COMPARING DIABETIC AND NON-DIABETIC LATINXS: RACIAL DISCRIMINATION PERCEPTION, DEPRESSIVE SYMPTOMS, AND BLOOD PRESSURE

Irene Escobar, B.A.

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APPROVED:

Charles A. Guarnaccia, Committee Chair
Jennifer L. Callahan, Committee Member
Casey Guillot, Committee Member
Vicki Campbell, Chair of the Department of Psychology
Tamara L. Brown, Executive Dean of the College of Liberal Arts and Social Sciences
Victor Prybutok, Dean of the Toulouse Graduate School

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Associations between greater perceived racial discrimination and both higher levels of depressive symptomology and higher blood pressure have been established in the literature. Research has found that depression is often comorbid with diabetes and individuals with type 2 diabetes are at an increased risk for depression as the prevalence of depression is 2 to 3 times higher in people with diabetes when compared to the general population. Additionally, individuals with type 2 diabetes are also at an increased risk for high blood pressure. Although these associations are present in the literature, no studies have been found that examine all of these variables in conjunction. The current study used data from the 2014 Health and Retirement Study to examine the associations among perceived racial/ethnic discrimination, depression symptoms, and blood pressure for older Latinx adults (ages 50+) with type 2 diabetes (n = 303) and without type 2 diabetes (n = 521), while controlling for sex, age, partner status, and education. Findings indicated diabetes status was positively associated with both depression symptoms ($t(790) = 5.32$, $p < .001$) and systolic blood pressure ($t(703) = 2.74$, $p = .006$). Racial/ethnic discrimination was positively associated with depression ($r(206) = .14$, $p = .045$); however, it was not associated with blood pressure. No statistically significant interactions were found. Discussion focuses on possible explanations for the research findings, future directions, and clinical implications.

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CHAPTER 1

INTRODUCTION

Perceived racial discrimination has been acknowledged as a chronic stressor associated with detrimental outcomes on mental health and is a contributing factor to racial health disparities for ethnic minority populations (Pascoe & Smart Richman, 2009; Williams, Neighbors & Jackson, 2003). Approximately 41% of the U.S. population reported experiencing racial discrimination, with 71% of Black and 52% of Hispanic individuals reporting being discriminated against (Pew Research Center, 2016). Perceived racial discrimination is associated with adverse health outcomes in minorities including poorer physical and mental health as well as an increased risk for disease (Williams et al., 2003). Among these detrimental health outcomes are higher levels of depression (Zvolensky et al., 2019) and higher blood pressure levels (Dolezsar et al., 2014). Additionally, experiencing racial discrimination has also been associated with augmented physical stress responses and harmful health behaviors that may lead to diseases including alcohol and substance abuse (Pascoe & Smart Richman, 2009).

Diabetes has been acknowledged as "one of the largest global health emergencies of the 21st century" by the International Diabetes Federation and is a contributor to the top 10 death causes worldwide (International Diabetes Federation, 2017). Diabetes is a major health problem worldwide with approximately 366 million of adults being affected by this disease, and it is predicted that by 2030 this number will rise to 552 million (Fisher et al., 2012). There are two main types of diabetes, Type 1 diabetes which has an earlier onset often diagnosed in childhood and Type 2 diabetes which was historically diagnosed in adulthood in those over the age of (Centers for Disease Control and Prevention, 2017), but is becoming more common in younger individuals (Alberti et al., 2004). More than 30 million Americans have diabetes and

approximately 95% of these individuals have Type 2 diabetes. Type 2 diabetes is a disease in which the body has difficulty using insulin because of insulin resistance (Centers for Disease Control and Prevention, 2017). Ethnic and racial minorities have the highest rates of type 2 diabetes prevalence with approximately 15.1% of American Indians, 12.7% of non-Hispanic Blacks, 12.1% of Hispanics, and 8.0% of Asian Americans diagnosed with type 2 diabetes when compared to 7.4% of non-Hispanic Whites (American Diabetes Association, 2017).

Diabetes is associated with an increased risk of depression and depressive symptoms with at least one-third of individuals with diabetes experiencing depressive disorders (Roy & Lloyd, 2012). Diabetes and depression are both recognized as chronic disorders that have a negative impact on quality of life and reduce life expectancy (Roy & Lloyd). Research suggests the prognosis for diabetes and depression worsens when the disorders are co-morbid as it may lead to further complications. Among these complications are poor adherence to medical treatment, treatment resistance, and increased morbidity and mortality (Roy & Lloyd). The relationship between diabetes and depression appears to be bidirectional with diabetic individuals being at greater risk for depression and individuals with depression being at greater risk for diabetes (Kok, Williams, & Zhao, 2015; Roy & Lloyd). Research has attributed this bidirectional relationship to a range of common links between depression and diabetes including chronic stress, adverse lifestyles, biological influences, antidepressant side effects, and structural changes in the brain (Badescu et al., 2016).

Diabetes has also been associated with physical health complications, especially macrovascular complications. Research has assessed the connection between diabetes and cardiovascular problems and found that type 2 diabetes increases the risk of experiencing a myocardial infraction and stroke (Emdin et al., 2015). Additionally, individuals with type 2

diabetes typically have higher blood pressure levels, a risk factor for diabetes (Emdin et al.). More specifically, research has found that the prevalence of hypertension, or high blood pressure, is higher in patients with type 2 diabetes when compared to the general population (Pechère-bertschi et al., 2005). Approximately 40% of patients with type 2 diabetes also experience co-morbid hypertension by age 45 and an estimated 60% of patients experience this co-morbidity by age 75 (Pechère-bertschi et al.).

Although depression and high blood pressure have been linked to both individuals with Type 2 diabetes and individuals who experience racial discrimination, research has not examined these variables in conjunction, specifically whether individuals with type 2 diabetes who experience racial discrimination have higher levels of depression and higher blood pressure compared to those who do not experience racial discrimination. The current study aims to fill the gaps in the literature and explores the relationships between perceived racial discrimination, depression, and blood pressure levels among diabetic and non-diabetic Latinx individuals.

Data from the 2014 Health and Retirement Study dataset was used to examine these relationships. In terms of the organization of the paper, a review of the literature that examines racial discrimination, diabetes, depression and blood pressure is provided, particularly work related to the central research hypotheses.

CHAPTER 2

REVIEW OF THE LITERATURE

Racial Discrimination and Mental Health

An association between perceived racial discrimination and depressive symptomology has been established in the literature as individuals who report higher levels of racial discrimination also report higher levels of depressive symptoms compared to those who report lower levels of racial discrimination (Finch, Kolody, & Vega, 2000). This association is present across individuals of different ages including adolescents who experience racial discrimination (Yip, 2015). Research has also demonstrated the immediate effects racial discrimination has on mental health. Torres & Ong (2010) assessed the relationship between discrimination and depression among Latino adults through the use of a daily diary method and found that levels of depression were significantly higher a day after experiencing a discriminatory event. Longitudinal studies have also revealed that this relationship holds over time. Schulz et al., (2006) found that an increase in discrimination over a 5-year period was associated with higher depression symptoms and lower self-reported general health status among a sample of Black women.

Perceived racial discrimination has also been associated with several other negative psychological outcomes among ethnic minority populations including anxiety, obsessive-compulsive symptoms, somatization, and posttraumatic stress disorder (Carter & Forsyth, 2010). Research has also found that perceived racial discrimination is associated with both higher psychological distress and a higher body mass index, which in turn may lead to sleep disturbances (Garcini et al., 2018). Gee et al., (2007) examined the relationship between racial discrimination and prevalence of DSM-IV disorders among Asian Americans, where results

indicated self-reported racial discrimination was associated with greater odds of having a DSM-IV disorder. After controlling for sociodemographic factors, individuals who reported discrimination had double the risk of having one mental disorder and triple the risk of having two or more mental disorders. Due to this study being cross-sectional, the directionality of this relationship may seem unclear, however, previous longitudinal research conducted by Torres and Ong (2010) noted above, establishes the temporal influence racial discrimination has on increases in depressive affect the next day. Similarly, additional longitudinal studies examining racial discrimination have also established temporal influences between discrimination and etiology of depressive symptoms (English, Lambert & Ialongo, 2014; Stein et al., 2016). English et al., 2014 conducted a 4-year study examining the impact of racial discrimination on depressive symptomology among African American adolescents. The study controlled for previous and existing depressive symptomology so that results were not confounded by previous depressive symptoms. Researchers found that experienced racial discrimination predicted depression symptoms, and no evidence was found to suggest depressive symptoms predicted experienced racial discrimination, indicating racial discrimination predicted depressive symptoms longitudinally. Similarly, Stein et al., 2016 also conducted a 4-year longitudinal study on the association between racial discrimination and depressive symptomology among African American and Latino adolescents and found that perceived racial discrimination from peers and adults was associated with greater depressive symptoms.

A meta-analysis examined the relationship between greater perceived racial discrimination and poorer physical and mental health among 53 research studies and found that the association is stronger for mental health (Williams, Neighbors, & Jackson, 2003). Among these 53 studies, 38 studies found positive associations between greater discrimination and

poorer mental health and 16 studies found a positive association between greater discrimination and poorer physical health outcomes (Williams, Neighbors, & Jackson). Of note, there were 9 studies that found either a conditional association (positive association only under some conditions) or no association between discrimination and mental health, and 18 studies that found either a conditional association or no association between discrimination and physical health. None of the studies found negative associations. The negative mental health outcomes measured in the studies included psychological distress, well-being, self-esteem, major depression, anxiety disorders, and anger. Among the physical health studies health outcomes included self-rated health, blood pressure and cardiovascular disease (Williams, Neighbors, & Jackson).

Similarly, a more recent meta-analysis examined the relationships between discrimination, mental health and physical health among 134 studies by testing the strength of the relationships quantitatively and found similar results. The relationship between discrimination and mental health outcomes yielded a small, but significant correlation of (r = -.16) indicating there was a positive association with greater discrimination being associated with poorer mental health (Pascoe & Smart Richman, 2009). Among the mental health variables included in the studies were symptoms of depression, anxiety, psychological distress, general well-being, and life satisfaction. Analyses investigated whether any mental health variables accounted for a stronger relationship and results indicated all mental health outcomes were equal in strength (Pascoe & Smart Richman). The relationship between discrimination and physical health was also examined and yielded a small, but significant correlation of (r = -.13) (Pascoe & Smart Richman). Physical health outcomes assessed in the studies included blood pressure, hypertension, cardiovascular disease, and other physical conditions and diseases. An analysis

was conducted in order to examine the differential relationship between mental health and physical health outcomes in relation to discrimination; although the correlation between discrimination and mental health outcomes appeared stronger, no significant differences were found (Pascoe & Smart Richman).

Racial Discrimination and Physical Health

Although previous research has established a stronger relationship between racial discrimination and mental health outcomes, research indicates detrimental physical health effects are also present (Williams & Mohammed, 2013). Racial discrimination is a chronic stressor and as a result may lead to physiological changes within the body including high blood pressure, higher cortisol levels, and increased heart rate which can lead to overall poor physical health over time (Pascoe & Smart Richman, 2009). Chronic stressors are known to increase vulnerability to physical illnesses and produce higher allostatic load. Allostatic load is the long-term effect of repeated exposure to stress that involves a heightened neuroendocrine response which in turn can accelerate disease processes (Pascoe & Richman). The physical health consequences associated with perceived racial discrimination include cardiovascular disease, hypertension, and negative self-report global ratings of health (Williams & Mohammed). Research has also found that perceived racial discrimination is associated with a greater likelihood of heart attack and minor heart conditions as well as arteriosclerosis; moreover, individuals who report multiple forms of perceived discrimination in addition to racial discrimination are at greater risk for these same negative outcomes (Udo & Grilo, 2017). In regard to adverse physical health outcomes among individuals with diabetes, research shows that perceived racial discrimination is also associated with worse diabetes management including lower probability of receiving a hemoglobin A1c test, a diabetic foot exam, and blood pressure

exam (Ryan, Gee, & Griffith, 2008).

Blood pressure and its relationship with racial discrimination has been a focus of interest in the literature particularly because results have been variable with some studies showing a positive association, others a conditional association, and some finding no association (Williams, Neighbors & Jackson, 2003). An explanation for these mixed results may be that individuals of different demographics respond to discrimination in distinct physiological ways thus leading to complex results across studies. Recent research indicates the effects of racial discrimination on blood pressure may vary among individuals of different ages. Evidence suggests exposure to lifetime racial/ethnic discrimination is associated with elevated ambulatory diastolic blood pressure in middle-aged and older adults compared to younger adults (Beatty Moody et al., 2016). Older adults who experience lifetime exposure of racial/ethnic discrimination may have a greater risk for cardiovascular related problems and blood pressure elevations due to the chronic nature of race-related stress, cumulative changes in the physiological processes, and an aging cardiovascular system. Additionally, cohort effects may also be responsible for these outcomes as older adults may have been born in a period where discrimination was more overt and blatant possibly leading to intensified reactions to discrimination experienced later in life (Beatty Moody et al.).

In addition to poor health outcomes, perceived racial discrimination has also been positively associated with maladaptive coping responses and health behaviors including cigarette and alcohol use, two of the leading preventable risk factors for morbidity and mortality in the U.S. (Chavez, Ornelas, Lyles, & Williams, 2015; Williams et al., 2013). Researchers found that there was a 26.7% smoking prevalence rate among Black adults who reported experiencing frequent racial discrimination in comparison to a 6.4% smoking prevalence rate among those

who reported infrequent racial discrimination (Landrine & Klonoff, 2000). Furthermore, the experience of stress within the discrimination also covaried with smoking rates as those who perceived discrimination as being extremely stressful had higher smoking rates (42.2%) when compared to those who reported it being mildly stressful (20.8%) (Landrine & Klonoff). Numerous studies have indicated a positive association between racial discrimination and alcohol use. Researchers found that Blacks who experienced racial/ethnic discrimination had a 51% greater odds of reporting drinking and Hispanics who experienced racial/ethnic discrimination had 62% greater odds of heavy drinking when compared to their counterparts who did not report being discriminated against (Borrell et al., 2010). Unhealthy stress coping mechanisms like alcohol use and smoking may help reduce stress and anxiety experienced by discrimination but may lead to health complications and increase the risk of multiple health diseases (Pascoe & Smart, 2009).

Diabetes and Ethnicity

Extensive research has documented the higher prevalence of type 2 diabetes among ethnic and racial minorities compared to non-Hispanic Whites with a prevalence rate twice as high when compared to their similar age non-Hispanic White counterparts (Hernandez et al., 2016; Noya, Chesla, Waters, & Alkon, 2020). Multiple factors help explain health disparities in diabetes including biological factors, health behaviors, healthcare aspects, and social factors (Spanakis & Golden, 2013). Biological factors that account for higher rates of diabetes among ethnic and racial minorities include differences found in glycemic control. Evidence suggests Black and Latino adults have worse glycemic control when compared to White adults and have higher levels of HbA1c, a measure of poor glycemic control (Heisler et al., 2007; Spanakis & Golden). In addition, studies show that Blacks and Hispanics have increased insulin resistance

when compared to Whites (Spanakis & Golden). Obesity, a risk factor for type 2 diabetes, is also higher among ethnic minorities in the U.S. with 49.5% of Blacks and 40.4% of Mexican-Americans having obesity compared to 34.3% of Whites (Golden et al., 2012). These higher levels of obesity among ethnic minorities may in part be due to lower levels of physical activity compared to Whites (Golden et al., 2012).

In addition to biological factors, social and environmental factors also play a role in the development of type 2 diabetes. Minorities often live in low socioeconomic neighborhoods and as a result may have a difficult time accessing healthy food, lack in exercise opportunities, and experience higher crime rates, all leading to poor health outcomes. Research has found that advantaged neighborhoods have been associated with positive diabetes treatment outcomes including improved insulin sensitivity and a decreased risk for type 2 diabetes whereas disadvantaged neighborhoods have been associated with increased smoking, physical inactivity, and poor blood pressure control, all of which may lead to diabetes and related complications (Spanakis & Golden, 2013).

Healthcare access is another factor to take into consideration as it has an influence on diabetes management. It is more likely for minorities with diabetes to lack health care insurance when compared to Whites (Spanakis & Golden, 2013). This lack of insurance makes it less likely for them to receive preventative health care services and as a result have higher odds of developing other conditions secondary to diabetes and have poor glycemic control (Spanakis & Golden). In addition, studies have shown that ethnic minorities often receive lower quality of care from medical providers (Ricci-Cabello, Ruiz-Perez, Labry-Lima, & Marquez-Calderon, 2010).

Latinxs and Diabetes

Research specific to Latinxs with type 2 diabetes have pointed to social factors including lack of insurance, financial barriers to medication use, and limited English proficiency as contributors to having worse glycemic control compared to their non-Latino counterparts (Fernandez et al., 2011). Language barriers are an impediment in diabetes management due to the chronic nature of the condition and the responsibility of the patient to have extensive knowledge of the disease, actively manage the disease, and remain in constant communication with the health care system. Evidence suggests limited English proficient Latinx diabetic patients are more likely to have poorer glycemic control when they have a physician who does not speak their native language (Fernandez et al).

Previous literature findings indicate language barriers between physicians and Latinx patients contribute to poorer communication, less satisfaction with care, poor treatment adherence, problems with medication comprehension, and less use of health services even among insured patients (Alvidrez & Pérez-Stable, 2017; Fernandez et al). A recent pre-post comparative study found that Latinx diabetic individuals who went from seeing a language-discordant physician to seeing a language-concordant physician resulted in significant improvement in both glycemic control and low-density-lipoprotein control (LDL) compared to individuals who went from one language-discordant physician to another language-discordant physician (Parker, Fernández, Moffet et al., 2017). Researchers acknowledge that having a language-discordant physician may be a disservice to the patient and negatively influence their diabetes self-management and medication adherence (Fernandez et al).

Somewhat related to this, acculturation and its relationship to diabetes management in Latinxs is another important aspect that has been examined. Researchers aimed to explore the

extent to which acculturation influenced diabetic Latinxs' health lifestyles, considering successful diabetes management largely relies on a healthy diet and exercise regimen (Mainous, Diaz, & Geesey, 2008). Research indicates more acculturated diabetic Latinxs tend to have less healthy diets when compared to diabetic Latinxs who are less acculturated. Specifically, more acculturated diabetic Latinxs were less likely to have diets high in fiber and lower in saturated fats compared to their counterparts. This is consistent with previous research findings showing that higher levels of acculturation are associated with low intake of fruits and vegetables and higher intake in fats (Mainous et al.). More traditional high-fiber diets that include consumption of vegetables and fruits and low-fat diets are shown to help prevent diabetes and other diseases that are common with diabetes such as obesity and coronary heart diseases (Kaline et al., 2007). Acknowledging the complex differences in diabetes management and health lifestyle among the Latinx ethnic subgroup is important in the understanding of racial and ethnic disparities in diabetes.

Diabetes and Depression

There is a bidirectional relationship between diabetes and depression such that individuals with type 2 diabetes have twice the prevalence rate of depression compared to the general population and having a primary diagnosis of depression may increase the incidence of developing diabetes (Badescu et al., 2016; Fisher et al., 2012). This bidirectional association can be understood through biological factors as well as psychosocial factors that may contribute to this complex relationship. For instance, biological mechanisms in individuals with diabetes such as vascular damage responsible for brain pathology has been found to increase vulnerability for depression in individuals with diabetes (Devarajooh & Chinaa, 2017). Additionally, researchers acknowledge a common link between diabetes and depression as diabetes often induces

structural changes in the brain including atrophy of the hippocampus and blood flow changes analogous to the neurodegenerative processes of hippocampal atrophy found in individuals with depression (Badescu et al.). Researchers posit that an explanation for why depressed individuals may be at greater risk for developing diabetes is through the use of antidepressants as research shows antidepressants may significantly increase levels of HbA1C (Badescu et al.)

Chronic stress is another common link for the relationship between diabetes and depression (Badescu et al.). A chronic stressor is defined as a persistent negative experience that produces threat in an individual (Williams & Mohammed, 2009). An example of a chronic stressor is racial discrimination because it can take a toll on a person's body and increase vulnerability for physical illness as well as increased allostatic load (Pascoe & Smart Richman, 2009). Persistent exposure to chronic stress activates the HPA-axis and the sympathetic nervous system (SNS) leading to an increase in the production of cortisol (Badescu et al.). Research has found that hypercortisolemia and a prolonged SNS activation can lead to insulin resistance, obesity, metabolic syndrome and type 2 diabetes (Badescu et al.). These mechanisms have also been identified as having a role in depression and excess cortisol has been acknowledged to have an effect on the hippocampus, a brain region involved in both depression and type 2 diabetes (Badescu et al.). Additionally, chronic stress has been shown to increase inflammatory cytokine production which in turn induces insulin resistance increasing the risk of type 2 diabetes. An increase in inflammatory cytokines has also been linked to depression suggesting that chronic stress and its consequences may promote both depression and type 2 diabetes (Badescu et al.).

The bidirectional relationship between diabetes and depression can also be attributed to psychosocial factors such as the burden of the disease and lifestyle. Living with the challenges of diabetes can become overwhelming and often lead to negative emotions including feelings of

guilt, hopelessness, and depression (Kok, Williams, & Zhao, 2015). Individuals who have poor diabetes management can have additional feelings of inadequacy, and a sense of powerlessness over their diabetes which can also contribute to developing or worsening their depression (Kok, Williams, & Zhao). Research has shown that diabetes with co-morbid depression is associated with nonadherence to diabetes management, worse self-care behaviors including poorer diet, less exercise and less blood glucose monitoring leading to higher blood sugar, and microvascular and macrovascular complications. Thus, these behavioral management shortfall result in increased morbidity and mortality compared to diabetic individuals without co-morbid depression (Hermanns et al., 2013; Kok, Williams, & Zhao). Lifestyle may also play a role in the bidirectional relationship as a study found that individuals with previously undiagnosed diabetes had a higher prevalence of depression indicating that physical inactivity and an unhealthy diet may be mechanisms influencing both (Badescu et al., 2016). Individuals with diabetes may have dietary and physical limitations and can experience symptoms such as fatigue often induced by hyperglycemia, which taken together may induce depressed mood (Rotella & Mannucci, 2013).

Research shows that diabetic individuals with co-morbid depression have significantly worse quality of life when compared to those with only one of the conditions or neither of the conditions (Hermanns et al., 2013). This can be seen through an increase of sick days and more frequent hospital visits in those with co-morbid depression compared to those who only have diabetes. Although this diabetes-depression co-morbidity is prevalent, the depression is often underdiagnosed and as a result left untreated in individuals with diabetes (Campayo et al., 2011). Due to depression sharing many common symptoms with diabetes such as fatigue and weight and appetite changes, medical professionals may have a difficult time recognizing when a diabetic patient has co-morbid depression (Kok, Williams, & Zhao, 2015). In order to improve

quality of life among diabetic patients and improve patient self-care behavior, medical health providers should keep in mind the high co-morbidity rate between diabetes and depression and improve recognition of depression (Hermanns et al., 2013).

Diabetes and Blood Pressure

Hypertension (defined as a blood pressure ≥130/80mmHg) is often co-morbid with diabetes affecting approximately 20 to 60% of diabetic individuals depending on their demographic background including age and ethnicity (Arauz-Pacheco, Parrott, & Raskin, 2003). Individuals with diabetes generally have higher blood pressure than those without diabetes; additionally, individuals with diabetes are two to three times higher risk at every level of systolic blood pressure for developing cardiovascular disease (ACCORD Study Group, 2010; Emdin et al., 2015). Cardiovascular disease (CVD) is the leading cause of death among adults with diabetes and the risk of stroke and cardiovascular morbidity and mortality doubles when an individual with diabetes is hypertensive (Fox et al., 2015; Grossman, Messerli, & Goldbourt, 2000). Hypertension is a risk factor that can be modified through regulation of blood pressure levels. Lowering blood pressure can help avoid macrovascular and microvascular health complications as lower blood pressure levels decrease the risk of cardiovascular events including strokes (Grossman, Messerli, & Goldbourt). Dietary management, specifically limiting sodium intake, weight reduction, and moderate daily physical activity has been shown to reduce blood pressure levels among individuals with hypertension and can also improve blood glucose control (Arauz-Pacheco, Parrott, & Raskin).

Individuals with diabetes have more variability in blood pressure (Balfour, Rodriguez, & Ferdinand, 2015). Racial and ethnic disparities exist, and older adults typically face more cardiovascular complications (Balfour, Rodriguez, & Ferdinand; De Boer et al., 2017). As

mentioned previously, besides older adults likely having experienced historically more overt and blatant discrimination than have younger individuals, older adults also have a much higher prevalence of type 2 diabetes (Selvin & Parrinello, 2013), which makes them an ideal sample for this study. Of note, diabetes is the only disease in which women have a higher risk of coronary heart disease compared to men (Wagner et al., 2014). Hypertension, or high blood pressure risk increases as a person ages and may be due to arterial stiffness which may result in an increase in systolic and decrease in diastolic blood pressure (De Boer et al., 2017). Furthermore, older adults above the age of 65 with diabetes and hypertension have a higher risk for cardiovascular events, hypoglycemia, and more difficulty achieving blood pressure targets when compared to younger adults (De Boer et al.). In terms of ethnic and racial differences, poorly controlled blood pressure is more prevalent among non-Hispanic Blacks and Hispanic individuals when compared to non-Hispanic Whites (Balfour, Rodriguez, & Ferdinand, 2015). Hispanic individuals with hypertension are less likely to be aware of their condition, to take medication for it, and to adopt lifestyle changes to control their blood pressure when compared to the rest of the population (Liao et al., 2016).

Another factor that may influence the relationship between diabetes and blood pressure is obesity. Obesity is considered the biggest risk factor for developing type 2 diabetes and hypertension and contributes to the etiology of both diseases (Cheung & Li, 2012). Hypertension and obesity can increase cardiovascular complications in individuals with type 2 diabetes including stroke and heart disease (Colosia, Palencia, & Khan, 2013). A systematic review of data from countries around the world found that even in countries where hypertension rates were low, there were still higher rates of hypertension among individuals with diabetes when compared to those without diabetes (Colosia, Palencia, & Khan, 2013). Diabetes,

hyperlipidemia, and hypertension have been associated with negative health function, health perception, and health-related quality of life with obesity exacerbating this association (Sullivan, Ghushchyan, & Ben-Joseph, 2008).

Current Study

Diabetes is an illness that is often accompanied by negative mental health and physical health outcomes including depression and high blood pressure levels (Dolezsar et al., 2014; Zvolensky et al., 2019). Research has found that stressful life experiences such as racial discrimination are also associated with higher levels of depression and blood pressure levels which in turn can increase the risk for additional diseases including cardiovascular disease (Finch, Kolody & Vega, 2000; Pascoe & Smart Richman, 2009). Furthermore, ethnic minority populations are especially vulnerable to experiencing racial discrimination and have higher rates of type 2 diabetes compared to their White counterparts (Hernandez et al., 2016; Pew Research Center, 2016). Despite these findings in different areas of research, the literature is scarce on studies that have researched these variables in concert.

The current study examined the effects of perceived racial discrimination on depression and blood pressure levels among Latinxs with and without type 2 diabetes. As stated previously, both type 2 diabetes and experiencing racial discrimination have been associated with higher levels of depression and increased blood pressure levels (Arauz-Pacheco, Parrott, & Raskin, 2003; Badescu et al., 2016; Dolezsar et al., 2014; Zvolensky et al., 2019). This study aimed to identify whether an interaction effect is present between racial discrimination and type 2 diabetes, where the impact of racial discrimination on depression and blood pressure levels are greater among type 2 Latinx diabetics.

Hypotheses

The below hypotheses test both main effects and the interaction of diabetes status and perceived discrimination. The first set of hypotheses tests the main effects and interaction related to depression levels. The second set of hypotheses tests the main effects and interaction related to systolic and diastolic blood pressure levels and discrimination.

$H_{1.1}$: Latinxs with type 2 diabetes will have higher levels of depression than Latinxs without diabetes. This hypothesis is aligned with previous literature stating depression levels are higher among diabetics (Badescu et al., 2016).

$H_{1.2}$: Latinxs who report higher levels of racial discrimination will have higher levels of depression than Latinxs who report lower levels of racial discrimination. This hypothesis is consistent with the research on discrimination and depression (Finch, Kolody & Vega, 2000).

$H_{1.3}$: An interaction will be present between diabetes status and perceived racial discrimination where depression is highest among diabetic Latinxs reporting higher levels of racial discrimination. Although previous literature has not examined these variables in concert, this hypothesis is based on the literature establishing that depression is higher among adults with diabetes (Roy & Lloyd, 2012).

$H_{2.1A}$: Latinxs with type 2 diabetes will have higher levels of systolic blood pressure than Latinxs without diabetes. This hypothesis is aligned with previous literature stating blood pressure levels are higher among diabetics (Emdin et al., 2015).

$H_{2.1B}$: Latinxs with type 2 diabetes will have higher levels of diastolic blood pressure than Latinxs without diabetes. This hypothesis is aligned with previous literature stating blood pressure levels are higher among diabetics (Emdin et al., 2015).

$H_{2.2A}$: Latinxs who report higher levels of racial discrimination will have higher levels of systolic blood pressure than Latinxs who report lower levels of racial discrimination. This hypothesis is based on the positive association between racial discrimination and high blood pressure found in the literature (Williams & Mohammed, 2013).

$H_{2.2B}$: Latinxs who report higher levels of racial discrimination will have higher levels of diastolic blood pressure than Latinxs who report lower levels of racial discrimination. This hypothesis is based on the positive association between racial discrimination and high blood pressure found in the literature (Williams & Mohammed, 2013).

$H_{2.3A}$: An interaction will be present between diabetes status and perceived racial discrimination where systolic blood pressure is highest among diabetic Latinxs reporting higher levels of racial discrimination. Although research on the relationship between racial discrimination and blood pressure among diabetic individuals is scarce, this hypothesis is based on evidence that high systolic and diastolic blood pressure levels were found among diabetic women who reported experiencing higher levels of racial discrimination (Wagner et al., 2016). As no previous research could be found concerning men, once this hypothesis was tested for all Latinx individuals, the analysis was repeated separately for men and women.

$H_{2.3B}$: An interaction will be present between diabetes status and perceived racial discrimination where diastolic blood pressure is highest among diabetic Latinxs reporting higher levels of racial discrimination. This hypothesis is based on evidence that high systolic and diastolic blood pressure levels were found among diabetic women who reported experiencing higher levels of racial discrimination (Wagner et al., 2016). As no previous research could be found concerning men, once this hypothesis was tested for all Latinx individuals, the analysis was repeated separately for men and women.

CHAPTER 3

METHODOLOGY

Inclusion Criteria, Descriptive and Atheoretical Analyses

The sample for the current study consisted of 824 individuals ages 50 and older (521 without diabetes; 303 with diabetes) from the 2014 wave of the Health and Retirement Study (HRS). Only participants identifying as Latinx/Hispanic were included in the study regardless of their self-identified race. The HRS is a biennial national longitudinal study consisting of various cohorts of American adults ages 50 and older, and their partners. Data collected includes health, economic, and psychosocial related questions. The HRS is sponsored by the National Institute on Aging and is the largest nationally representative study of older adults in the United States.

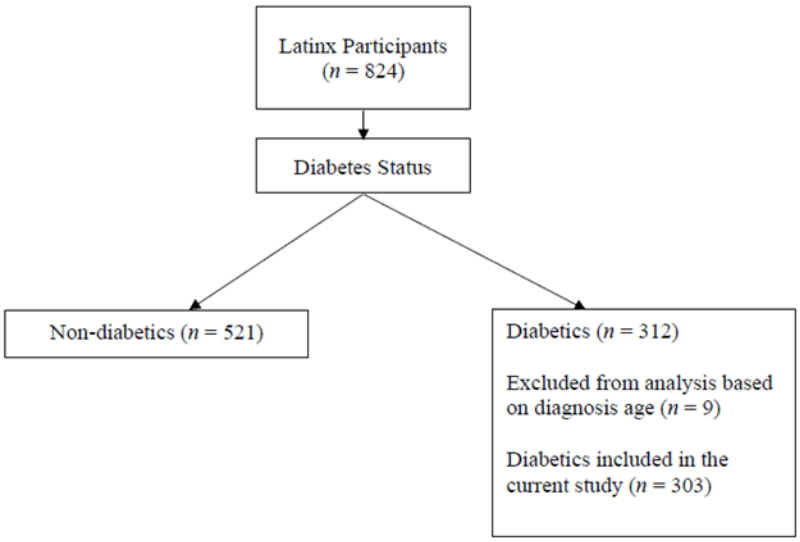

Figure 1. Flow of participants for the study procedures and analysis.

Individuals with Type 1 diabetes were excluded from the study on the basis of diabetes diagnosis age. Since the HRS does not ask about diabetes type, participants with diabetes who were diagnosed before age 40 were excluded. Type 1 diabetes is typically diagnosed first between ages five to seven or nearer to puberty (Atkinson, Eisenbarth, & Michels, 2014); thus using this exclusion criteria made it highly unlikely that individuals with Type 1 diabetes were

included in the data analysis sample. However, it is the case that some individuals with Type 2 diabetes diagnosed at a younger age may have been eliminated (see Figure 1).

Descriptive and inferential statistics were conducted for categorical variables of interest—diabetes status, gender, and marital status (see Tables 1 & 2). Continuous variables were first compared between individuals with and without diabetes, the group difference tests can be seen in Table 3. Atheoretical correlation analyses were conducted for age, education, racial/ethnic discrimination, depression, systolic blood pressure, and diastolic blood pressure in order to examine relationships between variables (see Table 4).

Table 1

Sample Sizes for All Groups

		Total Sample		**Diabetic**		**Non-Diabetic**	
		n	**%**	***n***	**%**	***n***	**%**
Sample Size:		824	100	303	36.8	521	63.2
Gender	Male	352	42.7	134	44.2	218	41.8
	Female	472	57.3	169	55.8	303	58.2
Marital/ Partner Status	Partnered	579	70.3	206	68.0	373	71.6
	Not partnered	245	29.7	97	32.0	148	28.4

Table 2

Descriptive and Inferential Statistics of Categorical Variables

		Total Sample (*N* = 824)		**Partnered (*n* = 579)**		**Not partnered (*n* = 245)**		**Chi-Square Test difference**	
		n	***%***	***n***	***%***	***n***	***%***	**X^2**	***p*<**
Gender	Male	352	42.7	291	82.7	61	17.3	45.25	.000
	Female	472	57.3	288		61.02	39.0		
Diabetes Status	Diabetic	303	36.8	206	68.0	97	32.0	1.19	.304
	Non-Diabetic	521	63.2	373	71.6	148	28.4		

Table 3

Diabetes Status Group Difference Tests

	Total Sample (*N* = 824)		**Diabetic (*n* = 303)**		**Non-Diabetic (*n* = 521)**		***t*-Test Difference**	
	M	***SD***	***M***	***SD***	***M***	***SD***	***t***	***p*<**
Age (years)	65.22	9.12	66.69	8.88	64.37	9.16	3.53	.000
Education (years)	10.17	4.38	9.28	4.66	10.68	4.14	-4.32	.000
CES-D (0-1)	.258	.286	.327	.304	.218	.268	5.32	.000
Discrimination	2.04	.896	2.01	.845	2.07	.930	-.504	.615
Systolic BP (72-230)	128.28	20.09	131.01	21.60	126.72	19.02	2.74	.006
Diastolic BP (43-114)	77.55	11.05	77.16	11.46	77.78	10.81	-.712	.477

Note: CES-D = Center for Epidemiologic Studies Depression Scale.

Table 4

Atheoretical Correlations for Continuous Variables

Variable	**1**	**2**	**3**	**4**	**5**	**6**
Age	--					
Years education	-.215*	--				
Discrimination	.037	.030	α = .857			
CES-D	.033	-.158*	.140*	α = .819		
Systolic BP	.214**	-.217**	.025	-.044	--	
Diastolic BP	-.158	.020	.011	-.036	.718**	--

Note: CES-D = Center for Epidemiologic Studies Depression Scale. Values on the diagonal are Cronbach's Alpha Internal Consistency reliability scores for scale measures. *$p < 0.05$ level (two-tailed). **$p < 0.01$ level (two-tailed)

Measures and Procedures

Data for the current study was drawn from the 2014 wave of the HRS, a biennial panel survey of Americans over the age of 50. This data was collected from March 2014 to April 2015 through face-to-face interviews. The HRS oversamples for Hispanic/Latinx and Black

individuals to facilitate the investigation of race and ethnicity. The HRS data used for the current study consisted of demographics, physical health, physical measures, cognition, and leave-behind questionnaires.

Demographics and Health Information

This data includes sex, age, partner status, years of education, self-reported Hispanic/Latino ethnicity, and diabetes status. As mentioned previously, individuals who were diagnosed with diabetes before age 40 were excluded to ensure only type 2 diabetics were present in the current sample (see Appendix A).

Depression

Depressive symptomology was measured using the short form version of the Center for Epidemiologic Studies Depression Scale (CES-D). The original CES-D contains 20 items and assesses for depression symptomology. The HRS uses an eight-item CES-D scale and includes recoded response choices of Yes = 1, No = 0, Don't know and Refused to answer (see Appendix B). The CES-D short form has been shown to have good reliability and validity among a variety of populations including older adults (Andresen et al., 1994; Grzywacz et al., 2006). For the current study, a variable was created to take the mean of all eight items, including the reverse scores of two positive items. A mean rather than a sum was taken to keep the scale score on the same metric as the items. Participants who did not answer all eight questions were excluded. The alpha internal consistency reliability for the eight-item CES-D scale was $\alpha = 0.82$ for all 824 participants.

Racial Discrimination

Self-reported perceived racial/ethnic discrimination was measured using a series of six

questions adapted from the Everyday Discrimination Scale (EDS) (Williams, Yu, Jackson, & Anderson, 1997). The EDS is one of the most commonly used discrimination measures that accounts for subjective experiences of discrimination (Lewis, Yang, Jacobs, & Fitchett, 2012). EDS questions assess the occurrence and frequency of discrimination and items include being treated with less respect, receiving poorer service, being threatened and harassed, and other related questions (see Appendix C). Participants are asked to rate the frequency of the discrimination experienced on a scale ranging from never (1) to almost every day (6) and the reason why the discrimination was experienced. This study focused on perceived racial/ethnic discrimination attributed to ancestry/national origin and race to account for discrimination linked to participants' Hispanic/Latino racial identity; the other attributed reasons were not used in the analyses. The racial/ethnic discrimination score was calculated using the mean of the six questions with higher scores indicating more frequent perceived racial/ethnic discrimination. Again, a mean rather than a sum was taken to keep the scale score on the same metric as the items. Participants who failed to answer three or more of the six items were excluded. This scaling was adapted as suggested by HRS. The alpha internal consistency reliability of the scale was $\alpha = 0.86$ for participants who endorsed being discriminated against.

Blood Pressure

Measures of systolic blood pressure (SBP) and diastolic blood pressure (DBP) were collected for each participant during three different consecutive measurements. Participants with one or more missing blood pressure measurements were excluded from the study. The mean of the three readings were used to determine a participant's SBP and DBP and were measured on a continuum with readings over 130/80 considered elevated.

Study Design and Procedure

Before testing hypotheses, atheoretical correlations of all variables were conducted to establish an initial overview of the relationships among the variables. To test the hypotheses mentioned above, a regression with an interaction effect was conducted. Prior to running analyses, assumptions were tested (normality, homogeneity of variance, random independent samples, linearity between the dependent variable and covariates, homogeneity of regression slopes, and covariates are independent of the independent variables) and outliers were examined. In order to avoid multicollinearity in testing interactions, variables were centered to avoid problems in estimating regression coefficients. Due to interactions being difficult to find, centering the variables improves the likelihood of finding existing interactions. In addition, there is low power to find interaction effects leading to the possibility of interaction effects going undetected even if they are present. Centering the variables helps increase the power, increasing the possibility of finding existing interactions (Aiken, West, & Reno, 1991).

Hypothesis Testing

Means difference *t*-tests were conducted in order to compare Latinxs with and without type 2 diabetes and test the following hypotheses:

> $H_{1.1}$ Latinxs with type 2 diabetes will have higher levels of depression than Latinxs without diabetes.
>
> $H_{2.1A}$: Latinxs with type 2 diabetes will have higher levels of systolic blood pressure than Latinxs without diabetes.
>
> $H_{2.1B}$: Latinxs with type 2 diabetes will have higher levels of diastolic blood pressure than Latinxs without diabetes.

Pearson's R correlations were conducted to test the following hypotheses:

> $H_{1.2}$: Latinxs who report higher levels of racial discrimination will have higher levels of depression than Latinxs who report lower levels of racial discrimination.

$H_{2.2A}$: Latinxs who report higher levels of racial discrimination will have higher levels of systolic blood pressure than Latinxs who report lower levels of racial discrimination.

$H_{2.2B}$: Latinxs who report higher levels of racial discrimination will have higher levels of diastolic blood pressure than Latinxs who report lower levels of racial discrimination.

Multiple regressions were conducted to test the following hypotheses:

$H_{1.3}$: An interaction will be present between diabetes status and perceived racial discrimination where depression is highest among diabetic Latinxs reporting higher levels of racial discrimination.

Depression is the dependent variable and the independent variables are diabetes status and discrimination. Diabetes status was dummy coded (Diabetes present = 1). Racial discrimination was centered (subtract off mean and then divide by standard deviation) in order to reduce multicollinearity. Additionally, the cross-product interaction of diabetes status and centered racial discrimination was tested. Sex, partner status, age, and years of education were covariates.

$H_{2.3A}$: An interaction will be present between diabetes status and perceived racial discrimination where systolic blood pressure is highest among diabetic Latinxs reporting higher levels of racial discrimination.

Systolic blood pressure is the dependent variable and the independent variables are diabetes status and discrimination. Diabetes status was dummy coded (Diabetes present = 1) and racial discrimination was centered. Additionally, the cross-product interaction of diabetes status and centered racial discrimination was tested. Sex, partner status, age, and years of education were covariates.

$H_{2.3B}$: An interaction will be present between diabetes status and perceived racial discrimination where diastolic blood pressure is highest among diabetic Latinxs reporting higher levels of racial discrimination.

Diastolic blood pressure is the dependent variable and the independent variables are diabetes status and discrimination. Diabetes status was dummy coded (Diabetes present = 1) and racial discrimination was centered. Additionally, the cross-product interaction of diabetes status

and centered racial discrimination was tested. Sex, partner status, age, and years of education were covariates.

CHAPTER 4

RESULTS

Independent Group *t*-Tests

An independent samples *t*-test was conducted to compare depression in Latinxs with diabetes and without diabetes. There was a significant difference in depression scores in Latinx individuals with diabetes (M = .327, SD = .304) and Latinx individuals without diabetes (M = .218, SD = .268); $t(790) = 5.32$, $p < .001$. These results demonstrate that Latinx individuals with diabetes have higher levels of depressive symptomology when compared to those without diabetes, confirming the study hypothesis.

An independent samples *t*-test was also conducted to compare systolic and diastolic blood pressure in Latinxs with diabetes and without diabetes. Results indicated a significant difference in systolic blood pressure in Latinx individuals with diabetes (M = 131.01, SD = 21.60) and Latinx individuals without diabetes (M = 126.72, SD = 19.02); $t(703) = 2.74$, $p = .006$. The findings demonstrate that Latinxs with diabetes have significantly higher systolic blood pressure when compared to Latinxs without diabetes and supports the study hypothesis. However, results did not indicate a significant difference in diastolic blood pressure in Latinx individuals with diabetes (M = 77.16, SD = 11.46) and Latinx individuals without diabetes (M = 77.78, SD = 10.81); $t(703) = -.712$, $p = .477$. This finding does not support the hypothesis that Latinxs with diabetes have higher diastolic blood pressure levels, however, a significant difference in systolic blood pressure among both groups is evident.

Pearson R Correlations

A Pearson product-moment correlation coefficient was computed to assess the relationship between racial/ethnic discrimination and depression. There was a positive

correlation between the two variables, $r(206) = .14$, $p = .045$. This correlation indicates a weak, positive relationship between discrimination and depression where higher levels of discrimination are correlated with higher levels of depression. This finding supports the study's hypotheses that Latinxs who report more discrimination will report higher levels of depression, however, the relationship between the two variables is weak. The sample size of this analysis is reflective of the smaller number of individuals who completed the CESD measure of depression.

A Pearson product-moment correlation coefficient was computed to assess the relationship between racial/ethnic discrimination and systolic blood pressure. There was no correlation between the two variables, $r(180) = .02$, $p = .737$ indicating the hypothesis that individuals who experience higher levels of racial discrimination have higher levels of systolic blood pressure is not supported. A Pearson product-moment correlation coefficient was also computed to assess the relationship between racial/ethnic discrimination and diastolic blood pressure. There was no correlation between the two variables, $r(180) = .01$, $p = .883$, and as such, the hypothesis that individuals who experience higher levels of racial discrimination have higher levels of diastolic blood pressure is not supported. The sample size of these analyses is reflective of the small number participants who had valid blood pressure readings.

Multiple Stepwise Regressions

Multiple stepwise regressions were conducted in order to test hypotheses and examine the amount of variance in the dependent variables accounted for by the predictors. Sex, partner status, age, years of education, diabetes status, ethnic/racial discrimination, and the cross-product interaction of diabetes status and racial discrimination were tested to investigate the extent to which these variables predicted depression, systolic blood pressure, and diastolic blood pressure. Racial/ethnic discrimination was centered to reduce collinearity. The assumptions for linearity

were met among independent variables and dependent variables. Statistical tests of normality were not met for any of the variables, however, visual inspections of distributions appeared normal. Analysis of collinearity statistics indicated the assumption of no multicollinearity was met. Furthermore, analysis indicted residuals are independent of each other and the variance of the residuals is constant. Since only extreme deviations from normality are likely to significantly impact findings and no significant outliers were examined, analyses were still conducted (Tabachnick & Fidell, 2013).

First, a multiple stepwise regression (shown in Table 5 and Table 6) was conducted to assess whether depression is accounted by the aforementioned predictors. In Step 1 of the regression, sex was entered and was not significantly related to depression, $F\Delta$ (203) = 2.26, p = .134, as it accounted for less than 1% of the variance in depression.

Table 5

Stepwise Multiple Regression Analysis of Depression

Step	Determinants	R	R^2	Adj R^2	Change Statistics			
					R^2 Δ	*F* Δ	Df_2	Sig. *F* Δ
1	Sex	.105	.011	.006	.011	2.26	203	.134
2	Sex, Partner Status	.288	.083	.074	.072	15.79	202	.000
3	Sex, Partner Status, Age	.291	.085	.071	.002	.451	201	.502
4	Sex, Partner Status, Age, Years of Education	.304	.092	.074	.007	1.63	200	.204
5	Sex, Partner Status, Age, Years of Education, Diabetes Status	.333	.111	.089	.019	4.12	199	.042
6	Sex, Partner Status, Age, Years of Education, Diabetes Status, Centered Discrimination	.357	.127	.101	.016	3.73	198	.055
7	Sex, Partner Status, Age, Years of Education, Diabetes Status, Centered Discrimination, Diabetes*Centered Discrimination	.358	.128	.097	.001	.248	197	.619

Table 6

Stepwise Multiple Regression Coefficients for Depression

Model	Variable	*B*	*SE B*	B	*t*	*p*
1	Sex	-.061	.040	-.105	-1.50	.134
2	Sex	-.037	.039	-.065	-.948	.344
	Partner Status	-.176	.044	-.271	-3.97	.000
3	Sex	-.035	.040	-.061	-.884	.378
	Partner Status	-.182	.045	-.280	-4.02	.000
	Age	-.002	.003	-.046	-.672	.502
4	Sex	-.043	.040	-.074	-1.07	.288
	Partner Status	-.182	.045	-.279	-4.02	.000
	Age	-.002	.003	-.059	-8.45	.399
	Years of Education	-.006	.005	-.088	-1.23	.204
5	Sex	-.049	.040	-.085	-1.23	.220
	Partner Status	-.182	.045	-.279	-4.05	.000
	Age	-.003	.003	-.080	-1.15	.251
	Years of Education	-.005	.005	-.076	-1.11	.267
	Diabetes Status	.083	.041	.140	2.05	.042
6	Sex	-.051	.040	-.089	-1.23	.196
	Partner Status	-.175	.045	-.269	-3.93	.000
	Age	-.003	.003	-.087	-1.25	.213
	Years of Education	-.006	.005	-.083	-1.21	.227
	Diabetes Status	.084	.040	.141	2.08	.039
	Racial/ethnic Discrim	.037	.019	.129	1.93	.055
7	Sex	-.049	.040	-.085	-1.23	.222
	Partner Status	-.177	.045	-.272	-3.95	.000
	Age	-.003	.003	-.087	-1.25	.212
	Years of Education	-.005	.005	-.079	-1.15	.251
	Diabetes Status	.083	.040	.141	2.07	.040
	Racial/ethnic Discrim	.030	.024	.105	1.26	.208
	Diabetes*Disc	.020	.041	.041	.498	.619

In Step 2 of the analysis, both sex and partner status were entered. Partner status was significantly related to depression, $F\Delta$ (202) = 15.79, $p < .001$, and explained an additional 7.2% of the variance ($R^2\Delta = .072$). Together, sex and partner status accounted for 7.4% of the variance in depression. Sex, partner status, and age were entered in Step 3 and the change in variance was not significant, $F\Delta$ (201) = .451, $p = .502$ with the variables accounting for 7.1% of the variance in depression. In Step 4, years of education was entered along with the previous three predictors and the change in variance was not significant $F\Delta$ (200) = 1.63, $p = .204$, as the variables accounted for 7.4% of the variance in depression. In Step 5, diabetes status was entered in addition to the previous four predictors and was significant at the .05 level, $F\Delta$ (199) = 4.12, $p < .05$, explaining an additional 1.9% of the variance in depression ($R^2\Delta = .019$). Centered racial/ethnic discrimination was entered in addition to the previous predictor variables in Step 6 and was not significant, $F\Delta$ (198) = 3.73, $p = .055$; together the variables accounted for 10.1% of the variance. The cross-product interaction of diabetes and centered discrimination was entered in Step 7 along with the other predictor variables, and was not significant, $F\Delta$ (197) = .248, $p = .619$, as it explained less than 1% of the variance in depression ($R^2\Delta = .001$). As these results suggest, the study hypothesis of an interaction being present between diabetes status and perceived racial discrimination in predicting depression is not supported.

A multiple stepwise regression (shown in Table 7 and Table 8) was conducted to assess the amount of variance accounted for in systolic blood pressure by the predictor variables. In Step 1 of the analysis, sex was entered and was significantly related to systolic blood pressure $F\Delta(177) = 9.95$, $p = .002$, accounting for 4.8% of the variance. In Step 2, partner status was entered in addition to sex and was not significant $F\Delta(176) = .232$, $p = .630$, as the variables accounted for 4.4% of the variance. Sex, partner status and age were entered in Step 3 and was

significantly related to systolic blood pressure $F\Delta(175) = 16.05$, $p < .001$, explaining an additional 7.9% of the variance ($R^2\Delta = .079$).

Table 7

Stepwise Multiple Regression Analysis of Systolic Blood Pressure

Step	Determinants	R	R^2	Adj R^2	Change Statistics			
					$R^2\ \Delta$	$F\ \Delta$	Df_2	Sig. $F\ \Delta$
1	Sex	.231	.053	.048	.053	9.95	177	.002
2	Sex, Partner Status	.233	.054	.044	.001	.232	176	.630
3	Sex, Partner Status, Age	.366	.134	.119	.079	16.05	175	.000
4	Sex, Partner Status, Age, Years of Education	.377	.142	.123	.009	1.73	174	.191
5	Sex, Partner Status, Age, Years of Education, Diabetes Status	.377	.143	.118	.000	.020	173	.887
6	Sex, Partner Status, Age, Years of Education, Diabetes Status, Centered Discrimination	.378	.143	.113	.000	.012	172	.914
7	Sex, Partner Status, Age, Years of Education, Diabetes Status, Centered Discrimination, Diabetes*Centered Discrimination	.384	.148	.113	.005	1.01	171	.316

In Step 4, years of education was entered along with the previously mentioned predictors and was not significant, $F\Delta(174) = 1.73$, $p = .191$ with the variables accounting for 12.3% of the variance in systolic blood pressure. Diabetes status was entered with the previous variables and was not significant $F\Delta(173) = .020$, $p = .887$, as the variables accounted for 11.8% of the variance. In Step 6, racial/ethnic discrimination was added along with the five previously mentioned variables, and was not significant $F\Delta(172) = .012$, $p = .914$, as the variables accounted for 11.3% of the variance in systolic blood pressure. Lastly, Step 7 included the cross-product interaction of diabetes and discrimination along with the other predictors and was not

significant, $F\Delta(171) = 1.01$, $p = .316$, as the variables accounted for 11.3% of the variance in systolic blood pressure. The study hypothesis of an interaction being present between diabetes status and perceived racial discrimination in predicting systolic blood pressure is not supported.

Table 8

Stepwise Multiple Regression Coefficients for Systolic Blood Pressure

Model	Variable	*B*	*SE B*	B	*t*	*p*
1	Sex	8.69	2.75	.231	3.15	.002
2	Sex	8.87	2.79	.235	3.18	.002
	Partner Status	-1.52	3.16	-.036	-.482	.630
3	Sex	8.03	2.68	.213	2.95	.003
	Partner Status	.501	3.08	.012	.163	.871
	Age	.742	.185	.286	4.01	.000
4	Sex	7.53	2.70	.200	2.79	.006
	Partner Status	.696	3.07	.016	.227	.821
	Age	.700	.188	.270	3.73	.000
	Years of Education	-.414	.315	-.095	-1.31	.191
5	Sex	7.50	2.72	.199	2.76	.006
	Partner Status	.687	3.08	.016	.223	.824
	Age	.697	.189	.269	3.68	.000
	Years of Education	-.411	.316	-.094	-1.30	.196
	Diabetes Status	.396	2.78	.010	1.42	.887
6	Sex	7.49	2.73	.199	2.75	.007
	Partner Status	.716	3.10	.017	.231	.818
	Age	.696	.190	.268	3.66	.000
	Years of Education	-.412	.318	-.094	-1.30	.196
	Diabetes Status	.402	2.79	.010	.144	.886
	Racial/ethnic Discrim	.141	1.30	.008	.108	.914
7	Sex	7.91	2.77	.210	2.87	.005
	Partner Status	.445	3.11	.010	.143	.886
	Age	.699	.190	.269	3.67	.000

(table continues)

Model	Variable	*B*	*SE B*	B	*t*	*p*
(cont.)	Years of Education	-.363	.321	-.083	-.494	.622
	Diabetes Status	2.00	3.67	-.051	-.545	.587
	Racial/ethnic Discrim	-.787	1.59	-.043	.494	.622
	Diabetes*Disc	2.07	2.05	.107	1.01	.316

A final multiple stepwise regression (shown in Table 9 and Table 10) was conducted to assess the amount of variance accounted for in diastolic blood pressure by the predictor variables. In Step 1, sex was entered into the regression and was not significantly related to diastolic blood pressure, $F\Delta(177) = 2.82$, $p = .095$, accounting for 1% of the variance. In Step 2, partner status was entered in addition to sex and was not significant, $F\Delta(176) = .060$, $p = .806$, as the variables accounted for less than 1% of the variance in diastolic blood pressure. Step 3 consisted of sex, partner status, and age, and was not significant $F\Delta(175) = 1.10$, $p = .296$, with the variables accounting for less than 1% of the variance. For Step 4 of the analysis, years of education was entered as well as the other previous predictor variables and was not significant, $F\Delta(174) = .462$, $p = .498$, as the variables accounted for less than 1% of the variance in diastolic blood pressure. In Step 5, diabetes status was introduced in addition to the previous predictor variables and was not significant $F\Delta(173) = .040$, $p = .842$, as the variables accounted for less than 1% of the variance.

Racial/ethnic discrimination was entered in Step 6 in addition to the previous predictor variables and was not significant, $F\Delta(172) = .033$, $p = .856$, with the variables accounting for less than 1% of the variance in diastolic blood pressure. Step 7 included the cross-product interaction of diabetes and discrimination along with the other predictors and was not significant, $F\Delta(171) = 1.38$, $p = .242$, as the variables accounted for less than 1% of the variance in diastolic blood pressure. These results do not support the study hypothesis of an interaction being present

between diabetes status and perceived racial discrimination in predicting diastolic blood pressure.

Table 9

Stepwise Multiple Regression Analysis of Diastolic Blood Pressure

Step	Determinants	R	R^2	Adj R^2	Change Statistics			
					R^2 Δ	*F* Δ	Df_2	Sig. *F* Δ
1	Sex	.125	.016	.010	.016	2.82	177	.095
2	Sex, Partner Status	.127	.016	.005	.000	.060	176	.806
3	Sex, Partner Status, Age	.149	.022	.005	.006	1.10	175	.296
4	Sex, Partner Status, Age, Years of Education	.157	.025	.002	.003	.462	174	.498
5	Sex, Partner Status, Age, Years of Education, Diabetes Status	.158	.025	-.003	.000	.040	173	.842
6	Sex, Partner Status, Age, Years of Education, Diabetes Status, Centered Discrimination	.159	.025	-.009	.000	.033	172	.856
7	Sex, Partner Status, Age, Years of Education, Diabetes Status, Centered Discrimination, Diabetes*Centered Discrimination	.182	.033	-.007	.008	1.38	171	.242

Table 10

Stepwise Multiple Regression Coefficients for Diastolic Blood Pressure

Model	Variable	*B*	*SE B*	B	*t*	*p*
1	Sex	2.68	1.59	.125	1.68	.095
2	Sex	2.62	1.61	.123	1.67	.106
	Partner Status	.450	1.83	.019	.246	.806
3	Sex	2.75	1.62	.129	1.70	.090
	Partner Status	.130	1.85	.005	.070	.944
	Age	-.117	.112	-.080	-1.05	.296

(table continues)

Model	Variable	*B*	*SE B*	B	*t*	*p*
4	Sex	2.91	1.64	.136	1.78	.077
	Partner Status	.069	1.86	.003	.037	.970
	Age	-.104	.114	-.071	-.915	.361
	Years of Education	.129	.190	.052	.680	.498
5	Sex	2.89	1.64	.135	1.76	.081
	Partner Status	.062	1.87	.003	.033	.974
	Age	-.106	.115	-.072	-.929	.354
	Years of Education	.132	.191	.053	.690	.491
	Diabetes Status	.335	1.68	.015	.199	.842
6	Sex	2.88	1.65	.135	1.75	.082
	Partner Status	.091	1.88	.004	.048	.961
	Age	-.108	.115	-.073	-.936	.350
	Years of Education	.131	.192	.053	.680	.497
	Diabetes Status	.342	1.69	.015	.202	.840
	Racial/ethnic Discrim	.143	.786	.014	.182	.856
7	Sex	3.17	1.67	.148	1.90	.059
	Partner Status	-.100	1.88	-.004	-.053	.958
	Age	-.106	.115	-.072	-.920	.359
	Years of Education	.165	.194	.067	.850	.397
	Diabetes Status	-1.35	2.22	-.061	-.609	.543
	Racial/ethnic Discrim	-.512	.963	-.049	-.531	.596
	Diabetes*Disc	1.46	1.24	.133	1.18	.242

CHAPTER 5

DISCUSSION

The current study adds to the growing body of research that explores the relationships between racial discrimination and both mental and physical health. This study adds to the literature in several ways. First, the study focused on the racial/ethnic discrimination experiences of Latinx individuals. Historically, research on discrimination has typically focused on Black American individuals, and more research is needed looking at the discrimination experiences of other minority populations including Latinx individuals, especially considering they are now the largest minority group in the United States (Findling et al., 2019). Second, the current study's population of interest consisted of older adults, an underrepresented group in the literature on discrimination and health (De Souza Braga, Caiaffa, Ceolin, De Andrade, & Lima-Costa, 2019). The unique experiences of older adults that face racial/ethnic discrimination can give us better insight on how discrimination affects diverse groups of people. Third, the study takes into account the effects that discrimination may have on individuals with type 2 diabetes. Since both diabetes and racial discrimination have been associated with increased depression symptomology and higher blood pressure levels in the literature, it begs the question whether individuals who experience the joint effects of both diabetes and discrimination are at higher risk of these negative health consequences. As such, the current study aimed to examine whether greater perceived racial discrimination is associated with both higher depressive symptoms and higher blood pressure among older adult Latinx individuals with diabetes when compared to older adult Latinxs without diabetes.

The current results found that Latinx individuals with type 2 diabetes had higher depression levels when compared to Latinx individuals without type 2 diabetes and confirmed

the study's hypothesis. This finding is consistent with the long-established relationship in the literature between individuals with diabetes having higher depression levels compared to those without diabetes (Badescu et al., 2016). Moreover, the results indicated Latinxs who experienced greater racial/ethnic discrimination had higher levels of depression symptomology, confirming the study's hypothesis. This finding resonates with previous research studies that have found a positive association between racial/ethnic discrimination and depression (Finch, Kolody, & Vega, 2000). As mentioned before, there are no studies in the literature that have explored the relationship among diabetes status, racial/ethnic discrimination and depression. A multiple stepwise regression was conducted to examine this relationship and based on previous research findings that examined these variables separately, it was hypothesized that an interaction would be present between diabetes status and perceived racial discrimination where depression was highest among diabetic Latinxs reporting higher levels of racial discrimination. The current results failed to support this hypothesis and showed that there was no interaction present between diabetes status and discrimination. It is important to note that when testing interactions, the power is expected to be low and as such, interaction effects may go undetected (Aiken, West, & Reno, 1991). Although the interaction was not significant, the multiple step-wise regression indicated that partner status and diabetes were significant predictor variables, highlighting that these factors are important when looking at depression outcomes.

Although the interaction (diabetes status x racial discrimination) did not predict depression, there are some interesting findings to note from this multiple stepwise regression. Sex was not significantly related to depression indicating Latinx men and women in the study have similar depression levels. This finding is inconsistent with prior research that has found well-documented support for sex differences in depression with women having a higher

depression prevalence when compared to men (Tan, 2017). However, some research has found sex differences in depression diminish in those over the age of 50 (Tan, 2017) and research using HRS data to study older adults found similar prevalence estimates for depression in men and women (Steffens, Fisher, Langa, Potter, & Plassman, 2009). As such, the nonsignificant relationship between sex and depression mirrors the previous findings of similar depression levels in men and women over the age of 50.

In terms of physical health outcomes, the current study found that Latinx individuals with type 2 diabetes had significantly higher levels of systolic blood pressure compared to Latinxs without type 2 diabetes. This finding supports the current study hypothesis and is consistent with the previous literature that reports blood pressure levels are typically higher among diabetics (Emdin et al., 2015). Contrary to the hypothesis that Latinxs with type 2 diabetes would have higher diastolic blood pressure compared to Latinxs without type 2 diabetes, results indicated there was not a significant difference in diastolic blood pressure between Latinxs with and without diabetes. Although the results for diastolic blood pressure differences were not significant, research indicates that systolic blood pressure may be a more important measurement for hypertension and exerts a greater influence on cardiovascular risk compared to diastolic blood pressure (Kannel, 2000). Additionally, research has found elevated systolic blood pressure is linearly related to mortality (Pastor-Barriuso, Banegas, Damin, Appel, & Guallar, 2003). Furthermore, isolated systolic hypertension, which is the most prevalent type of hypertension in those over the age of 50 is marked by an elevation in systolic blood pressure but not diastolic blood pressure (Pinto, 2007). As such, a greater emphasis should be placed on systolic blood pressure when determining cardiovascular risk (Kannel, 2000) and based on this measurement, Latinx diabetics in the present study may be at greater risk of cardiovascular events than their

non-diabetic counterparts.

As prior research has found positive associations between racial discrimination and blood pressure, it was hypothesized that Latinxs reporting higher levels of racial discrimination would have higher levels of systolic and diastolic blood pressure compared to Latinxs reporting lower levels of racial discrimination. The current study's hypotheses were not supported, with racial discrimination and blood pressure not being related. Despite these non-significant findings, the results do contribute to the mixed findings in the literature regarding racial/ethnic discrimination and blood pressure. Meta-analyses have found that the relationship between racial/ethnic discrimination and blood pressure is complex with some studies finding positive associations, conditional associations or no associations (Pascoe & Smart Richman, 2009; Williams, Neighbors & Jackson, 2003). Inconsistencies in these findings may be a result of individual participant differences and the demographic makeup of different research studies, as some individuals may react to stressors in more physiological ways than others. Other factors including coping style, personality, and social support may also influence the way individuals respond to racial discrimination (Pascoe & Smart Richman; Wagner et al., 2016). The reason for these inconsistent findings in the relationship between racial discrimination and blood pressure still remains unanswered and more research is needed to address this complex relationship.

Although previous research on the relationship between racial discrimination and blood pressure among diabetic individuals is scarce, one study examined this relationship and found high levels of systolic and diastolic blood pressure among diabetic women reporting racial discrimination (Wagner et al., 2016). Two separate multiple stepwise regressions were conducted to examine these relationships. It was hypothesized that interactions would be present between diabetes status and perceived racial discrimination where systolic and diastolic blood pressure

was highest among diabetic Latinxs reporting higher levels of racial discrimination. The current results failed to support these hypotheses since the interaction (diabetes status x racial discrimination) was not significant. Considering previous research examined this relationship solely among women, after testing these hypotheses, analyses were repeated separately for men and for women and still no significant differences were found.

As discussed previously, the sample used in this study was unique in comparison to other samples found in previous research studies on discrimination. Taking this into consideration, it is possible that a reason why the interaction effects were not present in the current study and why elevations in blood pressure were not associated with discrimination, may be because of the way older adults perceive discrimination. Different groups of people may perceive racial/ethnic discrimination differently and studies have found the extent to which individuals interpret a discrimination event as extremely stressful can have more negative health consequences than if they were to interpret it as mildly stressful, indicating a possible dose effect (Landrine & Klonoff, 2000). It is likely that Latinx older adults have experienced more overt forms of discrimination in their early life and as a result, may underreport the discrimination that they currently encounter because it is not manifested as overtly as it once was. Furthermore, it is possible that older adults do not interpret the current racial/ethnic discrimination they experience as stressful compared to the overt discrimination they may have experienced decades ago. Additionally, it is unclear whether persistent exposure to racial/ethnic discrimination over time magnifies negative health responses, or whether habituation takes place where there is a diminished response over time (Williams et al., 2003).

Another important consideration while interpreting results is that the everyday discrimination scale used in the current study does not ask for the severity of the discrimination

experienced or how stressful the individual interprets the perceived discrimination to be. These factors could potentially impact the nature of the relationships as there could be a difference between experiencing multiple minor instances of discrimination every day and experiencing severe instances of discrimination on occasion. Something else to consider is that the data for this study was collected in 2014 and shifts in the political and social climate in regard to Latinxs in the United States have occurred since the presidential inauguration in 2017. Given that a recent study found an increase in Latinx racial/ethnic discrimination experiences since the presidential election of Donald Trump (Callister, Galbraith, & Galbraith, 2019), future research should use more recent data to capture the increase in racial/ethnic discrimination among the Latinx community and implications for mental and physical health.

The current study resonates with many of the findings in the literature. It is evident that Latinxs with type 2 diabetes experience significantly higher levels of depression when compared to Latinxs without type 2 diabetes. This finding highlights the importance of screening for depression among patients with diabetes. The implementation of a depression screener during physician visits for diabetics can improve the recognition of depression symptoms and increase the likelihood of referral to mental health providers for treatment. As Hermanns et al., (2013) proposed, Primary Care Physicians should be aware of the high co-morbidity rate between diabetes and depression in order to combat the underdiagnosis of depression in diabetic patients and improve their quality of life. The finding that higher levels of racial/ethnic discrimination is associated with higher depressive symptomology is also important. The positive association between racial/ethnic discrimination and depression symptoms demonstrates the need for mental health clinicians to be aware of the influence racial/ethnic discrimination may have on the mental health of their minority clients. Furthermore, mental health clinicians should be willing to engage

in these difficult dialogues and provide a safe environment where Latinx clients can process their experiences with ethnic/racial discrimination.

APPENDIX A

DEMOGRAPHIC AND HEALTH QUESTIONS

What is your sex?

Responses: Male, Female

Current age?

Are you married or living with a partner?

Responses: Married, Remarried, Partnered, Other

Number of years in school?

Responses: 0 – 17

Do you consider yourself Hispanic or Latino?

Responses: Yes, No, Don’t Know

Before you were 16 years old, did you have diabetes?

Responses: Yes, No, Don’t Know

At what age were you first diagnosed with diabetes?

Has a doctor ever told you that you have diabetes or high blood sugar?

Responses: Yes, No, Don’t Know

In what year was your diabetes first diagnosed?

APPENDIX B

DEPRESSION QUESTIONS

Much of the time during the past week, you felt depressed. Would you say yes or no?

Much of the time during the past week, you felt that everything you did was an effort. Would you say yes or no?

Much of the time during the past week, your sleep was restless. Would you say yes or no?

Much of the time during the past week, you were happy. Would you say yes or no?

Much of the time during the past week, you felt lonely. Would you say yes or no?

Much of the time during the past week, you enjoyed life. Would you say yes or no?

Much of the time during the past week, you felt sad. Would you say yes or no?

Much of the time during the past week, you could not get going. Would you say yes or no?

Responses: Yes, No, Don’t know, Refused to answer

APPENDIX C

DISCRIMINATION QUESTIONS

Q29. In your day-to-day life, how often have any of the following things happened to you?

- You are treated with less courtesy or respect than other people.
- You receive poorer service than other people at restaurants or stores.
- People act as if they think you are not smart.
- People act as if they are afraid of you.
- You are threatened or harassed.
- You receive poorer service or treatment than other people from doctors or hospitals.

Responses:

Almost everyday

At least once a week

A few times a month

A few times a year

Less than once a year

Never

Q30. If any of the above have happened to you, what do you think were the reasons why these experiences happened to you?

Responses: ancestry or national origin, weight, gender, physical disability, race, an aspect of your physical appearance, age, sexual orientation, religion, or financial status

REFERENCES

ACCORD Study Group. (2010). Effects of intensive blood-pressure control in type 2 diabetes mellitus. *New England Journal of Medicine, 362*(17), 1575-1585.

Aiken, L. S., West, S. G., & Reno, R. R. (1991). *Multiple regression: Testing and interpreting interactions*. Sage.

Alberti, G., Zimmet, P., Shaw, J., Bloomgarden, Z., Kaufman, F., & Silink, M. (2004). Type 2 diabetes in the young: The evolving epidemic. *Diabetes Care, 27*(7), 1798-1811.

Alvidrez, J., & Pérez-Stable, E. J. (2017). Diabetes care in Latinos with limited English proficiency: What do language concordant clinicians add? *JAMA Internal Medicine, 177*(3), 313- 315.

American Diabetes Association. (2017). Statistics about diabetes. Retrieved May 13, 2019, from http://www.diabetes.org/diabetes-basics/statistics/

Andresen, E. M., Malmgren, J. A., Carter, W. B., & Patrick, D. L. (1994). Screening for depression in well older adults: Evaluation of a short form of the CES-D. *American Journal of Preventative Medicine, 10*(2), 77-84.

Arauz-Pacheco, C., Parrott, M. A., & Raskin, P. (2003). Treatment of hypertension in adults with diabetes. *Diabetes Care, 26*, S80-2.

Atkinson, M. A., Eisenbarth, G. S., & Michels, A. W. (2014). Type 1 diabetes. *Lancet, 383*(9911), 69-82.

Badescu, S. V., Tataru, C., Kobylinska, L., Georgescu, E. L., Zahiu, D. M., Zagrean, A. M., & Zagrean, L. (2016). The association between diabetes mellitus and depression. *Journal of Medicine and Life, 9*(2), 120-125.

Balfour, P. C., Rodriguez, C. J., & Ferdinand, K. C. (2015). The role of hypertension in race-ethnic disparities in cardiovascular disease. *Current cardiovascular risk reports*, *9*(4), 18.

Beatty Moody, D. L., Waldstein, S. R., Tobin, J. N., Cassells, A., Schwartz, J. C., & Brondolo, E. (2016). Lifetime racial/ethnic discrimination and ambulatory blood pressure: The moderating effect of age. *Health Psychology, 35*(4), 333-342.

Borrell, L. N., Diez Roux, A. V., Jacobs, D. R., Jr., Shea, S., Jackson, S. A., Shrager, S., & Blumenthal, R. S. (2010). Perceivied racial/ethnic discrimination, smoking and alcohol consumption in the Multi-Ethnic Study of Atherosclerosis (MESA). *Preventative Medicine: An International Journal Devoted to Practice and Theory,* 51(3-4), 307-312.

Callister, A. H., Galbraith, Q., & Galbraith, S. (2019). Immigration, deportation, and discrimination: Hispanic political opinion since the election of Donald Trump. *Hispanic Journal of Behavioral Sciences*, *41*(2), 166-184.

Campayo, A., Gómez-Biel, C. H., & Lobo, A. (2011). Diabetes and depression. *Current psychiatry reports*, *13*(1), 26-30.

Carter, R. T., & Forsyth, J. (2010). Reactions to racial discrimination: Emotional stress and help-seeking behaviors. *Psychological Trauma: Theory, Research, Practice, and Policy, 2*(3), 183-191.

Centers for Disease Control and Prevention. (2017). National diabetes statistics report. Retrieved May 13, 2019, from https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf.

Chavez, L. J., Ornelas, I. J., Lyles, C. R., & Williams, E. C. (2015). Racial/ethnic workplace discrimination: Association with tobacco and alcohol use. *American Journal of Preventive Medicine, 48*(1), 42-29.

Cheung, B. M., & Li, C. (2012). Diabetes and hypertension: is there a common metabolic pathway?. *Current atherosclerosis reports*, *14*(2), 160-166.

Colosia, A. D., Palencia, R., & Khan, S. (2013). Prevalence of hypertension and obesity in patients with type 2 diabetes mellitus in observational studies: a systematic literature review. *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, *6*, 327–338.

De Boer, I. H., Bangalore, S., Benetos, A., Davis, A. M., Michos, E. D., Muntner, P., ... & Bakris, G. (2017). Diabetes and hypertension: a position statement by the American Diabetes Association. *Diabetes Care*, *40*(9), 1273-1284.

De Souza Braga, L., Caiaffa, W. T., Ceolin, A. P. R., De Andrade, F. B., & Lima-Costa, M. F. (2019). Perceived discrimination among older adults living in urban and rural areas in Brazil: a national study (ELSI-Brazil). *BMC Geriatrics*, *19*(1), 67.

Devarajooh, C., & Chinaa, K. (2017). Depression, distress, and self-efficacy: The impact on diabetes self-care practices. *PLOS ONE 12(*3).

Dolezsar, C. M., McGrath, J. J., Herzig, A. J. M., & Miller, S. B. (2014). Perceived racial discrimination and hypertension: A comprehensive systematic review. *Health Psychology*, *33*(1), 20-34.

Egede, L. E., & Ellis, C. (2010). Diabetes and depression: Global perspectives. *Diabetes Research and Clinical Practice, 87*(3), 302-312.

Emdin, C. A., Rahimi, K., Neal, B., Callender, T., Perkovic, V., & Patel A. (2015). Blood pressure lowering in type 2 diabetes: A systematic review and meta-analysis. *JAMA*, *313*(6), 603–615. doi:10.1001/jama.2014.18574

English, D., Lambert, S. F., & Ialongo, N. S. (2014). Longitudinal associations between experienced racial discrimination and depressive symptoms in African American adolescents. *Developmental Psychology, 50*(4), 1190-1196.

Fernandez, S., Schillinger, D., Warton, E. M., Adler, N., Moffet, H. H., Schenker, Y.,… & Karter, A. J. (2011). Language barriers, physician-patient language concordance, and glycemic control among insured Latinos with diabetes: The Diabetes Study of Northern California (DISTANCE). *Journal of General Internal Medicine*, *26*(2), 170-176.

Finch, B. K., Kolody, B., & Vega, W. A. (2000). Perceived discrimination and depression among Mexican-origin adults in California. *Journal of Health and Social Behavior*, *41*(3), 295-313.

Findling, M. G., Bleich, S. N., Casey, L. S., Blendon, R. J., Benson, J. M., Sayde, J. M., & Miller, C. (2019). Discrimination in the United States: Experiences of Latinos. *Health Services Research*, *54*, 1409-1418.

Fisher, E. B., Chan, J. C. N., Nan, H., Sartorius, N., & Oldenberg, B. (2012). Co-occurrence of diabetes and depression: Conceptual considerations for an emerging global health challenge. *Journal of Affective Disorders*, *142*, S56-S66.

Fox, C. S., Golden, S. H., Anderson, C., Bray, G. A., Burke, L. E., De Boer, I. H., ... & Inzucchi, S. E. (2015). Update on prevention of cardiovascular disease in adults with type 2 diabetes mellitus in light of recent evidence: a scientific statement from the American Heart Association and the American Diabetes Association. *Circulation*, *132*(8), 691-718.

Garcini, L. M., Chirinos, D. A., Murdock, K. W., Seiler, A., LeRoy, A. S., Peek, K.,… & Fagundes, C. (2018). Pathways linking racial/ethnic discrimination and sleep among U.S. -born and foreign-born Latinxs. *Journal of Behavioral Medicine*, *41*(3), 364-373.

Gee, G. C., Spencer, M., Chen, J., Yip, T., & Takeuchi, D. T. (2007). The association between self-reported racial discrimination and 12-month DSM-IV mental disorders among Asian Americans nationwide. *Social Science & Medicine*, *64*(10), 1984-1996.

Golden, S. H., Brown, A., Cauley, J. A., Chin, M. H., Gary-Webb, T. L., Kim, C.,… & Anton, B. (2012). Health disparities in endocrine disorders: Biological, clinical, and nonclinical factors—an Endocrine Society scientific statement. *The Journal of Clinical Endocrinology & Metabolism*, *97*(9), E1579-E1639.

Grossman, E., Messerli, F. H., Goldbourt, U. (2000). High blood pressure and diabetes mellitus: Are all antihypertensive drugs created equal? *Arch Intern Med, 160*(16), 2447–2452.

Grzywacz, J. G., Hovey, J. D., Seligman, L. D., Arcury, T. A., & Quandt, S. A. (2006). Evaluating short-form versions of the CES-D for measuring depressive symptoms among immigrants from Mexico. *Hispanic Journal of Behavioral Sciences, 28*(3), 404–424. https://doi.org/10.1177/0739986306290645

Heisler, M., Faul, J. D., Hayward, R. A., Langa, K. M., Blaum, C., Weir, D. (2007). Mechanisms for racial and ethnic disparities in glycemic control in middle-aged and older Americans in the Health and Retirement Study. *Arch Intern Med, 167*(17), 1853- 1860.

Hermanns, N., Caputo, S., Dzida, G., Khunti, K., Meneghini, L. F., & Snoek, F. (2013). Screening, evaluation and management of depression in people with diabetes in primary care. *Primary care diabetes, 7*(1), 1-10.

Hernandez, R., Ruggiero, L., Prohaska, T. R., Chavez, N., Boughton, S. W., Peacock, N., … Nouwen, A. (2016). A cross-sectional study of depressive symptoms and diabetes self-care in African Americans and Hispanics/Latinos with diabetes: The role of self-efficacy. *The Diabetes Educator, 42*(4), 452–461.

International Diabetes Federation. IDF Diabetes, 8 ed., 2017, Brussels, Belgium: International Diabetes Federation, https://diabetesatlas.org/.

Kaline, K., Bornstein, S. R., Bergmann, A., Hauner, H., & Schwarz, P. E. H. (2007). The importance and effect of dietary fiber in diabetes prevention with particular consideration of whole grain products. *Hormone and Metabolic Research, 39*(9), 687-693.

Kannel, W. B. (2000). Elevated systolic blood pressure as a cardiovascular risk factor. *The American Journal of Cardiology, 85*(2), 251-255.

Kok, J. L. A., Williams, A. F., & Zhao, L. (2015). Psychosocial interventions for people with diabetes and co-morbid depression. A systematic review. *International Journal of Nursing Studies, 52*(10), 1625-1639.

Landrine, H., Klonoff, E. A. (2000). Racial discrimination and cigarette smoking among Blacks: findings from two studies. *Ethnicity & Disease, 10*(2), 195-202.

Lewis, T. T., Yang, F. M., Jacobs, E. A., & Fitchett, G. (2012). Racial/ethnic differences in responses to the everyday discrimination scale: a differential item functioning analysis. *American Journal of Epidemiology, 175*(5), 391-401.

Liao, Y., Siegel, P. Z., White, S., Dulin, R., & Taylor, A. (2016). Improving actions to control high blood pressure in Hispanic communities—racial and ethnic approaches to community health across the US project, 2009–2012. *Preventive medicine, 83*, 11-15.

Mainous, A. G., Diaz, V. A., & Geesey, M. E. (2008). Acculturation and healthy lifestyle among Latinos with diabetes. *The Annals of Family Medicine, 6*(2), 131-137.

Noya, C. E., Chesla, C., Waters, C., & Alkon, A. (2020). Shared Medical Appointments: An Innovative Model to Reduce Health Disparities Among Latinxs With Type-2 Diabetes. *Western Journal of Nursing Research, 42*(2), 117-124.

Parker, M. M., Fernández, A., Moffet, H. H., Grant, R. W., Torreblanca, A., Karter, A. J. Association of patient-physician language concordance and glycemic control for limited-English proficiency Latinos with type 2 diabetes. (2017). *JAMA Intern Med, 177*(3), 380-387.

Pascoe, E. A., & Smart Richman, L. (2009). Perceived discrimination and health: A meta-analytic review. *Psychological Bulletin, 135*(4), 531-554.

Pastor-Barriuso, R., Banegas, J. R., Damin, J., Appel, L. J., & Guallar, E. (2003). Systolic blood pressure, diastolic blood pressure, and pulse pressure: An evaluation of their joint effect on mortality. *Annals of Internal Medicine, 139*(9), 731-739.

Pechère-bertschi, A., Greminger, P., Hess, L., Philippe, J., & Ferrari, P. (2005) Swiss Hypertension and Risk Factor Program (SHARP): Cardiovascular risk factors management in patients with type 2 diabetes in Switzerland, *Blood Pressure, 14*(6), 337-344, DOI: 10.1080/08037050500340018

Pew Research Center. (2016). Roughly half of Hispanics have experienced discrimination. Retrieved May 13, 2019, from https://www.pewresearch.org/fact-tank/2016/06/29/roughly-half-of-hispanics-have-experienced-discrimination/.

Pinto, E. (2007). Blood pressure and ageing. *Postgraduate Medical Journal*, *83*(976), 109-114.

Ricci-Cabello, I., Ruiz-Perez, I., De Labry-Lima, A. O., & Marquez-Calderon, S. (2010). Do social inequalities exist in terms of the prevention, diagnosis, treatment, control and monitoring of diabetes? A systematic review. *Health & Social Care in the Community, 18*(6), 572-587.

Rotella, F., & Mannucci, E. (2013). Diabetes mellitus as a risk factor for depression. A meta-analysis of longitudinal studies. *Diabetes research and clinical practice*, *99*(2), 98-104.

Roy, T., & Lloyd, C. E. (2012). Epidemiology of depression and diabetes: A systematic review. *Journal of Affective Disorders, 142*, S8-S21.

Ryan, A. M., Gee, G. C., & Griffith, D. (2008). The effects of perceived discrimination on diabetes management. *Journal of Health Care for the Poor and Underserved*, *19*(1), 149-163.

Selvin, E., & Parrinello, C. M. (2013). Age-related differences in glycaemic control in diabetes. *Diabetologia*, *56*(12), 2549–2551. doi:10.1007/s00125-013-3078-7

Schulz, A. J., Gravlee, C. C., Williams, D. R., Israel, B. A., Mentz, G., Rowe, Z. (2006). Discrimination, symptoms of depression, and self-rated health among African American women in Detroit: Results from a longitudinal analysis. *American Journal of Public Health*, *96*(7), 1265-1270.

Spanakis, E. K., & Golden, S. H. (2013). Race/ethnic difference in diabetes and diabetic complications. *Current Diabetes Reports, 13*(6), 814-823.

Steffens, D. C., Fisher, G. G., Langa, K. M., Potter, G. G., & Plassman, B. L. (2009). Prevalence of depression among older Americans: The aging, demographics and memory study. *International Psychogeriatrics*, *21*(5), 879-888.

Stein, G. L., Supple, A. J., Huq, N., Dunbar, A. S., & Prinstein, M. J. (2016). A longitudinal examination of perceived discrimination and depressive symptoms in ethnic minority

youth: The roles of attributional style, positive ethnic/racial affect, and emotional reactivity. *Developmental Psychology, 52*(2), 259.

Sullivan, P. W., Ghushchyan, V. H., & Ben-Joseph, R. (2008). The impact of obesity on diabetes, hyperlipidemia and hypertension in the United States. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation, 17*(8), 1063- 1071.

Tabachnick, B. G., & Fidell, L. S. (2007). Using multivariate statistics. Boston: Pearson/Allyn & Bacon.

Tan, J. (2017). Women and Mental Health: An examination of factors implicated in gender differences in depression. In F. L. Denmark, & M. A. Paludi (Eds.), *Psychology of Women: A Handbook of Issues and Theories, 3rd Edition*. ABC-CLIO, LLC.

Torres, L., & Ong, A. D. (2010). A daily diary investigation of Latino ethnic identity, discrimination, and depression. *Cultural Diversity and Ethnic Minority Psychology, 16*(4), 561.

Udo, T., & Grilo, C. M. (2017). Cardiovascular disease and perceived weight, racial, and gender discrimination in US adults. *Journal of Psychosomatic Research, 100*, 83-88.

Wagner, J., Tennen, H., Finan, P., Feinn, R., Burg, M. M., Seawell, A., & White, W. B. (2016). Exposure to racial discrimination and ambulatory blood pressure in women with type 2 diabetes. *Stress and Health: Journal of the International Society for the Investigation of Stress, 32*(4), 337-345.

Williams, D. R., Yu, Y., Jackson, J. S., & Anderson, N. B. (1997). Racial differences in physical and mental health: socio-economic status, stress and discrimination. *Journal of Health Psychology*, 2, 335-351.

Williams, D. R., Neighbors, H. W., & Jackson, J. S. (2003). Racial/Ethnic Discrimination and Health: Findings From Community Studies. *American Journal of Public Health,93*(2), 200-208.

Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: evidence and needed research. *Journal of Behavioral Medicine, 32*(1), 20-47.

Williams, D. R., & Mohammed, S. A. (2013). Racism and Health I: Pathways and Scientific Evidence. *American Behavioral Scientist, 57*(8), 1152–1173.

Yip, T. (2015). The effects of ethnic/racial discrimination and sleep quality on depressive symptoms and self-esteem trajectories among diverse adolescents. *J Youth Adolescence, 44*, 419-430.

Zvolensky, M. J., Rogers, A. H., Bakhshaie, J., Viana, A. G., Walker, R., Mayorga, N. A.,… Ochoa-Perez, M. (2019) Perceived racial discrimination, anxiety sensitivity, and mental health among Latinos in a federally qualified health center. *Stigma and Health*.