among African American women have also been determined as the same reasons for poor self-management of Type 2 diabetes (Komar-Samardzija, Braun, Keithley, & Quinn, 2012). Obesity places stress on the body, which can lead to diabetes that is hard to manage (Rahim-Williams, 2011). Obesity has been also linked to increased inflammation and pulmonary dysfunction in older adult African American women, conditions that also increase difficult-to-manage Type 2 diabetes (Pinto, Seemungal, Teelucksingh, & Nayak, 2013). In a study of older African American men and women, Fritschi and Quinn (2010) found that obesity led to persistent fatigue, which led to poor

Type 2 diabetes self-management practices. Moreover, the researchers found increased rates of obesity among African Americans who are food insecure, with both factors influencing poor diabetes self-management practices (Franklin et al., 2012).

The comorbidity of obesity with Type 2 diabetes can lead to ambiguous results, a factor that has led to the methodological recommendation to statistically control for obesity, which I did in the current study (Jack et al., 2012; Kerr et al., 2007). Moreover, by controlling for obesity, a better understanding of the relationships between food insecurity, depression, and diabetes self-management practices may be more clear (Franklin et al., 2012; Ivers & Cullen, 2011).

Summary and Conclusions

The purpose of this chapter was to review the literature pertinent to this study and highlight important gaps that require attention. I opened Chapter 2 with a review of the literature search strategy, followed by reviews of the guiding model of Matthews's (2005) RCM, which guided the current examination of any direct associations between food insecurity and diabetes self-management behaviors that may result from emotional depression. I also determined whether there are direct effects of depression on diabetes self-management behaviors, relationships that have yet explored in previous studies. The previous review also included an overview of Type 2 diabetes and diabetes self-management practices and research on depression, food insecurity, and obesity. Included were reviews of studies that likened these factors to the development of Type 2 diabetes and, more importantly, poor self-management practices for the disease. As few studies included older adult African American women living in poverty who were food insecure and had Type 2 diabetes, the literature focused on older adult African American women with Type 2 diabetes. These studies were predominantly quantitative, but I

also included a few qualitative studies, as qualitative studies can provide rich descriptions of experiences (Sharma, 2008), and it is important to capture the experiences of older adult African American women living with Type 2 diabetes, another underexplored facet of research in this area. The following methodology seeks to address these gaps accordingly.

Chapter 3: Methodology

Low-income African American women aged 50 and older not only have higher rates of Type 2 diabetes and diabetes-related health complications compared to their peers (ADA, 2014; NDEP, 2015), but often demonstrate poor diabetes self-management skills (Cutrona et al., 2014; Hewitt et al., 2011). Food insecurity, depression, and obesity have all been linked to poor diabetes self-management skills in low-income African American women, ages 50 and older (Cutrona et al., 2014; Gucciardi et al., 2014; Rovner et al., 2013). Results of most studies have suggested that, after controlling for obesity, food insecurity may lead to increased levels of depression which in turn may lead to poor diabetes self-management practices (Franklin et al., 2012; Gonzalez et al., 2012; Nguyen et al., 2013). To date, this has not been a topic of study.

In this quantitative correlational study, I examined if food insecurity and depression were uniquely and significantly linked to poor Type 2 diabetes self-management practices. There is empirical support for these relationships, but these associations have not been examined in such a high-risk sample as low-income older African American women nor have they been examined through a culturally-congruent theoretical lens. I further assessed if depression significantly mediated between food insecurity and Type 2 diabetes self-management practices. A review of the literature uncovered no studies that addressed this specific mediation effect. The variable of BMI, a measure of obesity, was examined as a potential covariate for all three research questions.

The purpose of this chapter is to examine and discuss the study research design, methodology and data analysis. The topics first discussed are the study research design and the rationale for the choice of design. Considerable attention is devoted to the study methodology, a section unto itself, comprised of sub-sections on the study population, sampling and sampling

procedures, recruitment and data collection procedures, and study instrumentation and operationalization of study variables. The chapter then turns to a comprehensive assessment of threats to the validity of the study, with sub-sections on threats to internal, external, and construct validity. Ethical considerations are discussed in the penultimate section of the chapter, which ends with a summary.

Research Design and Rationale

In this quantitative nonexperimental study, which utilized a cross-sectional correlational research design, I posited three research questions. For the first research question, food insecurity was the independent variable, and diabetes self-management practices the dependent variable. For the second research question, depression was the independent variable, and diabetes self-management practices was the dependent variable. For the third research question, food insecurity was the independent variable, depression was the mediating variable, and diabetes self-management practices was the dependent variable. I considered overweight/obesity as a potential covariate. I measured the study variables using item and scale data from the 2015 BRFSS, an archival health surveillance dataset. The use of archival data expedited the overall study implementation phase.

The goal of a quantitative research study is to gain a more in-depth and scientifically informed understanding of social phenomenon through the use of the scientific method (Willliams, 2011). Quantitative research designs are typically classified in three ways, based on (a) the ability to manipulate the independent variable, (b) the intent of the study, and (c) time points of data collection (Williams, 2011). Quantitative studies can be either *experimental* or *non-experimental* (Punch, 2013). An experimental research design—the only design that can determine causality—involves the random selection of study participants from the population

and random selection of participants into study conditions (e.g., intervention or control groups; (Punch, 2013). In contrast, non-experimental research designs do not involve random selection of participants or the manipulation of variables (Punch, 2013).

Quantitative research designs are also delineated into categories based on the intent of the study (Punch, 2013; Williams, 2011). If the intent of a quantitative study is to simply illustrate and provide information on a phenomenon, a *non-experimental descriptive* research design is utilized (Punch, 2013; Williams, 2011). This type of quantitative research design has numerous limitations and lacks statistical rigor (Punch, 2013; Williams, 2011). If the intent of the study is to determine whether two or more groups (e.g., of people, interventions, events, or situations) significantly differ on a dependent variable, but the study lacks one of the randomization elements of an experimental designs, *non-experimental group comparison* research designs are utilized (Punch, 2013; Williams, 2011). There are two types of non-experimental group comparison research designs: the *quasi-experimental* research design, which allows for random assignment of participants to conditions but not random selection of participants; and the *causal comparative/ex post facto* research design, which examines pre-existing differences between naturally occurring groups (e.g., gender, ethnicity, age group; Punch, 2013; Williams, 2011).

If the goal of a quantitative study is to determine significant associations between two or more variables, a *non-experimental correlational* research design, also called the *associational* or *survey* research design, is used (Asamoah, 2014). The independent variable(s) is identified as the predictor variable(s), and the dependent variable(s) is called the criterion variable(s) in correlational studies (Asamoah, 2014). A correlational research design investigates if a significant linear relationship exists between the predictor and criterion variables; it also determines the direction and strength of that relationship (Asamoah, 2014).

Methodology scholars (Asamoah, 2014; Bettany-Saltikov & Whittaker, 2014; Gorard, 2012; Kowalczuk-Walędziak, 2015) have placed emphasis on distinguishing between the correlational research design and correlational statistics: simple correlational statistical techniques such as Pearson bivariate correlations are too simplistic for the testing of hypotheses. The overwhelming majority of correlational research studies have utilized advanced statistical analyses, such as multiple linear regression, logistic regression, path analysis, and structural equation modeling (SEM; Adams & Lawrence, 2014; Asamoah, 2014; Gorard, 2012; Kowalczuk-Walędziak, 2015). In this study, I used hierarchical linear regression (HLR) and hierarchical multiple linear regression (HMLR) analyses to address study research questions.

There are numerous statistical benefits of using advanced statistical techniques to test associational study hypotheses, including (a) the ability to examine the influence of more than one predictor variable on the dependent variable; (b) the capacity to control for covariates, which can be categorically or continuously coded, (c) testing of mediating and moderating variables, and (d) analyzing complex associational theoretical models (Asamoah, 2014; Bettany-Saltikov & Whittaker, 2014; Leon-Guerrero & Frankfort-Nachmias, 2014). Advanced statistical methods also provide the means to employ complex sampling analyses (Aponte, 2010; Saylor, Friedmann, & Lee, 2012). I employed complex sampling analyses in this study to ensure the accurate weighting of data.

While no correlational study can be used to determine causality, the use of advanced statistical analyses in correlational studies can strengthen the "implication of a causal relationship" by establishing temporal precedence—that is, that the effect preceded the outcome and reducing or eliminating spuriousness between the predictor and criterion variables through the statistical control of covariates and/or the testing of mediational and moderational effects

(Gorard, 2012, p. 120). While temporal precedence cannot be confirmed in this study, I reduced spuriousness in the predictor-criterion relationship by controlling for covariates.

Correlational research designs can be delineated into three types: (a) *explanatory*, (b) *predictive*, and (c) *model testing* (Gorard, 2012; Punch, 2013). The distinction between explanatory correlational and predictive correlational research designs centers on the timing of the data collection (Gorard, 2012; Punch, 2013). Researchers conducting explanatory correlational research studies collect data on the predictor and criterion data at the same time, whereas researchers conducting predictive correlational research studies collect the predictor data first and the criterion data at a later time point (Gorard, 2012; Punch, 2013). In other words, the explanatory correlational research design utilizes a cross-sectional approach, while the predictive correlational research design uses a longitudinal approach in the collection of data (Gorard, 2012; Punch, 2013). The predictive correlational research design is therefore superior to the explanatory design, as it achieves temporal precedence and enhances the internal validity of the quantitative correlational research study (Gorard, 2012; Punch, 2013). In this study, I utilized cross-sectional data from the 2015 BRFSS, which prevented this study from establishing temporal precedence, a limitation of the study.

The third and last type of correlational research designs are *model testing* designs (Gorard, 2012; Punch, 2013). The majority of public health, health disparity, and health promotion theoretical models are complex relational theories (inclusive of mediators and moderators) between and among variables that measure specific characteristics of individuals, groups, events, and situation (Asamoah, 2014; Bell, 2014). Many health-based theoretical models, including Matthew's (2005) RCM, incorporate constructs that occur naturally. The inability to manipulate theoretical relational variables precludes the use of experimental research

designs and requires the use of a correlational research design (Willams, 2011). While correlational studies cannot establish cause and effect, they "can be used to inform causal inferences and thus, evidence-based practice" (Williams, 2011, p. 66). I utilized the model testing correlational research design to examine the relationships among food insecurity, depression, and Type 2 diabetes self-management practices, theoretical relationships informed by Matthews's (2005) RCM.

Procedure

Population

The study sample represented the American population of low-income African American females aged 50 and older with Type 2 diabetes. In 2014, the Administration for Community Living (2015) and the United States Census Bureau (2015) estimated that there were six million African American women aged 50 and older in America. Of this six million, approximately 1.5 million had Type 2 diabetes and reported an annual income of $25,000 or less (Office on Women's Health, 2015; Okeke, 2016).

Sampling and Sampling Procedures

I used the BRFSS 2015 dataset in this study. The BRFSS, first implemented in 1984, is a health surveillance collaborative research project between the Centers for Disease Control and Prevention (CDC) and state health departments. The primary objective of the BRFSS is to assess health practices and risk behaviors associated with chronic diseases of the noninstitutionalized American adult population (CDC, 2015). The targeted population, sampling frame, and sampling method are reviewed in the following sections, first in relation to the 2015 BRFSS, and then in relation to the current study.

Targeted population: 2015 BRFSS. The targeted population, also called a *theoretical* population, is the group of individuals with whom the quantitative research study is conducted (Bowling, 2014). The targeted population for the 2015 BRFSS was adult American state and territory residents with landline and/or cellular phone service, which represented 97.7% of the American population (CDC, 2015). While BRFSS analysts do not have a specific method of accounting for the 2.3% of the American population who do not have telephone service, they did employ the statistical method of *iterative proportional fitting*, also called *raking*, to weigh data to ensure that underrepresented groups were accurately represented in the 2015 dataset (CDC, 2014a). Raking was used to weigh data on race/ethnicity, education levels, marital status, geographical region, telephone source, renter/owner status, gender by age, gender by race/ethnicity, and age by race/ethnicity groups (CDC, 2015).

Targeted sample: Current study. The targeted sample for this study was African American women, age 50 years or older, with an annual income of $25,000 or less and who had Type 2 diabetes. BRFSS data results from 2015 showed that the total number of African American females, age 50 or older, and of low-income status was 1,074. Of these 1,074 females, 350 (32.6%) reported having Type 2 diabetes. The percentage of 32.6% of African American females, age 50 or older, and of low-income status in this sample was not significantly different from the 28% of the American population of African American females, age 50 or older, and of low-income status ($\chi^2(1) = 0.59$, $p = .643$). The 350 BRFSS participants were the study sample.

Sampling frame: 2015 BRFSS. The sampling frame is the resource used to identify the targeted population to obtain the study sample (Bowling, 2014; Haig, 2014). The 2015 BRFSS utilized a national telephone registry to obtain landline phone numbers of individuals residing in all 50 states as well as territories of America (CDC, 2014a). The sampling frame for cellular

telephone numbers was the Telecordia database of telephone exchanges sorted by state area code number (CDC, 2014a).

Sampling frame: Current study. The sampling frame for the study was the 2015 BRFSS dataset. The 2015 BRFSS dataset did not provide any information, such as names or addresses that could be used to identify a study participant (CDC, 2015). It provided data on age, gender, race/ethnicity, low-income status, and chronic disease (including Type 2 diabetes status), variables that I used in the random selection of study participants.

Sampling method: 2015 BRFSS. Quantitative studies utilize either non-probability sampling methods, in which a convenient and opportunistic sample of participants is obtained, or probability sampling methods, in which some type of random selection of participants is utilized (Haig, 2014; Klugh, 2013). The 2015 BRFSS used a probability sampling method called *stratified random sampling*. This type of probability sampling involves delineating groups into strata, or groups, and then selecting a random sample of participants from each stratum (Haig, 2014; Klugh, 2013). The 2015 BRFSS stratified the study sample in ways. One, participants were stratified by type of telephone service (i.e., landline or cellular), and the majority (80%) of participants were interviewed using their landline while 20% of participants were interviewed using their cellular telephone (CDC, 2015). Two, participants were stratified into smaller geographical units, typically health department districts, within states (CDC, 2015).

Sampling method: Current study. In this study, I analyzed 2015 BRFSS data from the study targeted sample of 350 African American women, age 50 or older, of low-income status and with a diagnosis of Type 2 diabetes. This sample size was well above the required sample of 170 participants, which I determined from the initial results of an *a priori* power analysis using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009).

Study sample size: Power analysis. I conducted a power analysis using G*Power (Faul et al., 2009) for multiple linear regression, in consideration of the independent variable of food insecurity, the independent and mediating variable of depression, and the covariate of obesity. The power was set to .80 and the significance level was set to $p < .05$. Based on previous research on similar study topics (Bhattacharya, 2012; Cutrona et al., 2014), the effect size was set to small ($f^2 = .065$). The predictors entered into G*Power were the independent variable of food insecurity, the independent and mediating variable of depression, and the covariate of obesity. The results of the power analysis showed that a sample of 170 participants was required for this study. I also conducted a *post hoc* power analysis. The effect size was set to $f^2 = 0.15$, significance was set to $p < 0.05$, the total number of predictors was entered as three, and the total sample size was entered as N = 350. The observed power for the study was a very robust .9999. The use of a probability sample allowed for the generalizability of results to other samples of African American females aged 50 and older with Type 2 diabetes. Results, however, cannot be generalized to non-African American females or males ages 50 and older, with Type 2 diabetes, nor to African American females who do not have Type 2 diabetes.

Procedures for Recruitment, Participation, and Data Collection

The use of 2015 BRFSS archival data necessitated that this section included information with regard to the methodological practices as implemented for the 2015 BRFSS as well as methodological practices utilized in this study. In the following sections, information on the procedures for participant recruitment and data collection as delineated in the 2015 BRFSS study manual are outlined. Subsequent to this information is a discussion as to how I obtained and utilized the 2015 BRFSS dataset.

Data collection procedures: 2015 BRFSS. The BRFSS health surveillance project has been, and continues to be, a collaborative effort between the CDC and U.S. state and territory health departments (CDC, 2015). The BRFSS project is initiated each year with the annual meeting of the *BRFSS Coordinators Working Group*, comprised of state and national health officials selected by the CDC (CDC, 2015). The BRFSS Coordinators Working Group meets on an annual basis to (a) review and revise (if needed) the core BRFSS instrument; (b) develop questionnaire modules, which are clusters of items that address specific health issues; (c) review and approve state-specific questions; and (d) refine and finalize informed consent and data collection interview protocols. The state-specific BRFSS questionnaire is then reviewed by each state health department official, who removes any state-specific items per working group request and then submits a final state BRFSS instrument to the CDC. States use the respective BRFSS instrument for one calendar year. States that have a high population of Spanish-speaking residents have the option to utilize a BRFSS instrument that has been translated to Spanish. The CDC maintains all BRFSS instruments as well as BRFSS datasets (CDC, 2015).

While the CDC provides study oversight and management, state health departments are responsible for the annual collection of BRFSS data (CDC, 2015). State health departments have the option to contract with university-based survey research centers or commercial survey research firms to collect BRFSS data. In 2015, 44 state/territory health departments contracted with survey research centers/firms to collect BRFSS data, while nine collected these data in-house. BRFSS data are collected through interviews using Computer-Assisted Telephone Interview (CATI) system software. Relevant CDC staff provide extensive CATI training and technical assistance/support to state data collectors prior to and during data collection activities. Data collectors also receive training on BRFSS interview protocols. Once training is completed

for all state and territory research personnel, the data collection process is initiated (CDC, 2015). For the 2015 BRFSS study, the majority (80%) of telephone calls and subsequent interviews were conducted on weeknights (5PM to 9PM) and weekends (9AM to 9AM), while 20% of telephone calls and interviews were conducted between 9AM and 5PM on week days.

State data collectors utilize random digit dialing to randomly select (within geographical units and by telephone type) study participants (CDC, 2015). If the telephone call goes unanswered, the data collector has the option to call the number a total of 15 times. If the telephone call is answered, the BRFSS data collector explains to the individual who answered the call that he/she has been selected to potentially participate in the BRFSS health surveillance study. The data collector delineates the criteria for participation in the BRFSS study, namely that the individual must be an adult and a member of the household (cellular phone calls are treated as a one-person household), and confirms that the individual meets these criteria. The data collector then (a) states that the BRFSS questionnaire is completed through a phone interview, which lasts approximately 20 minutes; (b) summarizes the contents of the questionnaire; and (c) reviews with the individual the verbal informed consent process, which includes denoting the risks and benefits for participating in the study, the lack of compensation for participation, and the ability to maintain confidentiality but not anonymity of the participant. The individual is also provided study contact information (CDC, 2015).

The individual has the option of rescheduling the interview or completing it (CDC, 2015). The interview commences once the individual who answered the telephone call confirms that he/she is an adult and a member of the household and provides verbal informed consent. The interview is considered to be complete if the participant, having provided verbal informed consent, provides information on his/her age, ethnicity, and gender. As these demographic

questions are placed in the middle of the BRFSS instrument, a complete interview can contain up to 50% missing data (CDC, 2015).

Data collection and utilization procedures: Current study. The BRFSS datasets are publicly available for research studies (CDC, 2015). Access to this archival data did not require special permissions because it is in the public domain. I utilized 2015 BRFSS archival data, which are the most recent. I downloaded the 2015 BRFSS dataset as a SPSS 23.0 file from the BRFSS data website (CDC, 2015). Using SPSS 23.0 selection of cases function, I derived a targeted population dataset, comprised of data from all individuals who met the study criteria (i.e., age 50 or older, female gender, African American ethnicity, low-income status, and Type 2 diabetes status). I saved the final dataset, comprised of participant demographic and study variable data from 350 participants. The dataset included variables on participant age, income level, highest level of education, employment status, and relationship status (for descriptive information only) and the study variables of food insecurity, depression, Type 2 diabetes self-management practices, and BMI, as a measure of obesity.

Instrument and Operationalization of Constructs

I utilized specific items and scales from the 2015 BRFSS dataset. The following sections are delineated into descriptions of the study independent, mediating, and dependent variables. The description for each variable includes a general definition, an operational definition, and information on the variable type (i.e., categorical, ordinal, interval, and ratio) and response scale. The description also includes information on scale validity and reliability.

Independent variable: Food insecurity. The USDA (2014) defined food insecurity as the "limited or uncertain availability of nutritionally adequate and safe foods or limited ability to acquire acceptable foods in socially acceptable ways" (para. 3). I measured food insecurity in

this study using responses to the 2015 BRFSS indicator of household food insecurity: "How often in the past 12 months would you say you were worried and stressed about having enough money to buy nutritious meals?" This ordinal item is scaled using a 5-point Likert scale, from 1 (never) to 5 (always), with a higher score indicating higher levels of food insecurity.

Prior versions of the BRFSS survey included this single-item indicator of food insecurity. This single-item measure has been significantly correlated ($p < 0.01$) with obesity, including obesity among older adults, mental distress and depression, and health-related quality of life among middle and older aged women (Kwon, Wang, & Hawkins, 2016; Pierannunzi, Hu, & Balluz, 2013; Rizzo & Kintner, 2013). These findings support its criterion-related validity.

Independent and mediating variable: Depression. According to the APA (2014), depression is a medical illness that negatively influences individuals' emotional, physical, and cognitive states. The primary symptoms of depression are feelings of extreme sadness and marked loss in interest or pleasure in activities (APA, 2014). In the BRFSS dataset, I used the Kessler et al. (2002) six-item Psychological Distress Scale (PDS) to measure depression, with the items used to gauge the degree to which, in the past 30 days, a person felt (a) nervous, (b) hopeless, (c) restless, (d) depressed, (e) that everything was an effort, and (f) worthless. The PDS items were scaled from 1 = none to 5 = all, and the score was computed by summing the six items. The scale scores ranged from 6 to 30 points, with a higher score denoting higher levels of depression (Kessler et al., 2002; 2003).

The Kessler et al. (2002) six-item PDS has been used widely in health surveillance studies in the United States (i.e., BRFSS and SAMHSA's National Household Survey; CDC, 2015). The construct validity of the 6-item PDS has been confirmed in studies where factor analysis results determined a one-factor structure of the 6-item PDS (Herrick, 2015; Kessler et

al., 2002, 2003). Scholars (Ege, Messias, Thapa, & Krain, 2015; Herrick, 2015; Tan et al., 2015) have documented that the 6-item PDS is a sound screening tool for depression and serious mental illness in the general population, especially in samples of older adults with chronic diseases, including Type 2 diabetes, due to its sound discriminant and predictive validity. Herrick (2015), who utilized the North Carolina BRFSS 2013 data, demonstrated that the PDS was useful for discriminating between adults with diabetes who reported moderate stress and those who reported serious stress. Moreover, Herrick's (2015) results showed that the greatest differences in significance on PDS scores were those seen "with depression and disability ($p < 0.01$)" (p. 2). Tan et al. (2015) found significant associations ($p < 0.01$) between the six-item PDS and other measures of distress. Rosen et al. (2000) found significant associations between the six-item PDS and the Derogatis Symptom Checklist-90, while Wallston (2013) documented associations between the six-item PDS and the Multidimensional Health Locus of Control Scales ($p < 0.01$). The inter-item reliability of the PDS is excellent and has ranged from the mid .80s to the mid .90s in studies conducted with diverse samples (Herrick, 2015; Kessler et al., 2003).

Dependent variable: Diabetes self-management practices. Self-management practices for diabetes are critical elements of self-care to reduce the physical and psychological effects of Type 2 diabetes and to improve quality of life (Rovner et al., 2013). In this study, I assessed diabetes self-management practices using the BRFSS DSMS, which was comprised of four items with dichotomous yes/no response codes (CDC, 2015). These items were (a) monthly physical activity/exercise, (b) daily glucose monitoring, (c) daily checking feet for sores or irritations, and (c) ever having received diabetes self-management education (Chen et al., 2014). I computed the DSMS by summing the four items (CDC, 2015). DSMS scale scores ranged from 0 to 4, with a higher score indicating higher levels of consistent diabetes self-management practices (CDC,

2015). The DSMS has been utilized in studies using BRFSS data and has been shown to have significant associations with diabetes health-related behaviors (Jackson, 2015; Johnson, Ghildayal, Rockwood, & Everson-Rose, 2014; Herrick, 2015; March et al., 2014). The DSMS has also demonstrated discriminant validity with regard to individuals who were or were not insulin dependent (Johnson et al., 2014) and adults with and without obesity (March et al., 2014).

Covariate: Overweight/obesity. The CDC (2014b) defined obesity as having a BMI that is 25 kg/m2 or greater. In the 2015 BRFSS dataset, BMI was an indicator of overweight/ obesity, derived from the anthropometric (as opposed to self-report) measurement of height and weight (CDC, 2015). I used the interval-coded BMI variable, calculated as weight/height x 703 (CDC, 2015). The BMI item of the BRFSS has been recognized (along with smoking status, blood pressure, height, and weight variables) to "be of high reliability and high validity" (Pierannunzi et al., 2013, p. 2). Criterion-related validity of the BRFSS BMI measure has been confirmed in studies that have demonstrated significant correlations between anthropometric-measured BMI and self-reported physical fitness, health quality of life, and health literacy (Brown, Carroll, Workman, Carlson, & Brown, 2014; Evenson & McGinn, 2005; Keith, Clark, Stump, & Callahan, 2015; Kwon et al., 2016). Scholars noting significant age group, ethnic group, socioeconomic level, presence or absence of chronic health conditions, and geographical residence differences with regard to mean BMI (Brown et al., 2014; Grabner, 2012; Keith et al., 2015) have provided support for the discriminant validity of the BRFSS BMI measure.

Data Analysis Plan

I conducted data analyses using the SPSS 23.0 complex sampling technique. The 2015 BRFSS dataset was downloaded from the data website directly into an SPSS 23.0 data file and kept on a jump drive. I deleted variables not relevant to the study from the data file to reduce

confusion. Individual depression and Type 2 diabetes self-management practices items were analyzed to derive Cronbach's alpha for inter-item reliability. An acceptable Cronbach's alpha is greater than or equal to .70 (Bowling, 2014). The existence of any univariate outliers was determined using the SPSS outlier function. Any univariate outliers that were found were winsorized—that is, replaced with the next lowest or highest value (Bowling, 2014). I detected and addressed multivariate outliers using the SPSS Mahalanobis distance function (Bowling, 2014).

The research questions and accompanying hypotheses for this study were as follows:

RQ1. Does household food insecurity, as measured by the BRFSS food insecurity item, significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI?

***$H1_o$*.** Household food insecurity, as measured by the BRFSS food insecurity item, does not significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

***$H1_a$*.** Household food insecurity, as measured by the BRFSS food insecurity item, does significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

RQ2. Does depression, as measured by the BRFSS PDS, significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income

African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI?

$H2_o$. Depression, as measured by the BRFSS PDS, does not significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

$H2_a$.Depression, as measured by the BRFSS PDS, does significantly relate to diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

RQ3. Does depression, as measured by the BRFSS PDS, significantly mediate between household food insecurity, as measured by the BRFSS food insecurity item, and diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI?

$H3_o$. Depression, as measured by the BRFSS PDS, does not significantly mediate between household food insecurity, as measured by the BRFSS food insecurity item, and diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

$H3_a$. Depression, as measured by the BRFSS PDS, does significantly mediate between household food insecurity, as measured by the BRFSS food insecurity item and diabetes self-management practices, as measured by the BRFSS DSMS, in a sample of low-income African American women, ages 50 and older, controlling for overweight/obesity, as measured by BMI.

I utilized SPSS 23.0 software to conduct hierarchical linear regression (HLR) and hierarchical multiple linear regression (HMLR) for hypothesis testing[1]. The incorrect weighting of data was a concern in this study due to the use of data from low-income African American women age 50 and older. As with most national health surveillance systems, the BRFSS oversamples underrepresented income, age, and ethnicity groups (CDC, 2015). While oversampling increases the size of theoretically and empirically relevant study samples—a boon for health disparities research—the sample is no longer representative of the population, leading to inaccurate findings (CDC, 2015). I thus analyzed the data using complex sampling procedures to ensure that the data were correctly weighted.

I conducted preliminary statistical analyses—descriptive statistics and various assumption tests—prior to conducting HLRs/HMLR for hypothesis testing. I calculated the frequencies and percentages for categorical demographic variables (e.g., employment status, relationship status). For the very few interval or ratio-coded demographic variables (e.g., age), I computed means, standard deviations, and minimum and maximum scores. I then reported this information for descriptive purposes.

All multivariate statistics, including HLR/HMLR, have data assumptions that must be met to ensure the accuracy of statistical findings (Field, 2013; Garson, 2012). Linear regression models have five primary assumptions that must be met: (a) normality in the distribution of scale scores, (b) homoscedasticity, (c) linearity between the independent and dependent variables, (d) lack of multicollinearity between the independent variables, and (e) independence of residuals

[1] I ran an HLR to analyze the association between food insecurity and Type 2 diabetes self-management behaviors, controlling for education level on the first model or step of the analysis. I performed the same analysis for the predictor of depression, again controlling for education level. I conducted an HMLR to assess the relationship between food insecurity and depression, controlling for two covariates, age and BMI, on the first model or step of the analysis.

(errors; Field, 2013; Garson, 2012). In the following sections, I will provide information on the testing of these five assumptions for HLR/HMLR.

Assumption of Normality

To test the assumption of normality, I computed $z_{skewness}$ values by dividing the skewness value by the skewness standard error (Doane & Seward, 2011). A $z_{skewness}$ value less than 1.96 indicates that the normality assumption has been met. Outliers are often the reason for substantial skewness; had that been evident, the data would have been winsorized where the next lowest or highest value replaced the outlier (Doane & Seward, 2011).

Assumption of Linearity and Homoscedasticity

In accordance with recommendations from Nau (2015), the assumptions of linearity and homoscedasticity were tested by computing *predicted residual by actual residual* scatterplots. The assumption of linearity is met if the residual points showed a uniform distribution of residual data points, while the assumption of homoscedasticity is met if residual data points are equally dispersed above and below the horizontal axis (Nau, 2015).

Assumption of the Lack of Multicollinearity

If independent variables and/or independent and mediating variables are so highly associated with one another (with $r > .80$, $p < .001$) that they are measuring the same construct, multicollinearity is evident (Field, 2013). Variance inflation factors (VIF) were computed between and among food insecurity, depression, and obesity variables to determine multicollinearity. The assumption of lack of multicollinearity is met if VIFs are < 4.00 (Field, 2013). Had multicollinearity been evident, the variable with the highest association to other variables would have been used in HLR/HMLR analyses.

Assumption of Independence or Errors

I computed a Durbin Watson statistic to determine if data met the assumption of independence of errors, or lack of autocorrelation of residuals (Nau, 2015). Errors are independent—the assumption is met—if the Durbin Watson values are between 1.00 and 3.00 (Nau, 2015). The assumption of independence of error is most likely to be violated if data are ordered in a meaningful time sequence, which often does not concern typical data used in linear regression models (Nau, 2015).

After I addressed the assumptions for HLR, hypothesis testing was addressed by conducting HLRs or HMLRs (e.g., determined by the number of models run and the number of variables entered at each model in the analysis) and, had mediation requirements been met, HLR for mediation. HLR was employed when no covariates were found to be significantly associated with dependent variable, while HMLR was employed to account for the shared variance between the covariate and dependent variable. Results were considered significant if $p < 0.05$. Based on recommendations by Hayes (2013), overall model *F*-values and associated *p*-values for the HLR/HMLR models, with model effect size being determined by the model R^2 (Hayes, 2013). Results of the individual predictors included the predictors' standardized beta weights (β) and *p* values (Hayes, 2013).

Threats to Validity

Three types of validity in quantitative research studies pertain to study limitations in relation to the research methodology and design: (a) internal validity, or the degree to which it can be stated that the observed effects on the dependent variable(s) are due to the independent variables and not to unmeasured confounding variables; (b) external validity, or the ability to generalize study results to the population under study or other samples, settings, and times; and

(c) construct validity, or how well a study instrument operationally captures the constructs under study (Bowling, 2014). This section is organized according to these three types of validity.

Threats to Internal Validity

Threats to internal validity are participant or study factors that compromise the ability to state that dependent variable effects were the result of the independent variable (Bowling, 2014). Threats to internal validity for correlational studies include *confound bias* and *reverse causation* (Asamoah, 2014; Gorard, 2012). A study has confound bias if results are unclear as to whether the independent variable or an unmeasured extraneous variable is significantly associated with the dependent variable (Asamoah, 2014; Gorard, 2012). Covariate analysis may have helped to control confound bias in this study. Reverse causation concerns the lack of ability to determine the temporal precedence of variables (Asamoah, 2014; Gorard, 2012). There was possibility that Type 2 diabetes self-management practices influenced food insecurity and depression and not vice versa.

Threats to External Validity

External validity concerns whether one can generalize study findings to the population (or other samples), to other times, and to other settings (Bowling, 2014; Punch, 2013). The external validity of a study depends greatly on whether study participants represent the population (Bowling, 2014; Punch, 2013). The external validity of the current study was relatively strong, although the sample itself was restricted to a specific income, age, and gender group. The external validity strength was due to the use of the BRFSS national surveillance dataset that was comprised of a random sample of participants. However, results from this study could only be generalized to low-income African American women, ages 50 and older, with Type 2 diabetes. Results from this study cannot be generalized to African American men, African American

women younger than 50, African American women without depression, food insecurity, or Type 2 diabetes, or to similar samples collected using other means at other times.

Threats to Construct Validity

Construct validity pertains to the degree to which a scale or instrument adequately measures the intended construct it was supposed to measure (Bowling, 2014; Punch, 2013). One threat to construct validity is the poor operationalization of study constructs (Bowling, 2014; Punch, 2013). The BRFSS data have been utilized in numerous studies that have documented the sound construct validity of study variables (CDC, 2015), so this threat is minimal. Another threat to construct validity is the mono-method bias, where the investigator uses just one scale or instrument—or item—to measure a study construct (Bowling, 2014; Punch, 2013). The mono-method bias is common to correlational studies: time and cost-related study constraints often prevent the use of more than one means (e.g., self-report survey, observation, physiological indicators) of measurement (Bowling, 2014; Punch, 2013). .

Ethical Considerations

I used 2015 BRFSS archival data, collected by state health agencies in coordination with the CDC. Administrators at these agencies must follow ethical guidelines for human subjects. Their ethical responsibilities included (but were not limited to): (a) the recruitment of study participants; (b) the dissemination of study information to participants, including information on the potential benefits and risks of study participation; (c) obtaining participant informed consent and providing assurances of participant confidentiality; (d) answering any questions that the participants may have had regarding their study roles/responsibilities; and (e) data collection, coding, and entry (CDC, 2015). The original participants provided consent to the CDC during the original recruitment process and their data was subsequently anonymized (CDC, 2015).

I did not have any contact with study participants and was not in any way involved in the informed consent process. I was not required to contact the CDC to obtain permission to use the BRFSS data. The dataset contained no identifying information on study participants. Indeed, the study participants were completely anonymous to me. I was responsible for upholding specific ethics concerning research and data analysis. I did not start my data cleaning, organization, and analysis activities until I received approval to conduct my study from Walden University's Institutional Review Board (IRB). In accordance with APA (2002) ethical guidelines, I analyzed my data in a forthright and honest manner, and stored study material (to be destroyed in 5 years) in a locked file cabinet in my home office.

Summary

The purpose of this chapter was to articulate and elaborate upon the methodology of the current study. This chapter opened with a discussion of the research design of the study, followed by a rationale for its use. The chapter then continued with a comprehensive review of the population and targeted population of the study; this review included information on the sampling procedure, sampling frame, as well as the sample size determined by a power analysis conducted using G*Power (Faul et al., 2009). Considerations were given to the procedures for recruitment, participation, and data collection, followed by an examination of the operational definitions of study variables. The chapter then turned to an examination of the data analysis planned for hypothesis testing. The review of these methodological elements of the study set the stage for a discussion of the study findings, which is the focal point of Chapter 4, the following chapter.

Chapter 4: Results

Type 2 diabetes, a medical condition in which the body can no longer properly metabolize glucose due to insufficient production or processing of insulin, occurs at a disproportionately higher rate among African American women (CDC, 2015; Gucciardi et al., 2014). African American women over the age of 50 who are of low-income status have a high likelihood of developing Type 2 diabetes. Previous researchers have shown that contextual and individual factors, such as food insecurity and depression, negatively influence diabetes self-management behaviors in this population (Cutrona et al., 2014; Jack et al., 2012, 2014; Quirk et al., 2013; Tsenkova et al., 2012; Zahodne et al., 2014). The goal of this study was to address this gap in the literature, utilizing a relevant health disparity theory, Matthews's (2005) reserve capacity model (RCM). This study had a two-fold purpose: one, to determine if food insecurity and depression were significantly associated with diabetes self-management practices; and two, to assess if depression mediated between food insecurity and diabetes self-management practices in the high-risk group of African American older adult females living in poverty. To enhance the external validity of the study, I utilized 2015 data from the Behavioral Risk Factor Surveillance System (BRFSS), a national dataset on pertinent health factors and behaviors among Americans.

The purpose of this chapter was to present and discuss the results of the study based on statistical analysis conducted on 2015 BRFSS data of a national sample of African American women age 50 and older, whose reported annual income was less than $25,000 a year and who had Type 2 diabetes. The chapter opens with a data collection section, which includes information on the organization of the 2015 BRFSS dataset for analyses and descriptive statistics on study participants. The chapter continues with the results section. The results section includes descriptive statistics on the study variables, the results from the testing of covariates, the results

from the testing of assumptions for linear regression analyses, and results of hypothesis testing. The chapter concludes with a summary section.

Data Collection

Organization of 2015 BRFSS Data

I used the 2015 BRFSS dataset for the study. I downloaded the dataset from the BRFSS data site (CDC, 2015). I reviewed the dataset was reviewed and then removed cases so that the final dataset pertained to the sample—that is, it was comprised of data from African American women ages 50 or older, with Type 2 diabetes, and who were low-income. The initial dataset was comprised of data from 81,656 participants. I reduced this sample size to 10,610 when individuals with Type 2 diabetes were selected. When female gender was selected, the sample was reduced to 5809, and then to 632 when African American race was selected. When the sample was limited to age 50 or older, the sample was reduced to 549. When the sample was limited to African American females age 50 or older, with Type 2 diabetes, and who were of low-income (i.e., annual income of $25,000 or less), the final sample was 352. To ensure that the sample was comprised of those individuals who had Type 2 diabetes, I removed two participants who reported being diagnosed as children, and thus had Type 1, or juvenile diabetes, from the dataset. The final dataset consisted of 350 African American females age 50 or older who lived in poverty and who had Type 2 diabetes.

Descriptive Statistics: Study Participants

The total number of African American females, age 50 or older, and of low-income status was 1,074. Of these 1,074 females, 350 (32.6%) reported having Type 2 diabetes. The percentage of 32.6% of African American females age 50 or older of low-income status in this

sample was not significantly different from the 28% of the American population of African American females, age 50 or older, and of low-income status ($\chi^2(1) = 0.59$, $p = .643$).

The mean age of the 350 participants was 67.40 years ($SD = 8.57$ years), with ages ranging from 50 to 90 years. Table 2 presents the information on other demographic variables. With regard to annual income, 107 (30.6%) reported an income between $15,000 and $19,999; 86 (24.6%) reported an income between $10,000 and $14,999; 84 (24.0%) reported an income of less than $10,000; and 73 (20.8%) reported an income of $20,000 to $24,999. Regarding employment status, the largest numbers of participants reported that they were retired ($n = 172$, 49.2%) or unable to work ($n = 102$, 29.1%). Thirty-three (9.4%) reported being employed, 20 (5.7%) reported being unemployed, and 23 (6.6%) identified as homemakers. The group as a whole were relatively well-educated. Almost half ($n = 164$, 46.9%) of participants reported a high school degree as their highest level of education, while 112 (32.0%) reported having some college education or were college graduates (see Table 2 for more information). One hundred nineteen (34.0%) of participants were widowed; 115 (32.9%) were divorced/separated. Sixty-one (17.4%) participants had never been married, and 55 (15.7%) were married.

Table 2

Descriptive Statistics: Demographic Variables of Participants (n = 350)

Variables	Frequency	Percentage
Annual Income		
Less than $10,000	84	24.0
$10,000-$14,999	86	24.6
$15,000-$19,999	107	30.6
$20,000-$24,999	73	20.8
Employment Status		
Employed	33	9.4
Unemployed	20	5.7
Homemaker	23	6.6
Retired	172	49.2
Unable to Work	102	29.1

Variables	Frequency	Percentage
Highest Level of Education[a]		
Never Attended School	3	0.9
Elementary School	17	4.9
Some High School	54	15.4
High School Graduate	164	46.9
Some College	74	21.1
College Graduate	38	10.9
Relationship Status		
Married	55	15.7
Divorced/Separated	115	32.9
Widowed	119	34.0
Never Married	61	17.4

Note. [a] For covariate testing, highest level of education was recoded to 1 = less than high school, 2 = high school graduate, and 3 = some college/college graduate.

Results

Descriptive Statistics: Study Variables

I calculated descriptive statistics (i.e., mean, standard deviation, minimum and maximum scores) on the four study variables: the independent variable of food insecurity, the independent and mediating variable of depression, the dependent variable of diabetes self-management practices, and the potential covariate of body mass index (BMI). These descriptive statistics are presented in Table 3. I augmented the descriptive statistics with data on the inter-item reliability and normality of the variables. I computed Cronbach's alpha for the interval-coded depression scale and computed a Kuder-Richardson 20 (K-R 20) for the diabetes self-management practices scale, which was comprised of dichotomously-coded items. A Cronbach's alpha and a K-R 20 that greater than or equal to .70 is indicative or sound internal consistency (Garson, 2012). I assessed the assumption of normality by computing a $z_{skewness}$ value (i.e., skewness divided by skewness standard error); a $z_{skewness}$ value that is less than 1.96 indicates that the assumption of normality was met for the scale (Kim et al., 2012).

I measured food insecurity using a single item: "How often in the past 12 months would you say you were worried and stressed about having enough money to buy nutritious meals?" I scaled this item using a 5-point Likert scale, from 1 (never) to 5 (always), with a higher score indicating higher levels of food insecurity. As seen in Table 3, the mean score for the food insecurity item was 3.04 (*SD* = 1.19), which corresponded to the response "Sometimes," and the item scores ranged from 1.00 to 5.00. The $z_{skewness}$ value for the food insecurity item was -0.19, which denoted that this one-item scale met the assumption of normality.

I initially proposed the measure for depression as the 6-item Psychological Distress Scale (PDS). However, the PDS items were part of a module that states could elect to include in their surveys; as such, only 26 participants had PDS item scores. I therefore measured depression using two items: "How many days in the past month have you experienced depression?" and "How many days in the past month has your depression prevented you from doing your usual activities?" The respondent could answer from 0 to 30 days. This two-item assessment was deemed to be a sound measure of depression as it had a very good inter-item reliability, Cronbach's alpha = .92, and was significantly associated with the question "Has a doctor ever told you that you had a depressive disorder?[2]" The Pearson bivariate correlation between the two-item depression scale and the diagnosis of depression item was $r(350) = .25$, $p < .001$: higher scores on the depression scale was significantly associated with the likelihood of having been diagnosed with a depressive disorder. The mean depression score was 12.54 (*SD* = 6.90), and depression scores ranged from 1.00 to 30.00. The depression scale had a $z_{skewness\ value}$ of 0.59, indicating that this measure met the assumption of normality.

[2] The item, "Has a doctor ever told you that you had a depressive disorder?" was not used as a variable in the study as it was coded dichotomously, that is, 1 = yes and 2 = no. which would have required the use of binary logistic regression and not linear regression.

I initially measured the dependent variable of diabetes self-management practices by combining the four diabetes self-management items as to whether the participant (a) exercised monthly, (b) checked blood sugar at least once a day, (c) checked feet for sores or irritations at least once a day, and (d) had ever taken a course or class on how to manage Type 2 diabetes. As the items were scored where 1 = yes and 0 = no, I conducted a Kuder-Richardson 20 (K-R 20) to determine the inter-item reliability of the scale. The K-R 20 of the four-item diabetes self-management scale was poor, $\alpha = .56$, but improved to $\alpha = .70$ when the item "exercised monthly" was removed. I therefore computed the diabetes self-management scale by summing the remaining three items. The diabetes self-management scale mean score was 1.46 (*SD* = 1.18), and scale scores ranged from 0.00 to 3.00. The $z_{skewness}$ value of 0.25 denoted that the diabetes self-management scale met the assumption of normality.

The mean score of the covariate of BMI was 31.69 (*SD* = 6.83), indicating that on average, the group of participants were obese. The BMIs of the participants ranged from 18.00 to 50.00. As I measured BMI by one item, the Cronbach's alpha was not applicable to this scale. The BMI variable did display normality as evidenced by a $z_{skewness}$ value of 1.86.

Table 3

Descriptive Statistics: Study Variables (n = 350)

Variables	M	SD	Min	Max	α	$Z_{skewness}$
Food Insecurity	3.04	1.19	1.00	5.00	N/A	-0.19
Depression	12.54	6.90	1.00	30.00	.92	0.59
Diabetes Self-Management Practices	1.46	1.18	0.00	3.00	.70	0.25
Body Mass Index (BMI)	31.69	6.83	18.00	50.00	N/A	1.86

Testing of Covariates

I conducted a Pearson bivariate correlation with the variable of BMI to assess whether it was significantly associated with the mediator of depression and the dependent variable of

diabetes self-management practices. Results showed that BMI was significantly associated with depression ($r(350) = .11$, $p = .039$); as BMI increased, so did the levels of depression among participants. BMI was not significantly associated with diabetes self-management practices ($r(350) = .01$, $p = .901$).

I conducted additional statistical tests to determine if the demographic variables of age, employment status, highest level of education, and relationship status were significantly associated with the variables of depression and diabetes self-management practices. I conducted a Pearson bivariate correlation with the variable of age; the results showed that age was significantly associated with depression ($r(350) = .11$, $p = .034$); as age increased, so did depression. Age was not significantly associated with diabetes self-management practices ($r(350) = .02$, $p = .737$).

I conducted a series of Spearman's rho correlations, the non-parametric equivalent to Pearson bivariate correlations (Agresti, 2013), between the variables of income level, employment status, highest level of education, and relationship status and depression and diabetes self-management practices. Results from the Spearman's rho correlations, which are presented in Table 4, showed only one significant association: highest level of education was significantly associated with diabetes self-management practices ($r_s(350) = .134$, $p = .012$). As education level increased, so did engagement in diabetes self-management practices.

Table 4

Spearman's Rho Correlations: Income Level, Employment Status, Highest Level of Education, and Relationship Status and Depression and Diabetes Self-Management Practices (n = 350)

	Depression	Diabetes Self-Management Practices
Income Level	-.089	.011
Employment Status	.092	.071
Highest Level of Education	.087	.134*
Relationship Status	.070	-.082

Note. Highest level of education was recoded to 1 = less than high school, 2 = high school graduate, and 3 = some college/college graduate.

To summarize the results from covariate testing, BMI was significantly associated with depression, as was age; as BMI and age increased, so did levels of depression. BMI was not significantly associated with diabetes self-management practices. Only one variable, highest level of education, was significantly associated with diabetes self-management practices.

Testing of the Assumption of Lack of Multicollinearity

An important assumption for linear regression analyses is a lack of multicollinearity between the independent and mediating variables (Garson, 2012). Lack of multicollinearity is tested by computing a variance inflation factors (VIF), and if the VIF is less than 4.00, the assumption of lack of multicollinearity has been met (Garson, 2012). I computed a VIF for the relationship between food insecurity, the independent variable, and depression, the mediating variable. The VIF was 1.01, which indicated that the assumption of lack of multicollinearity was met. Statistical tests and results for the remaining assumptions of independence of errors, linearity between independent and dependent variables, and homoscedasticity are presented prior to the results of hypothesis testing.

Research Questions: Results of Hypotheses Testing

In this study, I posed three research questions. Based on the results of the testing of covariates, when hypothesis testing involved the examination of depression as the dependent

variable, the variables of BMI and age were included as covariates, and I conducted hierarchical multiple linear regression (HMLR) analyses. When hypothesis testing involved the assessment of diabetes self-management practices as the dependent variable, the only covariate included in the testing was highest level of education, and I conducted hierarchical linear regression (HLR) analyses.

In the following sections, I will provide results for each of the linear regression analyses conducted for the three research questions. Prior to the presentation of findings, results from statistical tests conducted with regard to the assumptions of independence of errors, linearity between the independent and dependent variable, and homoscedasticity are presented. The assumption of independence of errors indicates a lack of autocorrelation between regression residuals (Garson, 2012). I tested this assumption by calculating a Durbin-Watson value; if the Durbin-Watson value is between 1.00 and 3.00, the assumption of independence of errors has been met. The assumption of linearity pertains to the requirement that the independent and dependent variables have a linear relationship while the assumption of homoscedasticity concerns the requirement that regression residuals are similar across all values of the independent variable. These two assumptions are tested by computing a scatterplot of actual and predicted regression residuals. A scatterplot with residuals dispersed in a uniform manner (i.e., residuals are not scattered in a bow-like or vertical pattern) indicates that the assumption of linearity has been met, while residuals that are equally scattered above and below the horizontal 0 indicate that the assumption of homoscedasticity has been met (Garson, 2012).

Research Question 1

The first research question was, “Does household food insecurity significantly relate to diabetes self-management practices, in a sample of low-income African American women, ages

50 and older?" To address this question, I conducted a hierarchical linear regression (HLR). As covariate testing showed that education level was significantly associated with diabetes self-management practices (BMI was not), the first model of the HLR included the covariate of education level as a predictor. The second model of the HLR included food insecurity as the predictor variable. Diabetes self-management practices was the dependent variable.

The assumption of independence of errors was tested by calculating a Durbin-Watson statistic. The Durbin-Watson statistic was 1.79; as the Durbin-Watson value was between the values of 1.00 and 3.00, the assumption of independence of errors was met. The assumptions of linearity and homoscedasticity were tested by computing a scatterplot of actual and predicted regression residuals, which is presented in Figure 2. The uniform dispersion of the residuals signified that the assumption of linearity was met, while the residuals equally dispersed above and below the horizontal 0 indicated that the assumption of homoscedasticity was met.

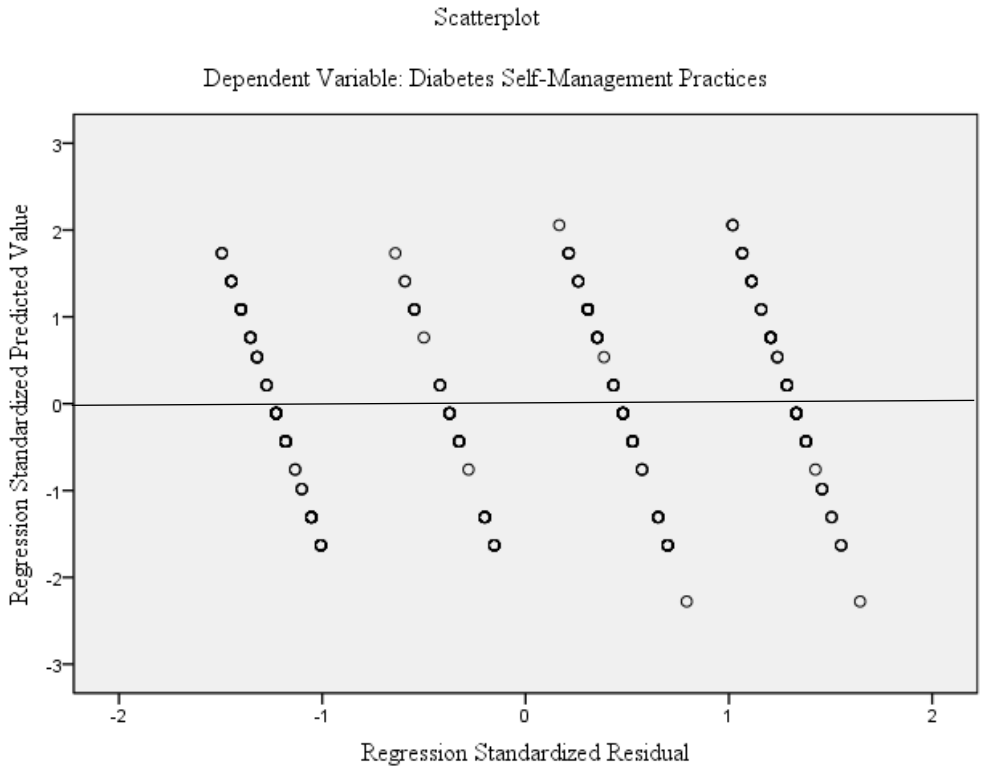

Figure 2. Scatterplot of residuals: Food insecurity predicting diabetes self-management practices

Results of the HLR are presented in Table 5. The first HLR model was significant ($F(1,348) = 6.61$, $p = .011$, $R^2 = .019$). Education level was a significant predictor of diabetes self-management practices ($\beta(350) = .137$, $p = .011$), and based on the R^2 of .019, a small effect size, education level explained 1.9% of the variance in diabetes self-management practices. As education level increased, so did engagement in diabetes self-management practices.

The second model of the HLR, in which food insecurity was entered as a predictor of diabetes self-management practices, was not significant ($F(1,347) = 0.69$, $p = .406$, $R^2 = .002$). Food insecurity did not significantly predict diabetes self-management practices ($\beta(350) = -.049$, $p = .406$). Education level, however, remained a significant predictor of diabetes self-management practices in the second model of the HLR ($\beta(350) = .157$, $p = .008$). As food insecurity was not significantly associated with diabetes self-management practices, I accepted the null hypothesis for the first research question.

Table 5

Hierarchical Linear Regression: Education Level and Food Insecurity Predicting Diabetes Self-Management Practices (n = 350)

	Model 1			Model 2		
	B	SE B	B	B	SE B	β
Education Level	.223	.087	.137*	.258	.096	.157**
Food Insecurity				-.055	.066	-.049
F/F_{change}	6.61			0.69		
R^2_{change} *for* F/F_{change}	.019			.002		
p	.011			.406		

Note. *$p < .05$; **$p < .01$

Research Question 2

The second research question was, “Does depression significantly relate to diabetes self-management practices in a sample of low-income African American women, ages 50 and older?”

As diabetes self-management practices was the dependent variable, the only covariate entered in the HLR analysis was education level (BMI was not significantly associated with diabetes self-management practices). I entered education level as a predictor on the first model of the HLR, followed by depression on the second model of the HLR. Diabetes self-management practices was the dependent variable.

To determine if the assumption of independence of errors was met, I calculated a Durbin-Watson statistic. The Durbin-Watson statistic value of 1.71 signified that the assumption of independence of errors was met. I computed a scatterplot of actual and predicted regression residuals to test if the assumptions of linearity and homoscedasticity were met. As seen in Figure 3, the uniform dispersion of the residuals indicated that the assumption of linearity was met, while the residuals equally dispersed above and below the horizontal 0 indicated that the assumption of homoscedasticity was met.

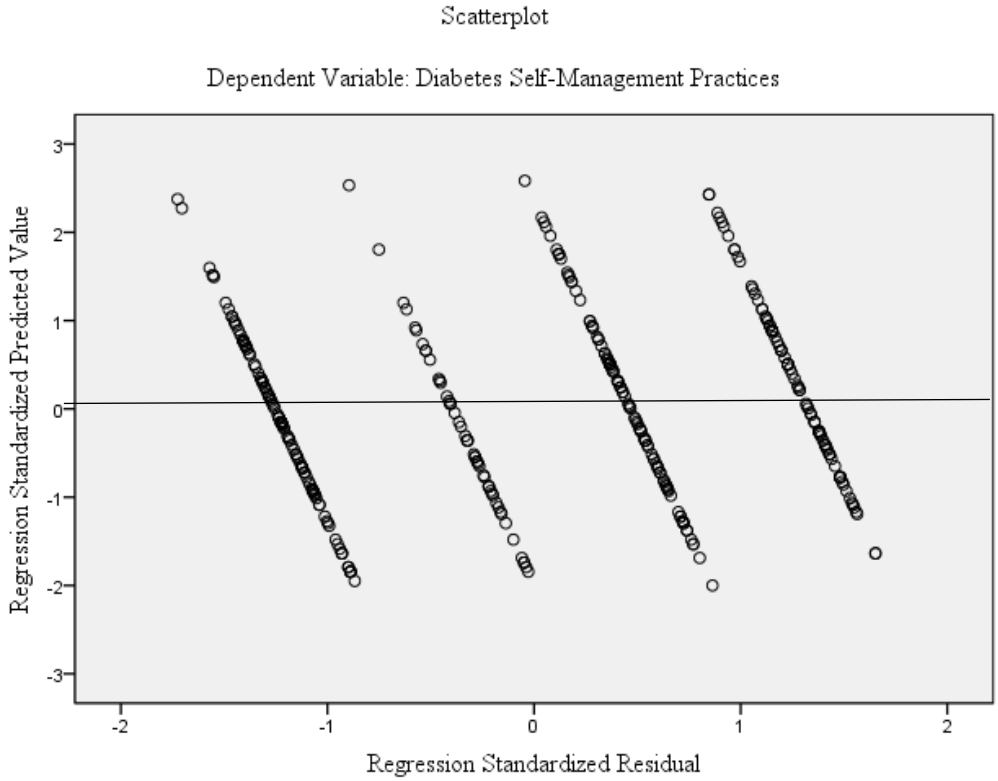

Figure 3. Scatterplot of residuals: Education level and depression predicting diabetes self-management practices.

Results of the HLR conducted for the second research question are presented in Table 6. As seen in the first HLR, the first model, with education level predicting diabetes self-management practices, was significant ($F(1,348) = 6.61$, $p = .011$, $R^2 = .019$). Education level was significantly associated with diabetes self-management practices ($\beta(350) = .137$, $p = .011$), and it explained 1.9% of the variance in diabetes self-management practices. As education level increased, so did engagement in diabetes self-management practices.

The second model of the HLR, in which depression was entered as a predictor of diabetes self-management practices, was also significant ($F(1,347) = 6.98$, $p = .009$, $R^2 = .019$). Depression was significantly associated with diabetes self-management practices ($\beta(350) = -.140$, $p = .009$), and based on the R^2 of .019, a small effect size, depression explained 1.9% of the variance in diabetes self-management practices. Education level remained a significant predictor of diabetes self-management practices in the second model of the HLR ($\beta(350) = .121$, $p = .023$). As depression was significantly associated with diabetes self-management practices, I rejected the null hypothesis for the second research question.

Table 6

Hierarchical Multiple Linear Regression: Education Level and Depression Predicting Diabetes Self-Management Practices (n = 350)

	Model 1			Model 2		
	B	SE B	β	B	SE B	β
Education Level	.223	.087	.137*	.199	.087	.121*
Depression				-.024	.009	-.140**
F/F_{change}	6.61			6.98		
R^2_{change} *for* F/F_{change}	.019			.019		
p	.011			.009		

Note. *$p < .05$; **$p < .01$

Research Question 3

The third research question was, "Does depression mediate between household food insecurity and diabetes self-management practices in a sample of low-income African American women, ages 50 and older?" Mediation requires that the independent and mediating variables are significantly associated with one another, that the independent and dependent variables are significantly associated with one another, and that the mediating and dependent variables are significantly associated with one another. The first research question addressed the relationship between the independent variable of food insecurity and the dependent variable of diabetes self-management practices. Food insecurity did not significantly predict diabetes self-management practices ($\beta(350) = -.049$, $p = .406$). The second research question addressed the relationship between the mediator of depression and the dependent variable of diabetes self-management practices. Depression was significantly associated with diabetes self-management practices ($\beta(350) = -.140$, $p = .009$).

The lack of significance between food insecurity and diabetes self-management practices precluded the ability to conduct hierarchical multiple linear regression (HMLR) for mediation. However, for interest, I conducted an HMLR to examine if food insecurity, the independent variable, was significantly associated with depression, the mediating variable. As covariate testing determined that BMI and age were significantly related to depression, I entered these as predictors in the first model of the HMLR. I entered food insecurity as a predictor on the second model of the HMLR. Depression was the dependent variable.

I computed a Durbin-Watson statistic to assess if the assumption of independence of errors was met. The assumption of independence of errors was met, as indicated by the Durbin-Watson value of 1.60. To determine if the assumptions of linearity and homoscedasticity were

met, I computed a scatterplot of actual and predicted regression residuals (Figure 4). As indicated by the uniform dispersion of the residuals, the assumption of linearity was met. As the residuals were equally dispersed above and below the horizontal 0, the assumption of homoscedasticity was met.

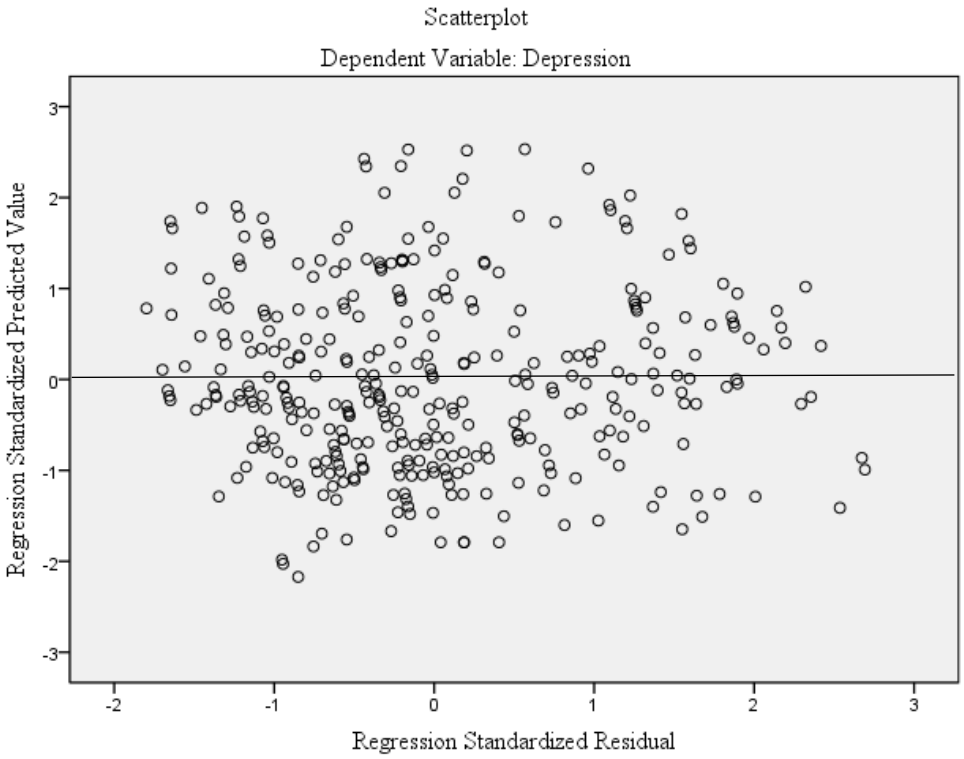

Figure 4. Scatterplot of residuals: BMI, age, and food insecurity predicting depression.

Results for the HMLR, with the covariates of BMI and age entered as predictors in the first model and food insecurity entered as the predictor on the second model, are presented in Table 7. The first model of the HMLR was significant ($F(2,347) = 3.83$, $p = .023$, $R^2 = .022$). While the overall model was significant, neither BMI nor age were significantly associated with depression ($\beta(350) = .096$, $p = .080$ and $\beta(350) = .097$, $p = .075$, respectively). As the two covariates were close to significance (as indicated by *p*-values of .080 and .075), the overall regression model was likely significant as a result of the combination of the two covariates. The

second model of the HMLR, with food insecurity predicting depression, was not significant ($F(1,346) = 0.20$, $p = .888$, $R^2 = .000$).

Two requirements for mediation were not met: Food insecurity, the independent variable, was not significantly associated with diabetes self-management practices, the dependent variable nor with depression, the mediating variable. Only one requirement was met; depression, the mediating variable, was significantly associated with diabetes self-management practices, the dependent variable. As two of the three requirements for mediation were not met, I accepted the null hypothesis for the third research question.

Table 7

Hierarchical Multiple Linear Regression: BMI, Age, and Food Insecurity Predicting Depression (n = 350)

	Model 1			Model 2		
	B	SEB	β	B	SEB	β
BMI	.096	.055	.095	.096	.055	.095
Age	.078	.044	.097	.077	.044	.096
Food Insecurity				.049	.349	.008
F/F_{change}	3.83			0.20		
R^2_{change} *for* F/F_{change}	.022			.000		
p	.023			.888		

Summary

The results of this study contributed to the health disparity literature regarding Type 2 diabetes management practices among a high-risk population, African American women age 50 and older living in poverty. In this study, I examined if food insecurity and depression were significantly associated with Type 2 diabetes self-management practices and assessed if depression mediated between food insecurity and Type 2 diabetes self-management practices. I used 2015 BRFSS data to answer the research questions. Of the 81,656 participants included in the 2015 BRFSS dataset, 1,074 were African American females, age 50 or older and of low-

income status. When limited to those with Type 2 diabetes, the sample was reduced to 350 low-income African American women, age 50 and older, the study sample. These data indicated that 32.6% of low-income African American women ages 50 and older had Type 2 diabetes, statistically similar to the population rate of 28%. The observed power for the study, with 350 participants, was a very robust .9999.

Results of the study did not meet all expectations. BMI was assumed to be significantly associated with depression and diabetes self-management practices and thus was initially included as a covariate. However, BMI was only significantly associated with depression. Two variables emerged as additional covariates: age, which was significantly correlated with depression, and highest level of education, which was the only covariate to be significantly associated with diabetes self-management practices. Indeed, as seen in the HLR results for the first research question regarding the relationship between household food insecurity and diabetes self-management practices, controlling for education level, highest level of education emerged as a significant predictor of diabetes self-management practices but food insecurity did not. As such, I accepted the null hypothesis for the first research question. Results from the HLR for the second research question regarding the association between depression and diabetes self-management practices, controlling for education level, showed that both the covariate of education level and the predictor of depression were significantly associated with diabetes self-management practices. The third and final research question inquired as to whether depression mediated between food insecurity and diabetes self-management practices, controlling for BMI and age. As the relationships between food insecurity and depression as well as diabetes self-management practices were not found to be significant, the requirements for mediation were not

met. As such, I accepted the null hypothesis for the third research question. The results of the study are discussed in consideration of the existing literature in Chapter 5.

Chapter 5: Discussion

African American females aged 50 and older have disproportionately higher rates of Type 2 diabetes, a disease that involves the insufficient production or processing of insulin resulting in elevated glucose levels, in comparison to their male and other ethnic group counterparts (CDC, 2015). Twenty-five percent to 30% of African American women 55 and older have a Type 2 diabetes, and this rate increases to 40% for African American women 65 and older (CDC, 2015; Okeke, 2016). Consistent engagement in diabetes self-management practices, such as daily checking of glucose levels and participation in diabetes education programs, helps to maintain health (Gucciardi et al., 2011, 2012, 2014; Sharma, 2017). The higher rates of Type 2 diabetes-related health problems (e.g., neuropathy, retinopathy, dementia) in African American older adult women, especially those in poverty, are likely associated with their inconsistent engagement in self-management practices (Cutrona et al., 2014; Gucciardi et al., 2009, 2013, 2014; NDEP, 2015). Three poverty-related factors—food insecurity, depression, and obesity—have shown to be significantly related to poor self-management practices among older African American females in poverty (Jack et al., 2012; Laraia, 2013; McNabb et al., 2014).

The potential cost to individuals and society has prompted a substantial and diverse body of public health empirical work on health disparities and chronic health issues among older adults, especially among people of color (Hurd et al., 2013; Mullings, 2014). Food security, depression, obesity, and Type 2 diabetes self-manage practices have acted as the focal points for public health research with various samples of ethnic minority males, females, and both groups of different ages (Baum et al., 2010; Black et al., 2015; Kerr et al., 2007; Quirk et al., 2013; Seligman et al., 2010, 2012). Few scholars, however, have examined these factors and their relationships among low-income African American women age 50 and older with Type 2

diabetes, the demographic with the highest rates of Type 2 diabetes and poorest diabetes self-management practices. Through this study, I addressed this gap in the public health literature by examining the relationship between food insecurity and diabetes self-management practices and mediational effects of depression between these two variables; obesity acted as a potential covariate. I utilized data from the 2015 BRFSS survey, using a national sample of African American women age 50 and older whose reported annual income was less than $25,000 a year and who had Type 2 diabetes.

This study yielded some expected and unexpected findings. Results showed that depression, but not food security, was significantly associated with Type 2 diabetes self-management practices. The lack of significance between food insecurity and Type 2 diabetes self-management practices and food insecurity and depression precluded the need to test for the potential mediational effects of depression. This lack of significance was unexpected, as were other outcomes. Two unexpected outcomes concerned obesity, as measured by BMI. First, obesity was not significantly associated with Type 2 diabetes self-management practices nor with depression (in HMLR analyses), despite the sample being on average obese. It was also unexpected that education level would emerge as a significant predictor of Type 2 diabetes self-management practices, which it did, even when depression was added to the HLR model. The purpose of this chapter is to present and review study results within the context of prior literature and Matthews's (2005) RCM, as well as to provide information on study limitations, recommendations, and implications.

Interpretation of Findings

Through this study, I aimed to contribute to the existing literature on depression and diabetes self-management practices (Baum et al., 2010; Kerr et al., 2007), and food insecurity

and diabetes self-management practices (Billimek & Sorkin, 2012; Gucciardi et al., 2014) among older African American women in poverty. I also addressed an empirical gap in the literature regarding depression as a potential mediator between food insecurity and Type 2 diabetes self-management practices, extending the existing empirical literature on the relationship between food insecurity and depression among older African American adults (Black et al., 2015; Ivers & Cullen, 2011; Quirk et al., 2013).

The emphasis on health disparities of this study necessitated the utilization of a culturally congruent theoretical framework, which was Matthews's (2005) reserve capacity model (RCM). The RCM postulates that poverty leads to an increase in stressors, which interact with coping mechanisms and resources—reserve capacities—to influence emotions and cognitions; these, in turn, affect intermediate health behaviors and ultimate health morbidity and mortality outcomes (Matthews, 2005). In the empirical literature on cardiovascular health among ethnic minorities, researchers have most frequently utilized the RCM. This theory has yet to be used to examine the relationship between depression, food insecurity, and diabetes in an ethnic minority groups. The following sections include discussions of the study findings with regard to prior empirical work and theory.

Interpretation of Findings: Prior Literature

The study yielded findings that were and were not consonant with prior literature. The results indicated that depression was significantly associated with Type 2 diabetes self-management practices. This finding has been supported in prior literature (Lamers et al., 2011; Rovner et al., 2013; Shim et al., 2013) conducted with African American women. This finding is notable, as the study participants were not a clinical sample, as they were in the studies by Lamers et al. (2011) and Papelbaum et al. (2011). In addition, the mean score of 12.54 days of

depression per month was not considerably high. It may be that even low levels of depression may impair Type 2 diabetes self-management practices among older African American females in poverty.

Prior researchers (Franklin et al., 2012; Laraia, 2013; Seligman et al., 2012) have indicated that food insecurity significantly predicted Type 2 diabetes self-management practices directly and indirectly, through elevated levels of depression. The lack of significance of these relationships in this study was counter to the majority of findings in this body of health disparities empirical literature; neither food insecurity nor depression was significantly associated with Type 2 diabetes self-management practices. It is unclear why the findings were not significant. Food insecurity was significantly associated with income level in this study, although income was not significantly associated with either depression or Type 2 diabetes self-management practices in this study.

Food insecurity is often significantly associated with poverty—indeed, it is an indicator of low socioeconomic status—and poverty has been consistently linked to poor self-management of diabetes in older adult African American women (Cutrona et al., 2014; Jack et al., 2012; Nguyen et al., 2013; Quirk et al., 2013). The lack of significant findings may have resulted from the use of data from African American women living in poverty. The older age of the study participants, who were between the ages of 50 and 90, may have been a factor. Some scholars have suggested that older low-income African American women define poverty differently when compared to their younger counterparts (Dovidio, Gaertner, Ufkes, Saguy, & Pearson, 2016; Mickelson & Hazlett, 2014). Mickelson and Hazlett found that older low-income African American women defined poverty within the context of their own sense of responsibility, goals, and behaviors, whereas their younger counterparts were more likely to

perceive poverty within the context of "others," including children, romantic partners, and the government.

Just as characteristics of the participant may have influenced findings, so may have the characteristics of the study measures. This was one of few studies that utilized a multi-item Type 2 diabetes self-management practices scale. Most researchers have used single-item measures of glycemic control (Musselman et al., 2014; Papelbaum et al., 2011). Further, a primary issue concerning the literature on the topics of depression and food insecurity is the varied and diverse measures of these constructs utilized in empirical studies (Coates, 2013; Headey & Ecker, 2013; Nolte, Paniagua, & Yamada, 2013). The language and structure—as well as the culturally congruence and accessibility—of one measure over another (Elsworth, Newman, & Osborne, 2013; Landrine & Corral, 2014) may have influenced responses made by the African American women and the subsequent findings.

I expected that obesity would be a covariate—that is, that it would be significantly associated with the mediator of depression and the dependent variable of Type 2 diabetes self-management practices. Obesity was significantly associated with depression in correlational analyses, but lost significance when HMLR analyses were conducted. Obesity was not significantly associated with Type 2 diabetes self-management practices. The significant association between obesity and depression at the correlational level supports the results of prior research conducted with African American women (Collins, 2013; Javed et al., 2011; Johnson & Wesley, 2012; Sutherland, 2013). The descriptive statistic results showed that, on average, the sample of African American women were obese. A categorical measurement of BMI further indicated that 55.1% of participants had BMIs of 30 or higher, placing them in the obese category, and an additional 25.5% had BMIs between 25 and 29.99, which placed them in the

overweight category. These high rates of overweight and obesity are disconcerting; nonetheless, they correspond to rates found in prior studies with low-income older African American women (Allison et al., 2014; Strings, 2015). It may have been that there was not enough variability in BMI scores to affect Type 2 diabetes self-management practices scores.

With the exception of depression, the only other variable significantly associated with Type 2 diabetes self-management practices was highest level of education. Empirical studies conducted with White adults, ethnically diverse adult samples, and African American female samples (Collins, 2013; Coogan, Wise, Cozier, Palmer, & Rosenberg, 2012; Sutherland, 2013; Tanenbaum, Leventhal, Breland, Yu, Walker, & Gonzales, 2015) have found significant associations between highest level of education and various diabetes self-management practices, including having attended Type 2 diabetes education courses, routine exercise, eating a healthier diet, and limiting alcohol intake. Coogan et al. (2013) found that the highest level of education among African American women was significantly associated with lower BMI scores and higher rates of healthy eating and routine vigorous exercise. There has not been extensive examination of the association between education level and Type 2 diabetes self-management practices, and studies assessing these associations among low-income older African American women with Type 2 diabetes are virtually nonexistent.

Interpretation of Findings: Theory

In this study, I tested the relevance of Matthews's (2005) reserve capacity model (RCM), one of the few health disparity mediational models that consider the influence of low socioeconomic status on both psychological and physiological factors (Matthews, 2005). Using Matthews's (2005) RCM framework, I posited that under the condition of poverty and obesity—considered a *stressor*—and food insecurity—considered *reserve capacity* construct, specifically,

an *absence of tangible resources* factor—would significantly influence depression, identified as an *emotional state,* and diabetes self-management practices, denoted as a *health behavior intermediary*. I further posited that depression, an emotional state, would mediate between food insecurity, an absence of tangible resources construct, and diabetes self-management practices, a health behavior intermediary.

Only one pathway was significant: that of depression, an emotional state, predicting the health behavior intermediary of Type 1 diabetes self-management practices. There was an unexpected significant finding with regard to educational level, which could hypothetically be treated as an indicator of socioeconomic status. Highest level of education "is often used as a generic measure of" socioeconomic status in health research (Galobardes, Shaw, Lawlor, Lynch, & Smith, 2006). Further, the significant relationship between education level and obesity, a stressor, satisfied the RCM pathway of low socioeconomic status predicting a stressor. This relationship was not the focus of the current study. Moreover, education level was not significantly related to food insecurity, and income level was neither associated with obesity nor with food insecurity. Results from this study did not provide substantive support for the RCM and were in fact in line with nonsignificant results in 12 of 21 previous studies examined in the literature review of RCM-guided health literature (Matthews et al., 2008).

Limitations of the Study

It is important to recognize the strengths of an empirical study before reviewing the limitations. A notable strength of this study was the use of a national surveillance dataset, the 2015 BFRSS. The BFRSS national health surveillance system has an embedded quality assurance system that ensured the quality and integrity of that sampling procedures, participant recruitment, and selection processes, data collection, data cleaning and related study

methodology (Pierannunzi, Hu, & Balluz, 2013). The use of a national dataset further provided an assurance of a large-enough sample. (I e., the sample size was large enough to achieve power of .80; Lin, Lucas & Shmueli, 2011). While the sample of 350 participants was lower than what was projected (which was an n of 1,000). I determine through a post hoc power analysis that it resulted in power of, 99.

When discussing study limitations, it is crucial that findings be reviewed within the context of both statistical significance and practical significance (APA, 1994; LeFebvre, 2013; Rosen & DeMaria, 2012. Statistical significance pertains to the scientific credibility of study findings as reliable and credible estimates of the population statistic (Hojat & Xu, 2004; LeFebvre, 2011). A researcher with significant statistical findings, determined by probability set at what is considered "an arbitrary value of $p < 0.05$" (Ziliak & McCloskey, 2008, p. 3), rejects the null hypothesis, while a researcher whose findings are nonsignificant, as determined by $p > 0.05$, fails to reject the null hypothesis (Aguinis et al., 2010; Wilkinson, 2014). Practical significance concerns the degree, or magnitude, to which the differences or relationships have meaning to the participant and the population they represent; it refers the degree to which findings have practical value in the real world (Hojat & Xu, 2004; Lee & Mohajeri, 2012). There are numerous measures of effect size (e.g., Cohen's d, Cohen's, eta2, omega2) based on the statistical analysis used for hypothesis testing). Eta2 is the statistical measure of the effect size of real-life relationships, which can be reported for studies using variations of linear regression (e.g., HLR, HMLR) (Hojat & Xu, 2004; Lee & Mohajeri, 2012).

Researchers have increasingly reported effect sizes in their published research since the APA's (1994) statement that effect sizes be included along with the more traditional results (i.e.., model F-value and associated p-value, standardized beta weights and associated p-values) "to

convey the most complete meaning of the results" (Kelley & Preacher, 2012, p. 137). By following APA's (1994) recommendation, I provided evidence supporting Kotrlik et al.'s (2011) argument that "too many research results … are … described as significant, when they are in fact small" (p. 132). The probability (p) value for the overall regression model and for depression as a predictor of T2D self-management practices was $p = .009$. Many researchers believe that a p-value that is substantially lower than $p < .05$ - and closer to $p < .001$ - is indicative of a large difference or strong relationship (LeFebvre, 2013). The effect size for the regression model of education level and depression predicting T2D self-management practices was, however, quite small, $R2 = .019$: Education level and depression collectively explained 1.9% of the variance, leaving other unmeasured variables to explain the remaining 98.1% of the variance. Moreover, based on effect sizes, the treatment effect of 1.9% was small (Sullivan, 2012).

While the use of archival BRFSS data conferred numerous benefits to the study, including the enhancement of the study's external validity, the measurement of study constructs was constrained. I measured food insecurity using a single item. While single-item measures of food insecurity are "widely accepted as valid" (Siefert, Heflin, Corcoran, & Williams, 2001), it is unclear as to whether interpretation of the meaning of the item was consistent across participants. How one answers items on a food insecurity scales is influenced by how the items are written as well as how responses are coded (Siefert et al., 2001).

As the Kessler et al. (2002) 6-item Psychological Distress Scale (PDS) is only available in state module surveys, PDS item data was available from only 26 participants in this study. I replaced the PDS with two items measuring depression: "How many days in the past month have you experienced depression?" and "How many days in the past month has your depression prevented you from doing your usual activities?" These two items had excellent inter-item

reliability (Cronbach's alpha = .92), and the scale comprised of these two items was significantly associated with a formal diagnosis of depression; however, the use of a multi-item measurement of food insecurity and the PDS rather than the two depression items may have resulted in different—and potentially significant—outcomes.

Recommendations

An intent of this study was that it would inspire additional empirical work on study topics in the form of replication studies and studies that account for some of the limitations of this study. An imperative of the scientific method is that studies be replicated to enhance the validity, dependability, and generalizability of previous work (Bowling, 2014). Replication studies that use earlier BRFSS data would be worthwhile, as would longitudinal studies that utilize multiple BRFSS datasets to determine whether posited relationships change over time. The generalizability of findings would be enhanced by conducting studies that assess the postulated relationships by using different measure of food insecurity, depression, and Type 2 diabetes self-management behaviors. Studies that measure food insecurity at the scale level are especially important, as this study employed a single-item measure.

The narrow participant criteria of this study, while theoretically and empirically necessary, limited the generalizability of study findings. Future scholars should examine relationships between food insecurity, depression, and Type 2 diabetes self-management practices with different income level, age, gender, and ethnicity samples. Comparison studies that assess whether relationship differences emerge across differing, age, ethnicity, or age-by-ethnicity groups would greatly contribute to public health research. Studies that examine age, ethnicity, and age-by-ethnicity differences in the perception and understanding of study constructs, including poverty status, would contribute greatly to the existing literature on these

issues. The majority of participants in this study that were overweight/obese may have influenced results in this study, as obesity status has been shown to influence responses on study surveys (Van Zutven, Mond, Latner, & Rodgers, 2015). Empirical work with samples of African American women or adults who are of normal weight or diverse in weight would help to determine if overweight/obesity was in fact a contributing factor of nonsignificant and significant findings found in this study. Finally, health disparity theorists would benefit from studies that test theoretical frameworks positing similar but different interactions among obesity, food insecurity, depression, and Type 2 diabetes self-management practices.

Implications for Practice

One intent of this study was to raise societal awareness of health disparities as they relate to Type 2 diabetes among low-income older African American women. Two findings that emerged from this study of concern were the significant relationship between depression and T2D diabetes self-management practices and the high rate of overweight/obesity. Post-study analyses, conducted to gain additional understanding of the study participants, showed that the largest group (n = 113, 32.3%) of participants had engaged in no T2D self-management practices. These findings call for the development of educational programs that focus on increasing awareness among this population on the importance of consistent engagement in T2D self-management practices (i.e., to one's health, mental health, finances, and quality of life). Study findings also call for the need to promote positive social change in the form of preventative interventions aimed at weight-loss and/or reducing depression among African American women at risk for developing Type 2 diabetes, as well as diabetes medical interventions that focus on the treatment of obesity and depression to enhance the management as well as health and mental health corollaries of Type 2 diabetes. The development of such

programs and initiatives could ultimately lead to the reduction of healthcare costs for the treatment of diabetes, which increased from $174 billion in 2007 to $245 billion in 2012 (ADA, 2014; NDEP, 2015).

Results also showed an unexpected association between education level and Type 2 diabetes self-management practices. This finding has profound social importance, as it suggests that existing federal initiatives, including those funded by Medicaid, that are aimed at increasing ethnic minority—especially African American—student participation in dual enrollment and college readiness programs, encourage ethnic minority youth to stay in school, and provide funding for ethnic minority adults of any age to attend vocational school or college may help to reduce health disparities among African Americans. Grassroots initiatives such as literacy programs or the provision of transportation for the elderly to visit libraries, museums, or bookstores, seminars, or classes may have the unexpected benefit of promoting the health literacy of this population.

Conclusions

This was the first study to examine the relationships among obesity, food insecurity, depression, and Type 2 diabetes self-management practices in a theoretically and empirically valid sample of low-income African American women, ages 50 and older. The posited relationship between food insecurity and diabetes self-management practices nor the mediating effect of depression between these two factors was not supported in study findings. However, I found that depression was significantly associated with Type 2 diabetes self-management practices—as was education, unexpectedly.

America will see an increase in both the elderly and African Americans in the coming decades (Mullings, 2014). It is crucial that society is prepared to adjust for these coming

demographic changes by ensuring that such populations have health quality of life. The development of interventions that promote the health and well-being of ethnic minority older adults and elderly would not only enhance the health and wellbeing of these American citizens, it would also likely reduce healthcare costs for all Americans. Empirical research is necessary to ensure the soundness and validity of such interventions. It is my hope that this study will be one among many empirical catalysts that increase not only the development and implementation of culturally-congruent interventions, but also enhance societal awareness of the health and mental health concerns of ethnic minority individuals.

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Appendix A: Permission Letter

Pearlean Day
812 Charles Street
Ruleville, Mississippi 38771

January 4, 2015

Dr. Karen A. Matthews
Department of Psychiatry, WPIC
University of Pittsburg School of Medicine
3811 O'Hara Street
Pittsburg, PA 15213

Dear Dr. Matthews:

As stated in my previous e-mail, I am completing a doctoral dissertation at Walden University entitled *Food Insecurity, Depression, and Diabetes Self-Management Practices in Low Income African American Older Adult Women*. I am requesting your permission to reprint in my dissertation the Reserve Capacity Model from Matthews, K.A., & Gallo, L.C. (2011). Psychological perspectives on pathways linking socioeconomic status and physical health in the *Annual Review of Psychology*, 62, 501-521.

The diagram to be reproduced is your Reserve Capacity Model. In your article, Matthews (2005). It was posited that the RCM provides a sound framework in which to study psychosocial mediators. According to the RCM, low socioeconomic status can impact health outcomes directly as well as indirectly via influences and interactions with stressors, reserve capacities, emotional and cognitive factors, and intermediate behaviors. You postulated that low SES can frequently incur numerous chronic stressors, which can, over time, thwart one's reserve capacities, or personal resources, "that can otherwise buffer stress." Few if any studies have utilized Matthews's RCM to explain processes as they related to diabetes self-management practices.

Your signing of this document will confirm that you developed the model used and tested relationships between socioeconomic statues, psychosocial characteristics, and health outcomes. If the above documentation meets your approval, please sign, scan, and e-mail as soon as possible.

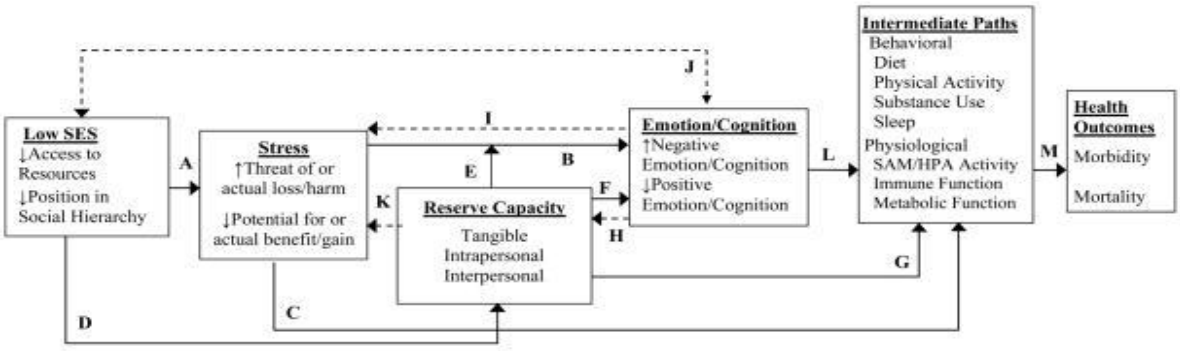
Thank you very much.

Sincerely,

Pearlean Day

PERMISSION GRANTED FOR THE USE REQUESTED ABOVE:

Appendix B: RCM Model



Matthews's (2005) Reserve Capacity Model