

RACIAL/ETHNIC DISPARITIES IN MENTAL AND COGNITIVE HEALTH AMONG  
OLDER ADULTS: THE ROLES OF STRESS EXPOSURE AND SOCIAL RELATIONSHIPS

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## **ABSTRACT**

Racial/ethnic health disparities in late life are a significant concern as the U.S. aging population becomes more diverse. While studies have focused on Black-White mental and cognitive health gaps, many disparities remain unexplained. The contributors to mental and cognitive health inequalities among other minority older adults, such as Hispanics, are not well understood. Guiding by the stress process model, this dissertation examines two potential pathways: differential exposure to stressors and access to protective resources and the differential effects of these factors in contributing to mental and cognitive health disparities among minority older adults. Using data from the Health and Retirement Study (HRS), three empirical studies were comprised to address research gaps. The first study investigates racial/ethnic disparities in late-life mental health, focusing on financial circumstances and social relationships. This study reveals that older Black and Latinx adults experience more depressive symptoms, partially due to their greater exposure to financial disadvantages and strained relationships, than whites. Despite receiving more relationship support than their White counterparts, Black and Latinx older adults derive less protection against depression from spousal and children's relationship support. The second study examines the impact of everyday discrimination on cognitive health, finding that discrimination is associated with lower baseline cognitive levels and a faster decline among older adults generally. However, the effect varies across racial and ethnic groups, with older white and Black adults declining more rapidly, while no association is observed among older Latinx adults. Finally, the third study explores the structural and qualitative aspects of friendships and cognitive health, suggesting that frequency of contact and relationship strain with friends impact cognitive function across all racial, ethnic, nativity, and gender groups. However, older Black men and foreign-born Latinas experience a diminished health return of contact frequency on cognition

relative to older white men. This dissertation uncovers racial/ethnic patterns of stress exposures and social relationships, illuminating the role of psychosocial factors in health disparities. It explores the complex interplay of these factors with race/ethnicity, nativity, and gender as they shape mental and cognitive health disparities among older adults. By providing population-based evidence, this research paves the way for developing interventions and programs that promote healthy mental and cognitive aging while reducing health disparities in the diverse older population.

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## CHAPTER 1: INTRODUCTION

Racial/ethnic health disparities are prevalent in the United States today, and they are expected to impose additional challenges on minority households and healthcare systems as the aging American population becomes more racially/ethnically diverse. Despite experiencing greater stress exposure and accumulated adversities, some studies have suggested that Blacks report a better or comparable mental health status relative to Whites (Breslau et al., 2006; Chatters et al., 1985; Mezuk et al., 2010; Taylor & Chatters, 2020). However, Black and Latinx older adults continue to face persistent health disparities in cognitive health, with their dementia prevalence being approximately 1.5 to 2 times higher than their White counterparts' (Alzheimer's Association, 2020). While socioeconomic factors (e.g., income, wealth, and education), physical and cardiovascular health (e.g., hypertension, diabetes, and heart disease), and health behaviors (e.g., exercise, drinking) partially explain these disparities—especially Black-White health gaps—many disparities remain unexplained (Chen & Zissimopoulos, 2018; Mayeda et al., 2016). Additionally, health disparity researchers have a limited understanding of mental and cognitive health inequalities among other minority older adults, such as U.S.-born and foreign-born Latinx individuals, and the potential psychosocial mechanisms or contributors to those disparities.

The stress process model suggests that racial/ethnic differences in exposure to stressors (e.g., financial strains and social strains from discrimination) and access to protective resources (e.g., relationship support) play critical but often underestimated roles in racial/ethnic health disparities (Schnittker and McLeod 2005; Turner 2013). However, the pathways through which stress exposure and social resources contribute to racial/ethnic disparities in mental and cognitive health among older adults have not been thoroughly studied. Several gaps in empirical research

remain, including the following: 1) whether or not stress exposure, relationship support, and relationship strain are equally distributed across older racial/ethnic groups; 2) whether stress exposure and social relationships in late life have differential effects on mental and cognitive health among racial/ethnic minorities as compared to Whites; and 3) the extent to which exposure to stressors and social relationships account for racial/ethnic disparities in mental and cognitive health in late adulthood.

This dissertation aims to address these research gaps by utilizing data from the Health and Retirement Study (HRS), a nationally representative report on older adults in the U.S. The dissertation consists of three empirical studies. The first study examines the presence of racial/ethnic disparities in late-life mental health. It explores how differential stress exposure (e.g., financial strain, relationship strain) and protective resources (e.g., financial resources, relationship support) contribute to the mental health gap among different racial/ethnic groups as well as how the effects of stress exposure and protective resources on health disparities vary by race/ethnicity. The second study focuses on the association between discrimination and cognitive health disparity by race/ethnicity in late adults. Specifically, it examines whether greater stress exposure to everyday discrimination among Black, U.S.-born Latinx, and foreign-born Latinx individuals explains any of their cognitive health disparities. The third study utilizes an intersectional perspective to examine how racial/ethnic differences affect the structural and qualitative characteristics of friendships and how this contributes to cognitive health disparities by race/ethnicity/nativity and gender. Collectively, these three studies address knowledge gaps that have not been empirically tested in the aging health research field (Brown et al., 2018). The findings of these studies will enhance our understanding of how racial/ethnic differences regarding stress exposure and social relationships may contribute to racial/ethnic

health inequality in later life. Furthermore, the findings will inform the development of social/health programs to reduce health disparities among older adults in diverse populations.

## **CHAPTER 2: RACIAL/ETHNIC DISPARITIES IN MENTAL HEALTH AMONG OLDER ADULTS: THE DIFFERENTIAL ROLES OF FINANCIAL CIRCUMSTANCES & SOCIAL RELATIONSHIPS**

### **INTRODUCTION**

According to the 2020 US Census, the proportion of racial and ethnic minority older adults aged 65 and over is projected to increase from 21% of the 2016 population to 44% by 2060 (Vespa et al., 2020). As the minority older population continues to grow, there is a public health imperative to understanding persistent health disparities by race/ethnicity, including mental well-being. However, it is widely known that findings on racial/ethnic differences in mental health are mixed and at times unexpected. For example, many studies showed that compared to White Americans, Black Americans have similar or lower rates of psychiatric disorders (e.g., mood and anxiety disorders) and fewer depressive symptoms, despite being disproportionately exposed to stressors (Breslau et al., 2006; Mouzon 2013; Kiecolt, Hughes, and Keith 2008; Mezuk et al., 2010; Williams et al., 2007; Taylor and Chatters 2020; Wang et al., 2021). However, other studies noted that the paradoxical findings of mental health advantage were mainly produced in adult samples with insufficient cases of people aged 50 and older (Wang et al., 2021). Additionally, the mental health of Latinx people is less discussed, but also shows inconsistent patterns. Some studies have found that Latinx adults have comparable or lower rates of depressive symptoms and psychiatric disorders than Whites (Breslau et al., 2006; Yang & Park, 2019). Yet, other research has shown higher rates of depressive symptoms and psychological distress among Latinx adults, including older Latinx people, relative to their White peers (Almeida et al 2011; Jang et al. 2008; Liang et al. 2011; Sternthal, Slopen, and Williams 2011).

According to the stress process model (SPM), mental health disparities can be explained by two underlying pathways: the differential exposure to and differential effects of stressors and protective resources (Kessler et al., 1999; Pearlin, 1999; Turner and Avison 2003). Given that protective resources (e.g., financial resources and relationship support) and stressors (e.g., financial and relationship strains) directly affect depressive symptoms and may vary by race/ethnicity (Mirowsky and Ross 2001; Thoits 2010; Turner 2013), it is likely that racial/ethnic minorities may experience poorer mental health than Whites due to differential exposure and differential effects of stressors and protective resources. However, these pathways have not been thoroughly tested in a racially/ethnically diverse aging population. Although some research has focused on Black-White disparities, little is known about how these pathways may explain mental health disparities between White and Latinx people, the latter being the largest minority group in the U.S. (Hayward et al., 2014). Despite existing research on the relationship between mental health and race/ethnicity, our understanding of how mental health varies among older adults of different racial/ethnic groups and the factors that contribute to those differences, if any, in older age is still limited (Lincoln, Chatters, and Taylor, 2003; Taylor and Chatters, 2020).

Using a nationally representative sample, the current study investigates the disparities of depressive symptoms among older Blacks, Latinx, and Whites and tests how differential exposure and differential effects of two stressors (financial and relationship strains) and two protective resources (financial resources and relationship support) explain racial/ethnic disparities in depressive symptoms. Drawing on the SPM, this study addresses three questions. First, is the prevalence of depressive symptoms among racial/ethnic minority older adults higher or lower than among their White counterparts? Second, can differential exposure to stressors and protective resources explain the racial/ethnic disparities in depressive symptoms? Finally, does

the magnitude of stress exposure and protective resources vary by race/ethnicity? This study provides new evidence of racial/ethnic disparities in stress exposure, protective resources, and mental health in a racially/ethnically diverse aging population. The findings of this study will contribute to our understanding of mental health disparities in older adulthood by race/ethnicity and will inform interventions aimed at reducing minority health disparities.

### **STRESS PROCESS MODEL**

The SPM provides a framework to explain how structural inequality and social stratification (such as by SES and race) impact mental health through unequal distributions of stressors and protective resources across social groups (Pearlin et al., 1981; Turner & Lloyd, 1999). Specifically, exposure to more stressors can lead to poorer mental health, while accessing more resources (e.g., financial and social resources) can bolster mental health by buffering the negative impact of stressors (Mirowsky and Ross, 2003; Turner & Lloyd, 1999). Accordingly, mental health disparities across racial/ethnic groups can be attributed to differential exposure to stressors or resources, which are due to structural barriers in the US (Phelan & Link, 2015; Turner & Avison, 2003). Furthermore, disadvantaged groups may be more vulnerable to the adverse impact of stressors or may benefit less from protective mental health resources than advantaged groups, which may account for mental health disparities (J. R. Kahn & Pearlin, 2006; Mcleod, 2012; Turner & Avison, 2003). SPM research has shown that chronic stressors tend to occur in domains such as finances and social relationships, which are particularly vital to mental health for older racial/ethnic minorities (Lincoln, 2007; Watkins et al., 2006). Both stressors and protective resources are shaped by race/ethnicity and have direct or indirect (buffering) effects on mental health (Turner 2013; Thoits 2010). However, the extent to which racial/ethnic patterns of stressors and protective resources account for racial/ethnic disparities in mental health in late-

life mental health remains understudied. It is also unclear whether some racial/ethnic groups systemically experience fewer health benefits from protective resources and/or more adverse impacts from stress exposure than others (Williams & Mohammed, 2013). Thus, the consideration of both differential exposure to stressors and differential effects of protective resources may provide a better understanding of why and how mental health inequality is sustained.

### **FINANCIAL RESOURCES, FINANCIAL STRAIN, AND MENTAL HEALTH**

Socioeconomic status (SES) is a well-recognized fundamental cause of health inequality (Link & Phelan, 1995). Financial resources, such as income and wealth, function as protective resources in promoting or maintaining mental health (Link & Phelan, 1995). Households with sufficient financial resources can afford goods and services—quality medical care and leisure activities—and can maintain social networks, which can help reduce stress and enhance mental well-being (Link and Phelan 1995; Marmot 2004). Studies have found a negative association between income/wealth and psychological distress, depressive symptoms, and anxiety disorders (Lorant et al., 2003). Conversely, financial strain, which is one of the most common stressors experienced in late life, can cause adverse mental health effects such as depression (Ferraro & Shippee, 2009; Kahn & Pearlin, 2006). Financial strain is often measured by self-appraisal instruments that capture chronic stress arising from economic hardships, including inadequate housing, food insecurity, and difficulties in making ends meet (Ferraro & Shippee, 2009; Kahn & Pearlin, 2006; Mirowsky & Ross, 2001). Older adults who experience sustained financial strains are at a higher risk than their financially stable peers of developing mental health problems, such as depression and anxiety, even after controlling for household income and wealth (Bierman, 2014; J. R. Kahn & Pearlin, 2006; Szanton et al., 2014).

However, financial resources and financial strain are both unequally distributed by race/ethnicity due to structural racism in the US (Phelan and Link, 2015; Williams & Mohammed, 2013; Teti et al., 2011). Black and Latinx individuals have significantly lower household income and wealth than Whites over their life course (Herring & Henderson, 2016; Williams et al., 2016) and have disproportionately higher unemployment rates due to residential segregation, poor quality of education, and a higher risk of incarceration (Angel & Angel, 2006; Sternthal, Slopen, & Williams, 2011; Teti et al., 2011). As a result, older Black and Latinx adults are more likely than their White counterparts to experience financial strain (Assari, 2019; Brown et al., 2020).

#### *Differential Exposure to Financial Resources and Strain*

In the context of race/ethnicity, the differential exposure hypothesis ascribes racial/ethnic minorities' mental health disadvantages to their disproportional exposure to economic adversity. Although some studies have shown that Black-White differences in mental health decrease significantly when socioeconomic factors are adjusted (Boen et al., 2020; Liang et al., 2011; Sternthal et al., 2011), surprisingly few studies have formally tested the mediating roles of financial resources and strains in mental health disparities by race/ethnicity (Hatch and Dohrenwend, 2007; Sternthal et al., 2011). Among the studies that have tested the mediation effects, some have found support for the differential exposure hypothesis (Boen et al., 2020; Liang et al., 2011). For example, using longitudinal data from HRS, Liang et al. (2011) indicated that Black and Latinx older adults experience more depression and psychological distress as they age than Whites, partially due to having fewer financial resources. In addition, a study using a community sample of all ages found that greater exposure to financial strain was linked to a higher risk of depressive symptoms for Blacks and Latinx (Sternthal et al., 2011). However,

other studies found no evidence for the mediation effects of income and wealth (Skarupski et al., 2005; Tobin, 2021) or financial strain (J. R. Kahn & Pearlin, 2006) on the Black-White difference in depressive symptoms.

#### *Differential Effects of Financial Resources and Strain*

Overall, within the SPM framework, research has analyzed whether racial disparities in health can be explained by differential effects of resources or stressors, such as the “*diminished gain*” of protective resources and the “*higher vulnerability*” to stress exposure (Turner and Avison 2003; Farmer and Ferraro 2005; Thoits 1995). For example, while greater financial resources, such as income, are known to contribute to better health and well-being, they may generate less health gain for Blacks than Whites (Farmer and Ferraro, 2005; Assari, 2018), which may be due in part to the higher cost, poorer quality, and lower availability of goods and services in minority neighborhoods (Williams & Mohammed, 2013). Moreover, the effect of financial strain on mental health may also vary by race/ethnicity. Accordingly, the *higher vulnerability hypothesis* suggests that stress exposure is more detrimental to the mental health of disadvantaged groups, such as racial minorities, due to their lack of stress-buffering resources (Thoits 1995; Link and Phelan 1995). However, some studies examining the susceptibility of SES-related stressors have found that resource-poor Blacks are more vulnerable to psychological distress than their White peers (Ulbrich et al., 1989), while others have found no evidence of this (Sternthal et al., 2011). Given the lack of research on the differential effects of financial resources or strains on aging populations that include Latinx participants, it remains unclear whether such differential effects exist within this minority group.

## **RELATIONSHIP SUPPORT, RELATIONSHIP STRAIN AND MENTAL HEALTH**

According to the SPM perspective, perceived social support benefits mental health more than actual support does, and this occurs through the main effect and the stress-buffering effect (Thoits 2011; Pearlin et al. 1981; Turner and Lloyd 1999). Social support typically refers to the presence of a. Although perceived support (e.g., emotional support) promotes mental health in people of all life person's significant others that they can turn to for emotional, informative, or instrumental assistance when needed (Thoits, 2011; Kim and Thomas, 2019; Uchino, 2006)stages, the salutary effect may vary depending on the sources of support in late life (Stafford et al., 2011; Thomas, 2016). Studies on late middle-aged and older adults suggest that relationship support from a spouse/partner has the most pronounced effect on mental health (such as mitigating depressive symptoms or a major depressive disorder), followed by support from adult children and family members, which are more impactful than friend support (H. J. Lee & Szinovacz, 2016; Stafford et al., 2011; Teo et al., 2013). In contrast, perceived relationship strain refers to negative social interactions with spouses, children, and family members, including excessive demands, criticism, and a lack of support (Shiovitz-Ezra & Leitsch, 2010). Although less discussed, relationship strain, particularly from spouses or partners, is associated with an increased risk of depressive symptoms and major depressive disorders in the general and aging populations (Y. Chen & Feeley, 2014; Shiovitz-Ezra & Leitsch, 2010; Stafford et al., 2011; Teo et al., 2013).

### *Differential Exposure to Relationship Support and Strain*

As previously noted, the differential exposure hypothesis posits that racial/ethnic minorities tend to have fewer coping or social resources and experience more relationship strain than Whites, due to their marginalized statuses. For example, Blacks report lower levels of

spousal support and poorer marital quality than Whites, which may be due to their lower marriage rates and higher divorce rates, which are ultimately driven by the structural racism and economic disadvantages that Black people, especially Black men, face (Kiecolt, Hughes, and Keith 2008; Yang and Park 2019; Bulanda and Brown 2007; Broman 2005). However, the salience of support and strain may vary depending on their relationship types (e.g., spouse/partner, children, and kin) and race/ethnicity (Almeida et al., 2009; Antonucci et al., 2014; Mouzon, 2013; Thomas, 2016). Consequently, evidence on racial/ethnic patterning of relationship support is mixed. While some ethnographic and empirical research suggests that Blacks and Latinx have higher levels of relationship support and structural characteristics of social networks (e.g., network size and contact frequency) than Whites, particularly from children and extended family, other studies report more similarities than differences in terms of relationship support (Ajrouch, Antonucci, & Mary R. Janevic, 2001; Landale et al., 2006; Mouzon, 2013; Staples & Johnson, 1993). Moreover, although Whites and Latinx have similar levels of core network characteristics, Whites reported slightly more support advantages than Blacks (Almeida et al., 2009; Flores et al., 2020; Kiecolt et al., 2008; Mouzon, 2014).

According to SPM, Blacks and Latinx may experience more relationship strain than Whites due to their greater exposure to socio-economic adversities that may be associated with more marital, parental, and familial conflicts (Broman, 2005; Williams et al., 2016; Williams & Mohammed, 2009). However, evidence for racial/ethnic patterns of social strain is limited and inconclusive. For example, some studies reported that Blacks experience more relationship strain from spouses and kin (Broman, 2005; Bulanda & Brown, 2007; Mouzon, 2013), but others found no significant Black-White differences in relationship strain from spouses/partners, children, or kin (Kiecolt et al., 2008; Kim et al., 2021). Although research on Latinx and relationship strain is

sparse, a study using HRS data found that U.S.-born Latinx reported less relationship strain from kin, but there was no significant difference in kin strain difference between foreign-born Latinx and Whites (Brown et al., 2020).

Whether and how the differential exposure hypothesis explains racial/ethnic disparities in mental health through certain types of relationship support and strain remains inconclusive (Almeida et al., 2009; Plant & Sachs-Ericsson, 2004; Yang & Park, 2019). Among the limited studies that assess relationship support from various relationship types and their mediation effects on mental health, some research has shown that spousal support (Yang and Park 2019) and familial support (Almeida et al., 2011) can suppress the association between race and depression. However, other studies found no evidence of such effects in explaining mental health disparities between Blacks and Whites (Kiecolt et al., 2008; Mouzon, 2014). As noted, perceived relationship support and strain may impact mental health among older adults more than structural support does (E. Y. Cornwell & Waite, 2012; Stafford et al., 2011). Thus, the inconsistent findings may be attributable to the different conceptual strategies, such as operationalization and measurement of social support (e.g., contact frequency, instrumental support, or perceived support) (Mouzon, 2013), and the types of relationship support investigated. Therefore, understanding the context of race/ethnicity and relationship types is crucial to a better understanding of the differential exposure hypothesis and its potential impact on mental health disparities.

#### *Differential Effects of Relationship Support and Strain*

Black and Latinx older adults tend to have larger family networks and be more family-oriented than Whites, but it is unclear whether the mental health benefits of relationship support from spouses, children, and family members are more or less protective for racial/ethnic

minorities than for Whites (Landale et al., 2006; Staples & Johnson, 1993). Research on the *diminished gain hypothesis* suggests that psychosocial resources may have less beneficial health effects for racial/ethnic minorities than for Whites due to structural racism and social inequality, thereby contributing to racial disparities in health (Turner and Avison 2003; Assari 2018). Although the diminished health gain from social support for Blacks has been observed in physical health (e.g., chronic disease and all-cause mortality) (Assari, 2018), empirical evidence is inconclusive. Some studies have found that relationship support from spouses and family members benefited the mental health of racial/ethnic minority adults more so than for White adults (Kiecolt et al., 2008; Lincoln et al., 2003; Plant & Sachs-Ericsson, 2004), while others found no difference by race (Yang and Park 2019). Furthermore, it is unclear whether Latinx have similar experiences with diminished health gain.

Although the mental health effects of relationship strain are rarely discussed, the effect magnitude may differ across racial/ethnic groups. According to the *higher vulnerability hypothesis* (Guo et al., 2015; Ulbrich et al., 1989), the emotional toll of relationship strain might be more detrimental to the mental health of racial/ethnic minority older adults than their White peers. Nevertheless, this hypothesis remains underexplored, as few studies have compared the association between relationship strain and late-life mental health outcomes across racial/ethnic groups.

## **HYPOTHESES**

Drawing from the SPM and the existing empirical finding, two sets of hypotheses will test the roles of financial resources, financial strain, relationship support, and relationship strain in mental health disparities by race/ethnicity in late life. The first set of hypotheses addresses racial/ethnic differences in financial resources and strains.

*Hypothesis 1a.* Older racial/ethnic minorities experience more depressive symptoms than their White counterparts.

*Hypothesis 1b.* Older racial/ethnic minorities hold fewer financial resources than Whites, and this partly accounts for their higher risks of depressive symptoms as compared to Whites.

*Hypothesis 1c.* Older racial/ethnic minorities experience more financial strains than Whites, which partially contributes to their greater prevalence of depressive symptoms (i.e., *differential exposure hypothesis*).

*Hypothesis 1d.* Financial resources are less beneficial for the mental health of older racial/ethnic minorities than they are for that of Whites (i.e., *differential effect-diminished gain hypothesis*).

*Hypothesis 1e.* Financial strains are more detrimental to the mental health of older racial/ethnic minorities than they are for that of Whites, since older racial/ethnic minorities are more resilient than Whites are when faced with economic adversities (i.e., *differential effect-higher vulnerable hypothesis*).

The second set of hypotheses examines how social support and strain may contribute to the association between race/ethnicity and mental health in late adulthood.

*Hypothesis 2a.* Older racial/ethnic minorities perceived less relationship support from their spouses and children than Whites did, which increased the former's risk of depressive symptoms (i.e., *differential exposure hypothesis*).

*Hypothesis 2b.* Older racial/ethnic minorities experienced more relationship strains with spouses and children than Whites did, which increased the former's risk of depressive symptoms (i.e., *differential exposure hypothesis*).

*Hypothesis 2c.* Relationship support from spouses and children is less beneficial for older racial/ethnic minorities than it is for Whites' mental health because disadvantaged social groups tend to experience more stress (i.e., *differential effect-diminished return hypothesis*).

*Hypothesis 2d.* Social strains from spouses, children, and family members are more detrimental to the mental health of older racial/ethnic minorities than they are to that of Whites, which contributes to the former having more depressive symptoms (i.e., *differential effect-higher-vulnerable hypothesis*).

## **METHODS**

### *Data*

This study uses data from the 2014 and 2016 waves of the HRS—a nationally representative panel study of American adults aged 50 years or older which conducts every two years. It oversamples Black and Latinx people to allow reliable comparisons in health disparities. HRS collects social relationships and psychosocial data biennially through the self-administered Psychological Leave-Behind Questionnaire (LBQ). Given that LBQ utilized a rotational study design, the 2014 wave of LBQ-eligible subsamples was combined with the 2016 wave of subsamples to attain the full LBQ sample. The response rate for the LBQ sample was 70 percent. Most of the missing values resulted from nonresponse to the social relationship questions; for example, about 1,820 individuals have missing values on one or more of the social support and strain variables. After excluding respondents who did not complete the CES-D scale (n= 126), those who were under age 50 at the time (n =375), those who identified their race as “other” (n=445), those missing key demographic information (n=18), and those who were eligible but failed to complete the LBQ (n=5,719), the analytic sample contained 12,448 individuals aged 50

to 104. Multiple imputations by chained equations were conducted to handle the missing values (M=20).

### *Measures*

#### *Dependent Variable: Depressive Symptoms*

Depressive symptoms were measured with an abbreviated eight-item version of the Center for Epidemiological Studies-Depression (CES-D). This version of CES-D includes eight dichotomous items asking whether the respondents felt depressed, felt everything required effort, experienced restless sleep, felt lonely, felt sad, could not get going, felt happy, enjoyed life, and had a lot of energy during the past week. Positive items were reverse coded, and all items were summed such that higher values indicated more depressive symptoms (range: 0-8). This abbreviated CES-D has shown an internal consistency, reliability, and validity comparable to the original 20-item version of CES-D (Turvey et al., 1999).

*Race/ethnicity* was self-identified and categorized into three groups: non-Hispanic White (labeled as White), non-Hispanic Black (labeled as Black), and Hispanic/Latino (labeled as Latinx).

#### *Independent Variables: Financial Resources and Financial Strain*

Financial resources were assessed by two variables: household income and household assets. Household income is the sum of all earnings from the respondent and their spouse, including earned income, pensions, annuities, and government benefits for the previous calendar year. Household assets comprised all sources of non-housing assets, including stocks, bonds, cash savings, and net investments for the previous calendar year. Then, household incomes and assets were divided by the square root of household size and logged transformed.

Financial strain was measured by two variables: financial dissatisfaction and food insecurity. The former was assessed by the average of the following three items on a five-point scale (1=completely satisfied; 2=very satisfied; 3=somewhat satisfied; 4=not very satisfied; 5=not at all satisfied): (1) The condition of the place you live (house or apartment); (2) present financial situation; (3) the total household income ( $\alpha=0.82$ ). Thus, the higher values indicate more financial dissatisfaction. Food insecurity was appraised by asking whether the respondent always had enough money for the food they needed and was coded as a dummy variable (1=no; 0=yes).

*Independent Variables: Relationship Support and Relationship Strain*

Relationship support from spouses, children, and family members was measured separately by three-item scales that asked the following: (a) “How much do they (spouse or children) understand the way you feel about things?” (b) “How much can you rely on them if you have a serious problem?” and (c) “How much can you share with them if you need to talk about your worries?” Response options ranged from 1 (a lot) to 4 (not at all). Items were re-coded and averaged with higher values indicating a higher level of social support. Also, a value of 0 was assigned to those with no spouse, child, or family members, regarding those three types of relationship support and strain.

Relationship strain of each type of social relationship was measured separately by a four-item scale that asked the following: (a) “How often do they (spouse or children) make too many demands on you?” (b) “How much do they criticize you?” (c) “How much do they let you down when you are counting on them?” and (d) “How much do they get on your nerves?” Items were scored on a scale of 1 (a lot) to 4 (not at all). All responses were reverse coded and averaged, so

higher scores meant greater social strain. A value of 0 was assigned to those with no spouse, children, or family members, as it was for social support variables.

### Covariates

Demographic covariates, including age in years, gender (0=male; 1=female), years of schooling, marital status (married [reference], previously married, and never married), U.S.-born (0=yes; 1=no), and number of chronic diseases were controlled because higher rates of depression were observed among individuals with multiple chronic diseases and poorer health; thus, self-reported health and the number of chronic diseases were also controlled as potential confounders of depressive symptoms (Assari, 2018; Watkins et al., 2017).

### Analytical Strategy

The analysis consisted of four steps. First, weighted means and proportions were estimated for all study variables; t-tests and tests of proportions of significance were used to assess differences in the descriptive statistics across racial/ethnic groups (refer to Table 2-1). Second, negative binomial regressions were employed to investigate the relationship between race/ethnicity and depressive symptoms, and how this association correlated with differences in financial and social relationship factors across racial/ethnic groups. Specifically, Model 1 examined the bivariate relationship between race/ethnicity and depressive symptoms. Model 2 adjusted this association by controlling for chronic diseases and sociodemographic covariates. Models 3 through 6 added financial resources, financial strains, social support, and social strain variables, respectively, to examine their contributions to racial/ethnic disparities of depression. Model 7 included all the covariates (see Table 2-2). Furthermore, Karlson-Holm-Breen (KHB) analyses were performed to assess the mediation effects and determine the extent to which the association between race/ethnicity and depressive symptoms was mediated through financial

resources, financial strains, social support, or social strains (Breen et al., 2013; Karlson et al., 2012). Finally, moderation analyses were conducted to test the interaction between race/ethnicity and those key factors. LBQ-specific weight was applied in all analyses to adjust for selection probabilities, non-response, and poststratification, using the *svy, subpop* function in Stata 17.

## **RESULTS**

### *Descriptive Statistics*

Table 2-1 displays the weighted descriptive statistics by race/ethnicity. Of all respondents, 69.38% were White, 18.08% were Black, and 12.54% were Latinx. On average, respondents reported 1.38 depressive symptoms (range 0-8). However, the averaged depressive symptom scores were significantly higher among racial/ethnic minorities than among Whites. Specifically, Latinx respondents reported the most depressive symptoms (1.93), followed by Blacks (1.72). In addition, Black and Latinx respondents reported having significantly more chronic diseases and poorer self-reported health, despite their average age being significantly younger than Whites. Compared to White respondents, Black and Latinx ones were less likely to be married and had fewer years of schooling. Furthermore, a relatively higher percentage of Black respondents were female (58.03%).

Financial resources and strains varied significantly across race/ethnicity. Whites had the most household income and assets as well as the lowest levels of financial dissatisfaction and food insecurity among all race/ethnic groups. While Latinx had the lowest level of household income, Blacks reported the least wealth and most financial dissatisfaction and food insecurity. In terms of social relationships, racial/ethnic minorities generally reported having similar or greater levels than Whites of relationship support from all sources, but the former also experienced more relationship strains. One exception was that Blacks had a significantly lower

level of spousal support than Whites, despite reporting less spousal strain. This may be due to the former's lower rates of marriage.

*Financial Resources, Financial Strains, and Depressive Symptoms*

Table 2-2 presents the results of the negative binomial regression models of depressive symptoms. Model 1, which was not adjusted for any covariates, revealed that older racial/ethnic minorities had a higher IRR of depression than their White counterparts (Blacks' incidence rate ratio [IRR]=1.53,  $p<0.001$ ; Latinx IRR=1.67,  $p<0.001$ ). When sociodemographic and health covariates were adjusted, older racial minorities still had a higher IRR of depressive symptoms than their White peers, but mental health disadvantages among racial/ethnic minorities were significantly reduced (Blacks' IRR=1.11,  $p<0.05$ ; Latinx's IRR=1.19,  $p<0.01$ , Model 2). These results support Hypothesis 1a, indicating that Black and Latinx older adults experience more depressive symptoms than their White peers.

Financial resources significantly explained a portion of disparities in depressive symptoms by race/ethnicity (Hypothesis 1b). In particular, depression disparity between Blacks and Whites became insignificant when household income and assets were included, while the OR for depressive symptoms among older Latinx remained similar relative to Whites (Model 3, Table 2-2). The KHB results confirmed that financial resources significantly mediated racial/ethnic differences in depressive symptoms. As shown in Panel A of Table 2-3, about 30.28% (indirect effect=0.03,  $p<0.001$ ) of the total effect of being Blacks on depression and 8.89% of the total effect of being Latinx (indirect effect=0.016,  $p<0.05$ ) were mediated through income and wealth. The regression and KHB findings support Hypothesis 1b, that Blacks and Latinx experience more depressive symptoms than Whites due in part to their relative household income and wealth disadvantages. Furthermore, financial dissatisfaction (IRR=1.46,  $p<0.001$ )

and food insecurity (OR =1.42,  $p<0.001$ ) corresponded with a higher IRR of depressive symptoms. Specifically, the Black-White difference in depression no longer existed after financial strains were controlled for. However, financial strains did not explain the depression disparity between Latinx and Whites (Model 4, Table 2-2). Panel B of Table 2-3 also confirmed that financial strain mediated 83.80% of the association between Blacks and depressive symptoms (indirect effect=0.12,  $p<0.001$ ) but it did not mediate the relationship between Latinx and depressive symptoms. These results partly support Hypothesis 1c, that Blacks experience more depressive symptoms than Whites partially because of the former's greater exposure to financial strains.

#### *Social Support, Social Strains, and Depressive Symptoms*

Model 5 shows that having higher levels of relationship support from spouses (IRR=0.83,  $p<0.001$ ), children (IRR=0.90,  $p<0.001$ ), and family members (IRR=0.90,  $p<0.001$ ) were associated with the lower relative risk of depressive symptoms. Notably, the addition of relationship support in Model 5 revealed a suppression effect: Black and Latinx older adults would experience worse mental health outcomes if their levels of relationship support were lower than their current ones. Additionally, the KHB test in Panel C of Table 2-3 confirmed that social support suppresses the Black-White and Latinx-White differences in depressive symptoms, as evidenced by the opposite sign of the indirect effect compared to the total effect. While the findings did not support Hypothesis 2a—that older racial/ethnic minorities perceived more supportive social relationships than Whites did from their spouses, children, and family, thereby reducing their risk of depression—the findings suggest that Black and Latinx older adults would experience even poorer depressive symptoms if they did not have the level of relationship support they currently have.

Furthermore, higher levels of social strain are associated with higher incidence rates of depressive symptoms (social strain from spouses IRR=1.30,  $p<0.001$ ; social strain from children IRR=1.07,  $p<0.01$ ; social strain from family members IRR=1.16,  $p<0.001$ ). Model 6 of Table 2-2 shows that relationship strain explains a significant portion of Black people's depressive symptoms, as the Black-White difference in depressive symptoms was no longer significant when relationship strain was considered. This finding was supported by the KHB test (Panel D, Table 2-3), which showed that social strains from spouses, children, and family members jointly mediated 97.12% of the effect of being Black on depression (indirect effect=0.10,  $p<0.001$ ) and 28.34% of the association between being Latinx and depression (indirect effect=0.05,  $p<0.01$ ). These results are in line with Hypothesis 2b, which posits that older racial minorities experience more relationship strains than Whites from their spouses, children, and family members, and that such increased relationship strain is associated with the former's higher risk of depressive symptoms.

Finally, Model 7 included all sociodemographic, financial, and social relationship covariates, and the results showed that there was no longer a significant depression disparity between older Blacks and Whites. However, Latinx older adults still had a 1.21 times greater IRR of depressive symptoms than their White counterparts. The KHB tests in Panel E of Table 2-3 confirmed these findings, demonstrating that financial strain and social relationship factors jointly mediated 85.31% of the association between being Black and experiencing depressive symptoms (indirect effect=0.12,  $p<0.001$ ). Nevertheless, these focal factors did not significantly mediate the association between being Latinx and having depressive symptoms. Overall, these results suggest that financial circumstances and social relationship factors explain more of the

depressive symptom disparities faced by Black older adults than those faced by their Latinx peers.

#### *Financial Factors and Social Relationships as Moderators of Depression Disparities*

Table 2-4 summarizes the results of the moderation analysis, which examined how financial factors and social relationships moderate the association between race/ethnicity and depressive symptoms. Overall, the effects of financial and social relationship factors tended to be weaker for racial/ethnic minorities than for Whites. Household income was found to be a significant moderator only in the model for Black older adults and depressive symptoms (Panel 1). Specifically, higher household income was associated with a lower rate of depressive symptoms for Black older adults, but income did not moderate the association between being Latinx and having depressive symptoms. There is no support for Hypothesis 1d (the *differential effect-diminished gain hypothesis*), which proposes that mental health benefits of income are weaker for minorities than they are for Whites. In fact, Blacks gained slightly more mental health benefits from higher incomes than Whites did. Moreover, exposure to financial dissatisfaction was less harmful on the depressive symptoms of Blacks (interaction IRR=0.84,  $p<0.01$ ) and Latinx (interaction IRR=0.90,  $p=0.052$ ) than it was to Whites (Panel 3). Figure 1 provides a graph of this finding, showing that the effect magnitude of financial dissatisfaction on depressive symptoms is more pronounced for Whites than it is for Blacks and Latinx. As such, it implies that Blacks and Latinx may be more resilient than Whites when faced with economic adversities.

Regarding social relationships, the analysis indicates that the moderation effect of relationship support tends to be less beneficial for racial/ethnic minorities than it is for Whites. As shown in Panel 6, Blacks (interaction IRR=1.10,  $p<0.001$ ) derived fewer mental health

benefits from spousal support than Whites (see Figure 2). Similarly, Panel 7 reveals that both Blacks (interaction IRR=1.07,  $p<0.05$ ) and Latinx older adults (interaction IRR=1.10,  $p<0.05$ ) gained fewer benefits from support from children than Whites did (see Figure 3). Additionally, the effect of family support on depression was less beneficial for Blacks than it was for Whites, although the interaction effect was marginally significant (interaction IRR= 1.09,  $P=0.07$ , Panel 7). Overall, Hypothesis 2c was partially supported, suggesting that relationship support is less beneficial to racial/ethnic minorities than to Whites. In terms of relationship strain, no significant moderating effects were found for strain from spouses or children among Blacks and Latinx. However, family strain was found to be a significant moderator for Latinx older adults (interaction IRR=0.85,  $p<0.01$ ), indicating that family strain was less harmful to the mental health of Latinx than to that of Whites. These findings do not support Hypothesis 2d (*higher vulnerability hypothesis*), which posits that racial/ethnic minorities are more vulnerable to relationship strain. Therefore, the results indicate that racial/ethnic minorities may be equally or less vulnerable than Whites to relationship strain.

## **DISCUSSION**

A large body of research has investigated the Black-White difference in mental health. However, it is still not well understood whether Black and Latinx older adults have a higher prevalence of depressive symptoms than their White peers or how differential exposure and differential effects of financial and relationship-related stressors and resources in late life contribute to any potential disparities. Using a nationally representative sample of older adults, this study confirms that racial/ethnic minority older adults, especially Latinx, experience more depressive symptoms than their White counterparts. The racial/ethnic disparities in depressive symptoms can be partially explained by their greater exposure to financial disadvantages,

relationship strain, and the diminished gain from relationship support from spouses and children. Furthermore, this study finds that racial/ethnic minorities experienced weaker impacts of financial and relationship strains than Whites.

### *Financial Circumstances*

Financial circumstances play a crucial role in the underlying mental health disadvantages of racial/ethnic minority older adults as compared to their White counterparts. This study shows that racial/ethnic minorities had lower household income and wealth than Whites, and nearly one-fifth of them experienced food insecurity. Specifically, differences in financial resources explained about 30% of Black-White disparities and 9% of Latinx-White disparities in depressive symptoms. Financial strain, on the other hand, accounted for 84% of the Black-White gap in depressive symptoms but not for the Latinx-White one. Structural and institutional racism and discrimination (such as residential segregation, poor quality of education, and the high unemployment rate among racial/ethnic minorities) have hindered minorities' efforts to accumulate financial resources and have exposed them to more financial strains (Phelan & Link, 2015; Williams & Mohammed, 2013). Although meeting the financial caretaking expectations is considered a pressure for males, especially Black males (Teti et al., 2012), the supplementary analyses of this study found no significant difference between Black males and females concerning the effect of financial factors on depressive symptoms (result not shown but available upon request). Financial resources and strains, therefore, are equally critical for Black males and females. Moreover, White and Latinx females (marginally significant) were more depressed than their male counterparts, even after adjusting for financial factors (result not shown but available upon request). Although financial disadvantages are one of the major risk factors for depressive symptoms among Black older adults, they appear to play a minor role in

explaining the mental health disparities of Latinx older adults compared to their White peers, despite Latinx having comparable financial resources and strains to those of Blacks. This could be because the concepts of financial resources and strains did not adequately capture the psychosocial factors most salient for older Latinx, as they may have unique experiences regarding financial circumstances.

Notably, this study observed that financial dissatisfaction is less harmful to the mental health of Blacks and Latinx than to that of Whites, despite their differential exposure to financial strain. These findings support the higher resilience hypothesis rather than the higher vulnerability hypothesis (Hypothesis 1e). Blacks and Latinx may have developed resilience, supportive resources, and coping strategies to handle financial hardship and socioeconomic challenges better than Whites as a result of the former's prolonged experience of marginalization (Williams and Mohammed, 2013; Teti et al., 2012; Landale, Oropesa, and Bradatan, 2006). In addition, Black and Latinx individuals appraise and experience financial strain differently than Whites, making exposure to financial strain less taxing on the mental health of racial/ethnic minorities than Whites (Brown et al., 2020; Lincoln et al., 2003). Furthermore, this study aligns with an increasing body of evidence that suggests Whites' vulnerability, indicating that Whites might be more susceptible to the impact of financial strain than Blacks and Latinx (Keyes, 2009; Malat et al., 2018). If the resilience of racial/ethnic minorities is an adaption to socioeconomic difficulties, then the vulnerability of Whites may be the cost of social privilege, as this study showed they were less resilient to socioeconomic adversities.

### *Social Relationship*

Relationship support plays an essential role in compensating for the mental health disadvantages of Black and Latinx older adults. This study aligns with prior ethnographic

findings, demonstrating that Black and Latinx older adults perceived comparable or higher levels than Whites of relationship support from children and extended family (Landale, Oropesa, and Bradatan 2006; Staples and Johnson 1993). Although all sources of relationship support were associated with fewer depressive symptoms regardless of race/ethnicity, they protect Black and Latinx older adults from worse mental health outcomes. In fact, Black and Latinx older adults might have a higher rate of depressive symptoms if not for the suppressing effect of relationship support.

This research highlights the overlooked role of relationship support as a mechanism contributing to racial/ethnic mental health disparities, with fewer mental health benefits yielded among racial/ethnic minority older adults than among their White peers. In particular, spousal support is least beneficial for Black older adults, and children's relationship support was less effective for Blacks and Latinx than it was for Whites. It is plausible that multilevel structural barriers limit the access and ability of racial/ethnic minority older adults to translate their given social resources into mental health gains, despite having more of these resources available to them than Whites do (William & Mohammed 2013). However, this result contradicts the claims made by Kiecolt and colleagues' (2003) and Lincoln and colleagues' (2003), that social support (i.e., spousal support and averaged perceived support) was more beneficial for Blacks than for Whites. However, these studies used a younger sample (aged 15–54 years) from the 1990-1992 waves of the National Comorbidity Survey, where Blacks reported either a similar or lower level of psychological distress than Whites. Therefore, more research is needed to evaluate the diminished effect of social support on mental health outcomes and the way in which it may serve as a pathway to understanding underlying health inequalities by race/ethnicity in late life.

The greater exposure to relationship strain among racial/ethnic minorities also contributes to racial/ethnic disparities in depressive symptoms, although the negative impact of familial relationship strain is less detrimental for Latinx than it is for Whites. As demonstrated in this study, Blacks and Latinx experienced more relationship strain with children and family members, and relationship strains from all relationship types account for a large proportion of the Black-White disparity and one-third of the Latinx-White disparity in depressive symptoms. Furthermore, although family relationship strains were positively associated with depressive symptoms, this study found that the adverse effect was weaker for Latinx than for Whites. It is conceivable that relationship strain is more tolerated or adaptive in a specific racial/ethnic group, such as Latinx, as they have greater or closer family networks. Also, it could be understood from the racial/ethnic differences in stress appraisal that Latinx older adults in this study appraised family strain as less stressful and therefore contributing less to depressive symptoms, as compared to Whites (Brown, Mitchell, and Ailshire 2018). However, unlike the two existing studies on Black-White disparities, which suggest relationship strains were stronger on psychological distress and depressive symptoms for Whites but not Blacks (Lincoln et al., 2003; Wang et al., 2021), the present study found no difference in the effect of relationship strain in explaining Black-White disparities in depressive symptoms. Future research may consider differentiating relationship strain from its sources and test whether they contribute to mental health outcomes differently.

## LIMITATIONS

Some limitations should be considered and deserve further investigation. First, this is a cross-sectional study; thus, causal ordering cannot be established even with mediation analysis. For example, financial resources and strain may likely present before and impact one's perceived instances of relationship support and strain and depressive symptoms and vice-versa. Future use of the longitudinal data research can further assess mental health changes as well as how the differential exposure and differential effect of stressors and protective resources may shape racial/ethnic disparities in mental health over time. Second, this study measured social support as perceived relationship support from core sources (as previous research suggested) rather than as instrumental assistance. Also, recent evidence suggests that the coping resources that support mental health (e.g., self-esteem, mastery, and religious attendance) are better protected for Blacks than Whites (Louie et al., 2021). Future research would benefit from examining whether differential exposure to stressors and differential effects of instrumental help and coping resources contribute to mental health disparities among White, Black, and Latinx older adults. Finally, this research found that financial circumstances and relationship-related factors play minor roles in Latinx-White disparities in depressive symptoms. Even when the moderation effect of nativity status (i.e., immigrant versus US-born) was considered in the supplementary analyses, Latinx natives were significantly more depressed than Latinx immigrants, Black natives, and White natives. More research is needed to explore other stress explanations and protective resources that may contribute to Latinx older adults' mental health disadvantages.

## **CONCLUSION**

This study contributes to mental health disparities literature by examining the differential exposure and differential effect of stressors and protective resources among older Blacks, Latinx, and Whites. The findings demonstrate that depressive symptoms are more prevalent among Black and Latinx older adults than their white counterparts, in part due to the former's greater exposure to financial disadvantages and relationship strain. In addition, although relationship supports are more available among Black and Latinx older adults, they are less protective against depressive symptoms for these groups than they are for their White peers. Overall, this study improves our understanding of the potential mechanism that contributes to racial/ethnic disparities in mental health in old age.

## **CHAPTER 3: EVERYDAY DISCRIMINATION AND RACIAL/ETHNIC DISPARITIES IN COGNITIVE FUNCTIONING**

### **INTRODUCTION**

Cognitive health inequalities faced by racial/ethnic minority older adults in the U.S. are well documented. Black Americans are two to four times more likely to develop Alzheimer's disease and related dementia (ADRD) than their White counterparts, and Latinx Americans at one point five times more likely than Whites (Alzheimer's Association, 2021; Chen & Zissimopoulos, 2018; Garcia et al., 2018). The disproportionate risk of ADRD and cognitive impairment during late life has imposed significant financial and caregiving burdens on racial/ethnic minority households and posed challenges to the U.S. healthcare system (Lin et al., 2021). Poor cognitive functioning is a major predictor of developing ADRD in the future and has been associated with inferior quality of life and functional ability (Alzheimer's Association, 2021). Substantial research has indicated that Black and Latinx older adults have more severe cognitive function disadvantages than Whites (Chen & Zissimopoulos, 2018; Langa et al., 2017; Mehta & Yeo, 2017). However, socioeconomic status (e.g., income, education, and literacy), physical and cardiovascular health (e.g., hypertension, diabetes, and heart disease), and genetic risk factors such as the apolipoprotein E (APOE)  $\epsilon$ 4 allele cannot fully explain such disparities (Chen & Zissimopoulos, 2018; Mayeda et al., 2016). In fact, many racial/ethnic disparities in cognitive outcomes remain unexplained, and the mechanisms underlying these disparities are not well understood.

Recent research has highlighted the role of stress-related psychosocial factors in racial/ethnic disparities in cognitive health; racial/ethnic minorities are more likely than Whites to be exposed to chronic social stressors, such as discrimination due to pervasive structural and institutionalized inequalities (Barnes et al., 2012; Forrester et al., 2019). As the stress process

model proposes, prolonged and excessive exposure to social stressors may lead to the overactivation of physiological regulatory systems, increasing the risk for health conditions, including those related to cognitive function (Pearlin, 1989; Phelan & Link, 2015; Zahodne et al., 2020). In particular, everyday discrimination can be seen as a chronic stressor that is especially detrimental to cognitive health. This is because identity-related stressors tend to be more harmful to psychological well-being than those that are less relevant to one's sense of self (Thoits, 1991). Although there is increasing interest in the impact of everyday discrimination on cognitive health later in life, several gaps remain in the research. First, research on the adverse effects of everyday discrimination on health has primarily focused on young and middle-aged adults, with relatively little attention given to the health consequences of discrimination among older adults (Han et al., 2021; Priest et al., 2013; Wheaton et al., 2018). Second, while some cross-sectional studies have suggested everyday discrimination may contribute to racial/ethnic disparities in cognitive health outcomes, empirical findings are mixed and inconclusive, and longitudinal associations between discrimination and racial/ethnic differences in cognitive decline are rarely examined (Barnes et al., 2012; Zahodne et al., 2017). Therefore, there is a need to examine the chronic association between psychosocial experiences with discrimination and cognitive health, which is likely cumulative (Wheaton et al., 2018). Furthermore, most studies on cognitive inequalities have focused on Black-White comparisons or Black older adults despite the fact that Latinx—the largest and fastest-growing minority group in the U.S.—also have an increased risk of ADRD and cognitive impairment (T. H. Brown & Hargrove, 2018; Crosswell et al., 2020). Although perceived discrimination has been linked to inferior educational, employment, and mental health outcomes among Latinx (Andrade et al., 2021; D. L. Lee & Ahn, 2012), its relationship to late-life cognition disadvantages among Latinx older adults has not yet been

established (Barnes et al., 2012). While discrimination is prevalent, its impact on the health of racial/ethnic minorities may vary. More research is needed to investigate who experiences more discrimination stressors and who is most affected by them. Additionally, while the “healthy immigrant” theory postulates that foreign-born Latinx tend to have better health outcomes than their U.S.-born counterparts (Abraido-Lanza et al., 1999), it is unclear whether this advantage extends to cognitive function and whether and how the impact of discrimination on cognition may differ between foreign-born and U.S.-born Latinx older adults as they age. Not taking immigration/nativity status into account may lead to an oversimplified and potentially misleading understanding of racial/ethnic disparities in cognitive health.

To address these knowledge gaps, this study utilized longitudinal data from the Health and Retirement Study (HRS) spanning the years of 2006 to 2016 to examine the association between everyday discrimination and cognitive health in a national representative sample of older adults, including White, Black, and Latinx individuals. The Latinx population was further stratified by nativity status. This study aims to answer the following research questions:

- (1) How does chronic exposure to everyday discrimination shape trajectories of cognitive decline among older adults?
- (2) Does the association between everyday discrimination and cognitive decline vary among Black, U.S.-born Latinx, foreign-born Latinx, and White older adults?

Since the aging population in the U.S. continues to grow rapidly become more racially and ethnically diverse, this study uses data from racially/ethnically diverse samples of middle-aged and older adults to provide a better understanding of the chronic burden of discriminatory experiences as risk factors for cognitive decline and the cognitive health disadvantages experienced by Black and Latinx older adults. Overall, this study contributes to the knowledge of

health profiles of a diverse aging population and underscores the role of psychosocial stressors in shaping racial/ethnic disparities in cognitive outcomes. Furthermore, it offers new evidence of the impact of everyday discrimination on cognitive aging and progression across populations of different racial/ethnic and nativity statuses, emphasizing the critical need to address social determinants to health so as to promote health equity, particularly in the realm of cognition.

### **STRESS PROCESS MODEL**

The stress process model (SPM) offers a theoretical framework that explains how the social and economic stratification of stress exposure in the population leads to racially/ethnically patterned health inequalities (Pearlin, 1999; Turner et al., 1995a). Due to pervasive structural and institutionalized inequalities associated with racism in the social, economic, and political spheres of life, racial/ethnic minority groups experience greater stress exposure and face more disadvantages in obtaining socioeconomic resources and enacting health-protective behaviors than their more privileged counterparts (Phelan & Link, 2015; Turner et al., 1995a; Wheaton et al., 2018). Stress exposure is associated with a variety of negative health outcomes, including cognitive impairment (Forrester et al., 2019). Specifically, excessive or chronic exposure to stressors can result in physiological dysregulation and chronic inflammation, which can accelerate the aging process and, consequently, increase the risks of metabolic disorder, hypertension, diabetes, cardiovascular disease, and stroke (Forrester et al., 2019; McEwen & Seeman, 1999; Mitchell & Aneshensel, 2017; Paradies et al., 2015; Wirtz & von Känel, 2017). Exposure to stressors has also been linked to an increased risk of mental health problems, such as depressive symptoms, anxiety, and psychiatric disorders (Williams & Mohammed, 2009). All of these physical and psychological conditions have been identified as risk factors for cognitive impairment and ADRD in the later stages of life (Bisht et al., 2018; Johansson et al., 2010;

Mitchell & Aneshensel, 2017; Paradies et al., 2015; Wirtz & von Känel, 2017). Moreover, research has shown that higher degrees of perceived stress are associated with poorer cognitive function and faster cognitive decline among older adults (Aggarwal et al., 2014; Bisht et al., 2018; Nkwata et al., 2021).

Research based on the SPM generally subscribes to the *differential exposure hypothesis*, which attributes the health disadvantages of Black and Latinx individuals to greater exposure than Whites to social stressors, such as everyday discrimination, socioeconomic adversities, and life strains (Hatch & Dohrenwend, 2007; P. A. Thoits, 1995; Turner et al., 1995b; Williams et al., 1997). On the other hand, studies on the *differential effect-higher vulnerability hypothesis* suggest that marginalized populations may be more susceptible to negative health effects of social and economic stressors due to pre-existing disadvantages, including constrained choices and limited coping resources (Aneshensel, 1992; Williams & Mohammed, 2009). Geronimus et al. (2006) proposed the theory of weathering, which suggests that disproportionate exposure to chronic stressors and systemic racial inequity (e.g., segregation, racism, and discrimination) faced by Black individuals may result in premature biological aging, or “weathering,” and render them more susceptible than their more privileged counterparts to stress in late life (Geronimus et al., 2010). Known as a cumulative stress perspective, the weathering theory is related to both differential exposure and *differential effect-higher vulnerability* and explains why Black older adults experience accelerated physiological wear and tear that manifests as earlier onset of physiological dysregulation (e.g., higher allostatic load and short telomere length) and chronic disease (e.g., hypertension and cardiovascular disease) as compared to whites (Geronimus et al., 2006, 2010). Accordingly, racial/ethnic minorities’ greater vulnerability than Whites to stress

may contribute to the former's greater cognitive deterioration later in life, which exacerbates racial disparities in cognitive health (Chen et al., 2021).

## **EVERYDAY DISCRIMINATION AND COGNITIVE HEALTH**

Everyday discrimination refers to the perceived chronic experience of microaggression, unfair treatment, interpersonal slights, and insults encountered in social interactions, such as receiving poor restaurant service, being perceived as not smart, being treated disrespectfully, and being unfairly followed in stores (Mouzon, Taylor, Woodward, et al., 2017; Williams et al., 1997). As a measure that includes racial and non-racial discrimination, everyday discrimination has the potential to effectively capture the negative impact of perceived unfairness, thereby reducing measurement error that may occur when questions are limited solely to racial discrimination (Williams & Mohammed, 2009). Previous research suggests that everyday discrimination is experienced by all racial/ethnic minorities, while White individuals are much less likely to report experiencing discrimination (Gong et al., 2017; Williams et al., 1997). In fact, Blacks have shouldered a large amount of discrimination due to the historical context of institutional and interpersonal racism (Gong et al., 2017; Phelan & Link, 2015). Black older adults who grew up during the era of Jim Crow laws would have experienced childhood and adolescence under legal segregation, oppression and social disadvantages with limited legal protections, and challenges to achieving socioeconomic success and good health and to accessing health resources (e.g., treatment and insurance) (Phelan & Link, 2015; Wheaton et al., 2018). Middle-aged Blacks continue to deal with discrimination in housing, employment, credit decisions, medical care, and the legal system (Phelan & Link, 2015). Based on estimates from the National Survey of American Life (NSAL), a national household probability sample of Black adults, about 90% of participants reported experiencing some form of discrimination, with more

than half (63.5%) attributing it to their race/ethnicity (Chae et al., 2011; Gong et al., 2017). Empirical evidence also suggests that about 60% of Black older adults report experiencing moderate or higher levels of everyday discrimination (Mouzon, Taylor, Woodward, et al., 2017; Wheaton et al., 2018).

Research has shown that Latinx are also disproportionately exposed to discrimination (Colby & Ortman, 2015; Lee & Ahn, 2012). The sociopolitical climate and anti-immigrant rhetoric have placed Latinx at greater exposure to discrimination, especially given the change in the US political landscape between 2004 and 2013. For example, anti-immigrant policies may have resulted in discrimination against the entire Latinx population, including foreign-born and U.S.-born individuals (Cobb et al., 2021). Findings from the National Latino and Asian American Study (NLAAS) show that about 70% of Latinx reported perceived everyday discrimination (Gong et al., 2017). Meanwhile, foreign-born and U.S.-born Latinx may experience discrimination differently, based on sociodemographic characteristics such as age, immigrant status, and level of acculturation (Cobb et al., 2021; Lee & Ahn, 2012). Since there are limited studies on the difference in exposure to discrimination between U.S.-born and foreign-born Latinx older adults, a more comprehensive investigation of the impact of discrimination on the cognitive health of the aging Latinx population requires an assessment of how racial and nativity status intersect in producing differential trajectories of health outcomes.

An emerging body of research suggests that exposure to everyday discrimination is associated with various adverse health outcomes, including those affecting cognitive functioning (Lawrence et al., 2022; Lewis et al., 2015; Mouzon et al., 2017; Williams & Mohammed, 2009). Perceived discrimination is associated with psychological distress, depressive symptoms, anxiety disorders, and major depressive disorders (Assari & Lankarani, 2017; Mouzon et al.,

2017). Furthermore, exposure to discrimination has been associated with biomarkers of premature aging, such as shortened telomere length, increased allostatic load, increased C-reactive proteins, poorer cognitive functioning (e.g., episodic memory, executive functioning, and vasoconstriction), and faster cognitive decline (Aggarwal et al., 2014; Barnes et al., 2012; Lawrence et al., 2022; Zahodne et al., 2020).

While the SPM offers a plausible explanation that links everyday discrimination and racial/ethnic disparities in cognitive functioning, findings regarding such associations have been mixed (Crosswell et al., 2020; Zahodne et al., 2021). In studies using cross-sectional data from both national and community samples (i.e., the National Survey of Midlife Development and the Washington Heights-Inwood Columbia Aging Project), Zahodne and colleagues found no evidence that discrimination accounted for Black-White disparities in executive function, episodic memory, and cognition among middle-aged to older adults (Zahodne et al., 2017, 2021). Using cross-sectional data from the Health and Retirement Study (HRS), Nkwata and colleagues (2021) found that excessive stress exposure (e.g., chronic stress, everyday discrimination) among racial minorities cannot significantly explain the cognitive disadvantage that Black older adults experience compared with Whites after adjustment for a series of health and behavioral confounders, including alcohol consumption, smoking, body mass index, and comorbidity due to diabetes, heart diseases, and stroke. Nevertheless, one study using clinical evaluation (i.e., the Minority Aging Research Study) noted that discrimination is a persistent stressor among Black older adults and is associated with poorer cognitive function (Barnes et al., 2012). Among the few studies investigating the link between everyday discrimination and cognition, most focus primarily on Black-White differences in cognitive functioning. Research on Latinx older adults is limited; few have examined the longitudinal association. As an

exception, Zahodne and colleagues used longitudinal data from HRS to show that perceived discrimination contributes to both lower initial memory levels and faster memory decline among Blacks, but not among Latinx (Zahodne, Sol, et al., 2019). This finding suggests that everyday discrimination likely plays different roles in shaping the cognitive trajectories of Black and Latinx older adults. Given these mixed results and the lack of research on the subject, additional studies are needed to further understand how chronic exposure to everyday discrimination contributes to cognitive aging, particularly in different racial/ethnic groups.

## **HYPOTHESES**

Based on SPM, chronic exposure to everyday discrimination is expected to be detrimental to cognitive health, and Black, US-born-Latinx, and Foreign-born Latinx are expected to experience greater degrees of exposure to everyday discrimination than their White peers. Moreover, the *differential effect-higher vulnerability hypothesis* suggests that racial/ethnic minorities are more likely to experience faster health deterioration and be more vulnerable to stressors due to pre-existing socioeconomic adversities and political marginalization (Williams & Mohammed, 2009). Therefore, it is likely that the adverse impact of everyday discrimination may be particularly detrimental to the cognition of Black, US-born-Latinx, and Foreign-born Latinx older adults, as they are more susceptible to social stressors than Whites. Based on these inferences, this study tests the following hypotheses regarding everyday discrimination and cognitive trajectories:

- (1) The exposure to everyday discrimination is associated with lower cognitive function and faster decline.

(2) The association between everyday discrimination and cognitive function is stronger for Black, U.S.-born Latinx, and foreign-born Latinx older adults than it is for their White counterparts.

## **METHODS**

### *Data*

This study used data from the 2006 to 2016 waves of the Health and Retirement Study (HRS) and cognition imputation data. The HRS is a nationally representative, biennial, longitudinal survey of non-institutionalized adults aged 50 years or older and their spouses, oversampling Black and Latinx individuals. The HRS collected information on the sociodemographic, physical, and cognitive health of aging adults via telephone or in-person interviews. Psychosocial data was collected using a self-administered Psychological Leave-Behind Questionnaire (LBQ) every four years, with a random half of HRS respondents surveyed since 2006 (i.e., 2006, 2010, 2014) and the other half since 2008 (i.e., 2008, 2012, 2016). Because of the rotational design of LBQ, the discrimination trajectories were assessed based on three waves: 2006/2008, 2010/2012, and 2014/2016. Given that cognition functioning data were collected every two years, this study utilized data from six waves of the cognitive status from 2006 to 2016 in order to estimate the cognitive trajectories.

Given the focus of this study, people from other races/ethnicities were excluded. The analytic samples are restricted to community-dwelling respondents aged 50 and older and had no missing values on demographic covariates, such as age, gender, education, household incomes, and marital status. Missing values on discrimination-related variables were handled using the Full Information Maximum Likelihood (FIML) estimation approach in Mplus (Muthén and Muthén 1998-2005). The final analytic sample included a total of 8,195 respondents, 6,531 of

whom self-identified as White (79.7%) 1,031 as Black (12.3%), 320 as U.S.-born Latinx (3.8%), and 353 as foreign-born Latinx (4.1%).

### *Measures*

#### *Dependent Variables: Cognitive functioning*

Cognitive functioning was assessed by a modified version of the Telephone Interview for Cognitive Status (TICS). TICS provides a global cognition summary score calculated by combining scores across several items, including 10-items immediate recall (scored from 1 to 10), delayed recalls of 10 words (scored from 1 to 10), the Serial 7s test (i.e., participants were asked to subtract 7 from 100 and continue subtracting 7 from the prior number for a total of five trials, with one point awarded for each correct trial; scored from 0 to 5), and backward counting starting from 20 and 86 (with one point awarded for each correct answer, scored from 0 to 2). A small proportion of participants (0.8-3.1%) declined to participate in the assessment of immediate recall, delayed recall, and serial 7s. The HRS has developed an imputation strategy to address the missing cognitive data across all waves (Servais, 2010). The final TICS score ranged from 0 (severely impaired) to 27 (high functioning) (Langa et al., 2017).

#### *Independent Variables: Everyday Discrimination*

Everyday discrimination was measured by a five-item Likert scale (Cronbach's  $\alpha=0.83$ ), administered as a part of the LBQ. Respondents were asked how often the following happened: (1) "You are treated with less courtesy or respect than other people," (2) "You receive poorer service than others at restaurants or stores," (3) "People act as if they think you are not smart," (4) "People act as if they are afraid of you," and (5) "You are threatened or harassed" (Williams et al., 1997). Given that all items were rated on a scale ranging from 1 (almost every day) to 6 (never), the response items were reversed-coded such that higher

averaged scores indicated greater exposure to everyday discrimination. In the analytic sample, Black respondents reported the highest levels of discrimination (1.77), followed by U.S.-born Latinx (1.75), and foreign-born Latinx (1.55).

*Race/ethnicity/nativity.* The key independent variable, race/ethnicity/nativity, was self-reported and categorized into four groups: non-Hispanic White individuals (labeled as Whites [reference]), non-Hispanic Black or African American individuals (labeled as Blacks), U.S.-born Hispanic/Latinx individuals (labeled as U.S.-born Latinx), and foreign-born Hispanic/Latinx individuals (labeled as foreign-born Latinx). Of the Latinx respondents, 52.55% were foreign-born, while only 4.01% (N=263) of Whites and 5.58% (N=58) of Blacks were foreign-born. Therefore, this study did not include the nativity status of White and Black respondents due to the minute proportion of foreign-born individuals among them.

*Sociodemographic covariates.* This study controlled for basic sociodemographic covariates and health conditions at the baseline—including *age* (in years), *gender* (0=male, 1=female), *marital status* (married/cohabiting [reference], divorced, separated, and widowed), *education*, *income*, *wealth*, *depressive symptoms*, and *chronic disease*—as potential confounders of cognitive functioning. *Education* was assessed by years of schooling and categorized into four groups: less than high school (reference group), high school graduates, some college, and college graduates or beyond. *Household income* was measured as the total earnings from all sources, including investment returns, pensions, annuities, and welfare payments in the previous calendar year. *Household wealth* was assessed as the net value of total wealth, including second home, vehicles, bank accounts, and stocks minus debts (e.g., mortgages, other loans) from all queried sources. Both income and wealth were denominated in dollars and log-transformed to reduce skew. This study utilized the RAND version of household income and wealth data in which

missing values were imputed (RAND HRS, 2016). *Depressive symptoms* were assessed by an eight-item version of the Center for Epidemiologic Studies Depression (CES-D) modified for a yes/no format. Higher scores corresponded to more depressive symptoms. *Chronic disease* was the sum of the self-reported presence/absence of the following six chronic diseases at the time of the 2006 wave: hypertension, diabetes, cancer, lung disease, heart problems, and arthritis.

### *Analytic Strategy*

As respondents entered the HRS study period with varying initial levels of everyday discrimination and cognition and experienced different changes in these factors over time, this study used the parallel latent growth curve model to assess the effect of everyday discrimination on the initial level of cognition (i.e., latent intercept) and change (i.e., latent slope) in cognitive function from 2006 to 2016. The parallel latent growth curve model estimates the initial level and subsequent rate of change for everyday discrimination and examines whether these forms of intercept and slope predict the intercept and slope of cognitive scores over the study period. The equation of the latent growth curve model can be expressed as follow:

$$Y_{it} = \pi_{0i} + \pi_{1i} T_{it} + \varepsilon_{it}$$

$$\pi_{0i} = \beta_1 + X'A_1 + \lambda_{00}\theta_{0i} + \xi_{1i}$$

$$\pi_{1i} = \beta_2 + X'A_2 + \lambda_{10}\theta_{0i} + \lambda_{11}\theta_{1i} + \xi_{2i}$$

$$D_{it} = \theta_{0i} + \theta_{1i}T_{it} + v_{it}$$

$$\theta_{0i} = \beta_3 + X'A_3 + \xi_{3i}$$

$$\theta_{1i} = \beta_4 + X'A_4 + \xi_{4i}$$

where  $Y_{it}$  represents the cognitive function of individual  $i$  at time  $t$ .  $\pi_{0i}$  and  $\pi_{1i}$  are the intercept or initial level and slope or rate of change, respectively, of cognitive function for individual  $i$  over time.  $D_{it}$  is the  $i$ th individual's everyday discrimination score at time  $t$ . Note that  $t$  in the cognitive trajectory indicates six waves, while  $t$  in the everyday discrimination trajectory

indicates three waves.  $\theta_{0i}$  and  $\theta_{1i}$  are the latent intercept and latent slope, respectively, of everyday discrimination trajectories for the  $i$ th individual across waves.  $T_{it}$  is the time variable for individual  $i$  at time  $t$ .  $X'$  is the vectors of covariates (i.e., demographic and health covariates) and  $A_1 - A_4$  are vectors of corresponding coefficients.  $\varepsilon_{it}$ ,  $\xi_{1i} - \xi_{4i}$  are the residual (i.e., unexplained variation) or random variations associated with the intercept and slope. The parameter  $\lambda_{00}$ ,  $\lambda_{10}$ , and  $\lambda_{11}$  are the focus of the analyses which represent the effects of everyday discrimination trajectories on cognitive health trajectories. Fig. 1 illustrates the structural path diagram of the parallel linear growth curve analysis employed in this study. Furthermore, multiple group analyses were conducted to compare the growth curves model parameters (i.e., latent intercept and latent slope) across different racial/ethnic groups and to test for significant differences in the growth trajectories of cognitive function. In this multiple group analysis, each racial/ethnic group was estimated separately with constrained parameters set to be equal across groups in order to assess their differences using statistical tests. Significant differences in the model parameters suggests that the impact of everyday discrimination on cognitive function trajectories varies across groups. Specifically, the experience of everyday discrimination may affect the initial level of cognitive function or change in cognitive function differently for different racial/ethnic groups over time. These findings could provide information on how everyday discrimination contributes to disparities in cognitive health among different populations. Model fit was assessed using three common indicators: the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the root-mean-square error of approximation (RMSEA). All growth curve models were conducted in Mplus 8.3.

## RESULTS

Table 1 displays the descriptive statistics of all analytical variables, both for the total sample and by race/ethnicity. On average, the cognitive function of older adults showed a gradual decrease. Specifically, Black, U.S.-born Latinx, and foreign-born Latinx older adults exhibited significantly lower cognitive function than their White counterparts. The level of everyday discrimination remained relatively stable across all waves, with Black and U.S.-born Latinx older adults reporting more everyday discrimination than foreign-born Latinx and White older adults. Overall, compared to Whites, Black, U.S.-born Latinx, and foreign-born Latinx respondents were significantly younger, less educated, had less household income and wealth, and were less likely to be married, with higher percentages being divorced, widowed, or never married. Additionally, minority race/ethnicity older adults reported having more chronic disease and more depressive symptoms than White older adults.

Table 3-2 presents the results from the parallel growth curve model, using everyday discrimination to predict the initial levels of cognitive function (i.e., latent intercept) and the rate of change (i.e., latent slope) in cognitive function. Results in Table 3-2 show that higher initial levels of everyday discrimination were associated with lower initial levels of cognitive function ( $= -0.19, p < .01$ ), and a more rapid increase in everyday discrimination was associated with a faster decline in cognitive function ( $= -0.36, p < .05$ ). These findings suggest that greater exposure to everyday discrimination is associated with poorer initial levels of cognition and that a more rapid increase in everyday discrimination is associated with a faster rate of cognitive decline.

Table 3 shows the results from the multiple group analysis for Whites, Blacks, U.S.-born Latinx, and Foreign-born Latinx. Overall, the findings indicate that everyday discrimination is

associated with cognitive trajectories only among older White and Black adults but not among either group of Latinx older adults. For Whites, higher initial levels of everyday discrimination were associated with a faster rate of cognitive decline ( $\lambda_{10} = -0.200$ ,  $p < .05$ ), and a more rapid increase in everyday discrimination ( $\lambda_{11} = -0.375$ ,  $p < .05$ ) was associated with a faster rate of cognitive decline. Likewise, among Blacks, higher initial levels of everyday discrimination were associated with faster decline in cognitive function ( $\lambda_{10} = -0.469$ ,  $p < .05$ ), and a more rapid increase in everyday discrimination was associated with a faster rate of cognitive decline ( $\lambda_{11} = -0.707$ ,  $p < .01$ ). In addition, the comparison of the estimated slopes from the multiple group model demonstrates that change in discrimination had a significantly steeper slope for Blacks than for Whites (mean slope<sub>white</sub> = -0.469 vs. mean slope<sub>black</sub> = -0.707,  $p < .05$ ). Neither the initial level nor the rate of change of everyday discrimination were significantly associated with the cognitive trajectories of U.S.-born or foreign-born Latinx.

## **DISCUSSION**

Substantial research provides that everyday discrimination as a psychosocial stressor can have adverse effects on various health outcomes, including physical and mental health and biomarkers, and can be a potential contributor to racial/ethnic disparities in health (Lawrence et al., 2022; Lewis et al., 2015; Mouzon, Taylor, Woodward, et al., 2017; Williams & Mohammed, 2009). However, few studies have examined the longitudinal association between everyday discrimination and cognitive health trajectories and whether this association operates differently across different racial/ethnic groups. To address these gaps, this study used nationally representative data of older adults over a 10-year period to examine two research hypotheses: (1) everyday discrimination is associated with lower cognitive function and faster decline, and (2) the association between everyday discrimination and cognitive function is stronger for Black,

US-born Latinx, and foreign-born Latinx older adults than it is for their White counterparts. Overall, the findings fully support the first hypothesis and partially support the second one.

The analytical results indicate that racial/ethnic minority older adults exhibited lower levels of cognitive function than their White peers. Black older adults reported the lowest levels, followed by foreign-born Latinx and U.S.-born Latinx, consistent with previous research on racial/ethnic disparities in cognitive function (Alzheimer's Association, 2021; Chen & Zissimopoulos, 2018; Garcia et al., 2018). Additionally, everyday discrimination was more prevalent among Black and U.S.-born Latinx older adults than among Whites, which is in line with prior research that suggests that discrimination constitutes a social stressor for certain racial/ethnic minority groups (Gong et al., 2017; D. L. Lee & Ahn, 2012). However, foreign-born Latinx older adults reported experiencing the lowest levels of everyday discrimination, and no significant difference in everyday discrimination was observed between foreign-born Latinx and White older adults. The fact that foreign-born Latinx and Whites have similar levels of everyday discrimination is somewhat unexpected, particularly given that prior research has maintained that sociopolitical scenarios and anti-immigrant policies and attitudes toward Latinx immigrants led to an increase in discrimination against both foreign-born and U.S.-born Latinx individuals (Andrade et al., 2021; Cobb et al., 2021). It is likely that differences in nativity status may be at play in stress appraisal within the Latinx population. Research suggests that foreign-born Latinx may experience or perceive less deprivation than their U.S.-born counterparts, as they use their previous, more adverse circumstances in their home countries as a reference for social comparison (Abraído-Lanza et al., 2016). Conversely, U.S.-born Latinx, who have different life experiences from their foreign-born counterparts, may experience a stronger sense of social deprivation and discrimination due to blocked socioeconomic opportunities, prejudice,

and systemic and structural inequalities in the racialized American social system (Schwartz et al., 2010). Despite this inconsistency with prior research on foreign-born Latinx older adults, this finding provides empirical support indicating the racial/ethnic pattern of stress exposure and the disproportionate distribution of everyday discrimination among Black and Latinx older adults.

Aligning with the SPM and broader literature on everyday discrimination and health outcomes (Lewis et al., 2015; Mouzon, Taylor, Woodward, et al., 2017; Williams & Mohammed, 2009), this study found support for the first hypothesis that higher initial levels of everyday discrimination were significantly associated with lower initial cognition and a faster cognitive decline over time among older adults. The chronic experience of everyday discrimination may trigger physiological stress responses that could potentially disrupt inflammatory regulation and vascular health, leading to cognitive health decline (Bisht et al., 2018; Mitchell & Aneshensel, 2017; Zahodne et al., 2020). While the biophysical mechanism of stressors on cognition was not the primary focus of this study, it is a plausible pathway through which discrimination may affect cognitive health (Bisht et al., 2018; Johansson et al., 2010). Also, the findings of this study are consistent with previous cross-sectional research, indicating an association between greater everyday discrimination and poorer cognitive function (Aggarwal et al., 2014; Barnes et al., 2012; Zahodne et al., 2017). Although a similar association was observed in a recent study by Zahodne and colleagues (2020) regarding the adverse impact of everyday discrimination on subsequent cognitive abilities two to four years later, the present study provides a novel finding: chronic exposure to everyday discrimination is associated with both lower initial levels of cognitive score and a faster decline in cognitive function over time. Additionally, this study differs from Zahodne and colleague's (2020) in that the chronic effect of everyday discrimination on cognitive aging was assessed over a ten-year period, whereas their

study only examined discrimination at one point in time and its effect on subsequent cognitive abilities spanning two to four years later. Therefore, this study examines more persistent, longer-term change between everyday discrimination and cognitive aging than Zahodne and colleague's (2020).

In the present study, multiple group analyses were conducted to evaluate the race-specific links between everyday discrimination and cognitive aging. Several intriguing findings emerged, which partially support hypothesis 2 and the broader literature on everyday discrimination and health outcomes. Specifically, this study found a significant association between the trajectory of everyday discrimination and the cognitive trajectories of Black and White older adults, but not among U.S.-born or foreign-born Latinx older adults. Among Black older adults, a greater exposure to and an increase in everyday discrimination contribute to a faster decline in cognitive function, but not necessarily to a lower initial level of cognition. This finding provides important nuance to the expected outcomes of the study. This aligns with the weathering theory, which proposes that chronic exposure to psychosocial stressors and social inequality, such as everyday discrimination, may lead to increased susceptibility to stressors, resulting in accelerated aging that contributes to cognitive deterioration (Geronimus et al., 2006). This is consistent with previous research showing that cumulative stress exposure, such as discrimination, underlies cognitive health disadvantages experienced by Black individuals in middle and late life (Chen et al., 2021; Zahodne et al., 2019).

The findings reveal that exposure to everyday discrimination was also associated with a faster cognitive decline among White older adults. This result aligns with prior research showing that experiences of discrimination and unfair treatment have negative effects on health for both minorities and Whites (Lewis et al., 2015; Williams & Mohammed, 2009). This result implies

that the perceptions of discrimination may have a stronger effect on Whites than expected, despite the lower likelihood of Whites experiencing discrimination. In fact, there is some empirical evidence that the unmet expectations for material and social success may result in a greater emotional toll on the health and psychological distress of Whites than on their socially disadvantaged counterparts when exposed to an equivalent stressor (Keyes, 2009; Malat et al., 2018). Furthermore, research on stress appraisal indicates that Whites appraise stressful events as more upsetting than racial/ethnic minorities do, while the notion of appraising stressors as more upsetting was associated with poorer initial memory performance (Brown et al., 2020; Morris et al., 2021). One potential explanation for this differential effect is that White individuals, particularly males, may be less emotionally flexible, less resilient, and have fewer coping resources to deal with socioeconomic adversities and psychosocial stressors because they are not socialized to perceive and adapt to such stressors (Keyes, 2009; Malat et al., 2018). Recent studies have highlighted that “whiteness” or the belief in white superiority may also impact White individuals’ psychosocial and behavioral responses (e.g., increase in risky lifestyles or behaviors) to stressors such as discrimination and socioeconomic adversities, which could be detrimental to White people’s health (Malat et al., 2018). This has been observed in the increasing rates of “deaths of despair,” alcohol-related diseases, and substance use among Whites with low-SES (Malat et al., 2018). In particular, middle-aged White males living in rural areas with less education may be especially vulnerable to “deaths of despair,” as they experience economic hardships. Future research should further investigate this issue.

This study found no significant association between discrimination and cognitive health among U.S.-born Latinx and foreign-born Latinx older adults, which contradicts hypothesis 2. However, this finding is consistent with Zahodne et al.’s (2019) study on everyday

discrimination and memory decline in which the discrimination-cognition link only applied to Black older adults, and not to Latinx. It is worth noting that while the theory of weathering may posit that some of the health disadvantages faced by racial/ethnic minorities are due to unique stressors (e.g., segregation, racism, and discrimination), there is a lack of evidence to support that weathering operates in a similar manner for U.S.-born Latinx and foreign-born Latinx older adults (Peek et al., 2010). Likewise, while foreign-born Latinx and their U.S.-born relatives reported different levels of everyday discrimination, the exposure to such stressors did not account for both of their cognitive functions in this analysis. A plausible explanation for the discrepancy observed regarding the weathering theory could be the differential health effect of residing in racially/ethnically homogenous neighborhoods, especially for Latinx populations. Empirical evidence suggests that while residential segregation has deleterious effect on the health of Black adults, Latinx individuals living in more ethnically-dense neighborhoods reap health protective benefits known as *barrio* advantages (Aranda et al., 2011; Ferraro et al., 2017). Accordingly, one of the possible explanations for the lack of a significant association between everyday discrimination among Latinx groups could be that *barrio* advantages may serve as a shield, buffering Latinx individuals from the detrimental effects of discrimination- and acculturation-related stress on their health (Abraído-Lanza et al., 2016; Aranda et al., 2011). As a result, both foreign-born and U.S.-born Latinx could be less susceptible to the cognitive impacts of discrimination (Aranda et al., 2011; Ferraro et al., 2017). Further research is needed to explore the potential influence of ethnic neighborhoods in protecting the cognitive health of Latinx older adults against the effects of discrimination.

## LIMITATIONS

Several limitations should be noted in this study. First, the Latinx population is known for its large intra-ethnic heterogeneity based on social characteristics, such as ethnic and racial identity, migration history, culture, socioeconomic status, and geographic location. However, due to the data limitations and sample size, this study could not explore these subgroup differences regarding everyday discrimination. Second, this study included only three waves of data on everyday discrimination during the ten-year study period. Although cognitive function data were collected every two years, everyday discrimination data were only assessed every four years. A longer follow-up would allow for better modeling of everyday discrimination trajectories over time. Third, although growth curve models and longitudinal data offer valuable insights into the associations between everyday discrimination and cognitive trajectories over time, this study may not fully address concerns regarding causation. While longitudinal studies allow us to examine the temporal order of variables, it remains possible that the observed relationship between discrimination and cognitive decline is bidirectional. In other words, cognitive decline may also influence individuals' experiences of discrimination, thus creating a reverse causality scenario. Thus, additional research designs and methods, such as randomized controlled trials, are often needed to establish causal relationships more robustly.

It is important to note that the assessment of everyday discrimination in this study utilized a widely adopted five-item scale without attributions. This scale captures the experience of chronic daily unfair treatment but does not specifically focus on racial discrimination (Kessler et al. 1999). In addition, certain items, such as “perceived as not smart,” may inadvertently capture aspects of cognitive decline, leading to a biased estimation of the impact of everyday discrimination on cognitive function. Therefore, future research could investigate whether discrimination attributions (e.g.,

race/ethnicity, gender, age, socioeconomic status) and intersectional identities could account for racial/ethnic differences in cognitive function.

Moreover, it is worth noting that the appraisal of discriminatory experience may vary based on race/ethnicity and nativity status. These differences in appraisal may yield different impacts on late-life cognition. In fact, research has indicated that appraising stressors as more upsetting is associated with poorer initial memory performance (Morris et al., 2021).

Additionally, research has suggested that Black, U.S.-born, and foreign-born Latinx older adults may appraise stressful events as less upsetting compared to their white counterparts, and there are plausible reasons for this (Abraído-Lanza et al., 2016; Brown et al., 2020). First, it is possible that earlier and more frequent exposure to stress exposure may build resilience in Black and U.S.-born Latinx older adults and equip them with context-specific coping skills to deal with stress (Keyes, 2009; Malat et al., 2018). Second, foreign-born Latinx older adults may perceive their discriminatory experiences as less deprived or disturbing, as they tend to use their previous, more challenging circumstances in their home countries as a reference point for social comparison (Abraído-Lanza et al., 2016).

Moreover, although everyday discrimination predicts the cognitive well-being of Black older adults, it may not comprehensively assess discriminatory experiences among Latinx older adults, especially foreign-born Latinx, as it focuses mainly on chronic and everyday slights in a public setting. Therefore, further investigation is needed to explore how different measures of discrimination relate to psychosocial stressors, such as major discrimination and stressful life events, and how they can predict cognition, particularly for Latinx groups (Williams & Mohammed, 2009). Precisely, experiences of lifetime major discrimination are comprised of events related to socioeconomic status that occur in the labor market, the criminal justice system,

healthcare system, lending practices, and the housing market (e.g., being unfairly dismissed from a job, experiencing discrimination during the hiring process, or being denied a mortgage) (Mouzon et al., 2017). Considering the growing anti-Latinx immigrant sentiment, the stress of experiencing major discrimination could have implications for one's livelihood, employment, upward mobility, and access to healthcare, potentially impacting cognitive health (Mouzon et al., 2017). However, this study could not investigate this question in depth as major discrimination data were only available for two waves. Therefore, more longitudinal studies that use larger samples of aging populations are needed to re-examine this finding of no significant association between everyday discrimination and Latinx cognition and to test the potential link between major discrimination and cognitive health among Latinx older adults. Additionally, qualitative gerontological studies may also provide a better understanding of the lived experience of discrimination and the mechanisms undergirding discrimination that may account for cognitive health disadvantages among Latinx older adults. Despite the aforementioned limitations, this study offers a valuable contribution to research on the stress process and minority health by providing new evidence of the longitudinal impact of everyday discrimination on cognition. Moreover, this study reveals racial/ethnic differences in the relationship between everyday discrimination and cognitive decline, highlighting that chronic exposure to everyday discrimination may accelerate cognitive decline among both White and Black older adults.

## **CONCLUSION**

A substantial body of literature suggests that the psychosocial stressor of everyday discrimination is linked to a variety of health outcomes impacting mental health and physical health and biomarkers (Barnes et al., 2012; Zahodne et al., 2019). This national longitudinal study provides evidence for longitudinal associations between everyday discrimination and

cognitive aging. It demonstrates that chronic exposure to everyday discrimination was associated with a lower initial cognitive level and a faster decline among all older adults. Moreover, this association produced differential trajectories by race/ethnicity, suggesting that a higher initial level of everyday discrimination and an increase in everyday discrimination led to a faster cognitive decline in later life, particularly for White and Black older adults. Future research should further explore the unobserved contributors or mechanisms underlying cognitive health disparities among Latinx older adults. Overall, this study sheds light on the impact of everyday discrimination on cognitive health, highlighting the need to consider the nuanced effects of discrimination on different racial and ethnic groups.

## **CHAPTER 4: FRIENDSHIP AND COGNITIVE HEALTH AMONG RACIALLY/ETHNICALLY DIVERSE OLDER ADULTS: THE ROLE OF RELATIONSHIPS OF CHOICE FROM AN INTERSECTIONAL PERSPECTIVE**

### **INTRODUCTION**

The prevalence of dementia has witnessed a significant rise in the United States in recent years, increasing from 2.3 million individuals in 2002 to over 5 million in 2015 (Alzheimer's Association, 2015). The persistent racial/ethnic inequalities in cognitive functioning and dementia incidence among older adults have long been a public health and health justice concern, with Black Americans being two to four times more likely, and Latinx Americans being one point five times more likely, than White Americans to develop Alzheimer's disease and related dementia (ADRD) (Alzheimer's Association, 2021; Chen & Zissimopoulos, 2018; Garcia et al., 2018). The occurrence of poor cognitive functioning is a primary predictor of developing ADRD in the future. Empirical research has revealed that Black and Latinx older adults exhibit more cognitive function disadvantages than their White counterparts (Chen & Zissimopoulos, 2018; Langa et al., 2017; Mehta & Yeo, 2017). Moreover, this burden of experiencing cognitive health detriments is compounded by the rapid increase in the number and proportion of ethnic minorities and immigrants in the aging population. According to the U.S. Census Bureau, the Latinx older adult population is expected to increase more than fourfold to 18.6 million by 2050, intensifying cognitive health disparities (Manly & Mungas, 2015; Vespa et al., 2020). In addition to race/ethnicity, gender (specifically, being female) and some aspects of acculturation, such as nativity status and language use, may be positively associated with cognitive functioning (Lamar et al., 2021). Among race-gender groups, Black men have been found to report the worst cognitive health in late adulthood (Garcia et al., 2021). However, little is known about how race/ethnicity, gender, and nativity status intersect to shape cognitive function in later life.

Because there are no disease-modifying treatments for cognitive impairment, emerging studies have explored various preventive or protective factors, such as psychosocial resources and social relations, that might mitigate cognitive decline or maintain cognitive function in older adults (Zahodne, Ajrouch, et al., 2019a). Recent research has drawn attention to the potential benefits of late-life friendships—defined as voluntary and selective relationships not based on familial or spousal bonds—for maintaining or enhancing well-being and health, including cognition, among older adults and the building of cognitive reserve (Chopik, 2017; Zahodne, 2021). Despite increasing interest, the health benefits of friendships, including their influence on late-life cognition, remain understudied due to an overwhelming focus on obligatory familial relationships, such as those with spouses, children, and other family members (Chopik, 2017). As such, several gaps still exist in the research on racial/ethnic disparities in cognitive health. First, while some initial studies have examined Black-White differences in the characteristics of friend networks, less is known about how late-life friendships differ across race/ethnicity, nativity, and gender (Chatters et al., 2018; Sharifian et al., 2019). Furthermore, the characteristics and protective effects of friendship may vary across sociodemographic strata, such as race/ethnicity, gender, and nativity status, which contribute to cognitive disparities in late life (Zahodne et al., 2018). However, it remains underexplored how these factors intersect to shape friend relationships, which in turn may contribute to cognitive inequalities in late life. Second, it is unclear whether various dimensions of friendship, including its structural and qualitative characteristics, may account for cognitive health disparities. To address the above-mentioned gaps, this study employs the “convoy of social relationship” framework and adopts an intersectional approach to thoroughly examine how friendship characteristics influence cognitive health. Specifically, this study investigates whether there are differences in the structural and

qualitative characteristics of friendship across race/ethnicity and how they intersect with nativity status and gender. Additionally, it assesses the extent to which these differences contribute to cognitive health disparities. Leveraging longitudinal data from the Health and Retirement Study (HRS) spanning from 2010 to 2016, this study aims to address the following research questions:

- (1) Do racial/ethnic minority older adults experience more disadvantages in the structural characteristics of friendship (e.g., number of close friends, frequency of contact, and number of friends compared to family members in the social network composition) and friendship quality (e.g., levels of relationship support and strain from friends) than Whites?
- (2) If racial/ethnic minority older adults do experience more disadvantages in the structural characteristics of friendship and friendship quality, do these differences contribute to cognitive health disparities among racial/ethnic minority older adults?
- (3) Are the structural and qualitative characteristics of friendship less protective for racial/ethnic minority older adults than they are for Whites?

A better understanding of cognitive health among a racially/ethnically diverse aging population is needed to reduce cognitive health disparities and improve population health among older adults.

## **THE CONVOY MODEL AND FRIEND RELATIONSHIPS**

The convoy model provides a framework for understanding the instrumental role of those social relationships, including their structure, type, and quality, in shaping health and well-being throughout the lifespan, with particular emphasis on old age (Antonucci, Ajrouch, & Birditt, 2014). The framework posits that social relationships serve as a convoy that accompanies people over their life. Specifically, the innermost circle of social relationships, such as those with

spouses, children, and core family members, tend to be more enduring and remain stable in late adulthood. On the other hand, peripheral relationships, such as those with friends and acquaintances, are more susceptible to changing circumstances and often experience a decrease in both the number of relationships and frequency of contact as individuals age (R. L. Kahn & Antonucci, 1980). The convoy functions to socialize, protect, and support people in times of need and to exert significant positive effects on health. Moreover, the convoy model identifies two dimensions of social relationships: structural and qualitative. The structural dimension refers to objective characteristics, such as the number of close friends, the frequency of contact with friends, and the composition of one's social network (e.g., the number of spouses, children, family members, and friends). In contrast, the qualitative dimension encompasses both positive and negative aspects, where positive relationships are characterized by a level of social support and negative relationships are characterized by social strain (e.g., demands and conflicts) (Antonucci et al., 2014). On average, older age is associated with fewer friends, less frequency of contact, a higher proportion of family members in the network, and less relationship strain with friends (Ajrouch, Antonucci, & Mary R. Janevic, 2001; B. Cornwell et al., 2008). Furthermore, the social convoy model suggests that social characteristics, such as age, race/ethnicity, gender, and socioeconomic status, can influence the structure, type, and quality of one's convoy, as the different convoy characteristics tend to reflect one's social position (Ajrouch, Antonucci, & Mary R. Janevic, 2001). Thus, studying social convoys of relationships can illuminate how aging experiences may differentially impact late-life health, including cognition, across diverse groups (Antonucci et al., 2014).

As a relationship formed by choice, friendship may play a distinct and influential role in late-life cognition from structural and qualitative characteristics. Compared to obligatory and,

at times, ambivalent relationships such as spousal or familial ties, relationships with friends are formed voluntarily with peers who share similar characteristics, cohort experiences, and lifestyles (Bagwell et al., 2005; Chen & Fu, 2008; Chopik, 2017). Given the voluntary nature of friendships, fostering and maintaining them requires continuous effort, mutual interaction, and active engagement to sustain emotional closeness; this includes participation in informal activities and interpersonal communication (Roberts & Dunbar, 2015). According to the cognitive enrichment hypothesis, maintaining a socially enriched environment in old age may preserve or even enhance cognitive resources (e.g., language, memory, and attention) through social interactions and engagement in leisure or intellectual activities (Hertzog et al., 2009; Jonaitis et al., 2013; Roberts & Dunbar, 2011, 2015). Therefore, having a large network of friends or maintaining a high frequency of contact with friends can provide more opportunities for cognitive exercise, leading to increased cognitive stimulation and the building of cognitive reserve (Hertzog et al., 2009; James et al., 2011; Scarmeas & Stern, 2003). Studies investigating the association between friendship and cognitive outcomes among older adults have mainly focused on the structural characteristics of such relationships—including social network size, friendship components, and contact frequency—and have found that some structural aspects of social relations have been linked to preserved cognitive functioning. For example, empirical research suggests that having more close friends, rather than children or neighbors, has been linked to better cognition (Wang, He, & Dong, 2015; Frith & Loprinzi, 2017). Specifically, older adults with many friends (i.e., five or more close friends) are associated with better cognition than those reporting no close friends (Frith & Loprinzi, 2017). Gender differences have also been observed, indicating that more friendships are linked to less cognitive decline only among women (Béland et al., 2005). Moreover, several studies have highlighted that a higher proportion

of friends than family within one's social network is associated with better cognitive health, whereas a greater proportion of family than friends is linked to lower cognition (Li & Dong, 2018; Sharifian et al., 2019). Additionally, the frequency of contact with friends is particularly important for cognition. For example, frequent contact with friends may offer greater cognitive benefits (e.g., episodic memory) than frequent contact with family members (Sharifian et al., 2021; Zahodne, Ajrouch, et al., 2019a); Windsor et al., 2014).

### *Social Relationships, Relationships of Choice, and Cognitive Health*

Some researchers have argued that the qualitative characteristics of friend relationships may uniquely affect cognitive aging to the extent that they reduce or increase the stress that matters to cognition (Krueger et al., 2009) (Amieva et al., 2010). Previous research suggests that satisfaction with relationships and relationship support have a greater impact on reducing the risk for dementia development than the structural characteristics of relationships, such as network size and marital status. The socioemotional selectivity theory proposes that, unlike familial relationships that tend to remain relatively stable over time, friendships are more susceptible to social pruning, resulting in fewer friendships but better relationship quality as individuals age (Carstensen, Isaacowitz, & Charles, 1999). Therefore, it is assumed that older adults receive more friend support and avoid negative relationships with friends (e.g., relationship strain) in late adulthood. Furthermore, relationship support, in particular, may affect cognitive outcomes, especially global cognitive function and episodic memory, by buffering the impact of physiological stress. On the other hand, relationship strain (e.g., conflicts and demands) is a source of stress that has a negative influence on overall cognitive function and working memory and increases the risk of cognitive impairment and faster cognitive decline (Lisa L. Barnes et al., 2004; Kelly et al., 2017; Wilson et al., 2016). Despite the potential impact of friendship on

cognitive function among older adults, there is surprisingly limited knowledge regarding the quality aspect of friendship and its influence on cognitive function. In fact, empirical studies seldom assess the structural and qualitative characteristics of relationships separately and often fail to distinguish friend relationships from other close ties due to a lack of appropriate measures (Blieszner et al., 2019).

*Race/ethnicity, Gender, Difference in the Link Between Friend Relationship and Cognition: An Intersectionality Approach*

Given the potential link between friendship and cognitive functioning, an important question arises: Do the structure and quality of friendships differ across racial/ethnic groups, nativity status, and gender, and to what extent do these differences contribute to disparities in cognitive functioning in old age? According to the social convoy model, friendship structure and quality can vary based on race/ethnicity, gender, and nativity status, as these convoy characteristics may align with an individual's social position (Ajrouch, Antonucci & Janevic, 2001). However, there is a lack of comparative research exploring differences in friendship patterns across racial/ethnic and nativity status, as many existing studies focus on only the general population and some on the comparison between Blacks and Whites or between Latinx and Whites (Ajrouch, Antonucci & Janevic, 2001; Almeida et al., 2009; Kiecolt et al., 2008). Furthermore, the available studies examining the racial/ethnic differences in the structural and qualitative characteristics of friendships among older adults are notably limited and yield inconsistent findings (Almeida et al., 2009; Flores et al., 2020).

Regarding the structural characteristics of friendship, previous studies indicate that older Black adults have smaller friend networks than their White peers (Ajrouch, Antonucci & Janevic, 2001; Lisa L Barnes et al., 2004). Previous research has also observed that, relative to

Whites, Blacks tend to have a more family-oriented network with fewer friends. Research on racial differences in contact frequency is limited and yields mixed results. Some studies indicate higher contact frequency among Whites (Flores et al., 2020; Shim et al., 2012), while others report similar or more frequent contact with convoy members (e.g., family and friends) for Blacks and Whites (Ajrouch, Antonucci, & Janevic, 2001; Lisa L Barnes et al., 2004; Kiecolt et al., 2008; Nguyen, 2017). On the other hand, Latinx exhibit comparable numbers to Whites regarding friends, contact frequency, and friend support (Almeida et al., 2009; Flores et al., 2020). However, it is important to note that these studies on Latinx were derived from community samples of adults aged 18 years and older, which may not reflect the pattern among the national population.

Regarding relationship quality, empirical findings generally suggest that Whites report a support advantage over minority groups (Almeida et al., 2009; Flores et al., 2020; Mouzon, 2014). Specifically, Blacks and foreign-born and US-born Latinx individuals receive less relationship support from friends than Whites (Almeida et al., 2009; Flores et al., 2020; Kiecolt et al., 2008; Mouzon, 2014). However, there are no significant Black–White differences in relationship strain with friends (Almeida et al., 2009; Kiecolt et al., 2008). Research on Latinx relationship strain is limited. One study, which used data from the Health and Retirement Study (HRS), showed that older U.S.-born Latinx adults experience less relationship strain than Whites, while there was no significant difference between foreign-born Latinx and Whites (Brown et al., 2020). However, it is noteworthy that Brown et al. focused on assessing relationship strain without distinguishing between kin and non-kin relationships, leaving friend strain among older Latinx individuals largely unexplored. Furthermore, these mixed findings are likely due to various factors, including differences in the age of the studied sample populations (e.g., all adults

versus older adults) and the proportion of racial/ethnic minorities within the samples. However, race/ethnicity may not be the only critical factor for understanding the variability in friendships' impact on cognition, as gender and nativity status may also exert an influence.

Based on the differential effect or diminished return hypothesis, socially disadvantaged groups may experience diminished health benefits from protective resources. It is possible that the protective effect of friendship on cognitive health may differ across gender, racial/ethnic groups, and nativity status (Ajrouch, Antonucci, & Janevic, 2001; Garcia, Downer, et al., 2019). Thus, an intersectional approach is crucial for understanding how race/ethnicity, nativity, and gender jointly contribute to health inequalities (Gilbert et al., 2016). On average, women tend to cognitively outperform men, including in global cognition, executive function, and memory, but they also experience faster cognitive decline than men (Levine et al., 2021). Substantial epidemiological evidence highlights racial/ethnic disparities, indicating that Black and Latinx older adults report poorer cognitive health than Whites (Alzheimer's Association, 2021; C. Chen & Zissimopoulos, 2018; Garcia et al., 2018). Both foreign-born and U.S.-born Latinx face a higher risk than Whites of dementia and cognitive impairment in late life (Garcia et al., 2019). Among men, Black males exhibit the lowest cognitive scores among all racial/ethnic groups. Previous research suggests that Black men may experience greater socioeconomic disadvantages than Black women and men of other racial/ethnic groups. These disadvantages can be attributed to Black men's exposure to negative race- and gender-based stereotypes and racial discrimination in various aspects of life, including education, criminal justice, and the labor market (Brown & Hargrove, 2018; Gilbert et al., 2016; Williams & Mohammed, 2013). These persistent psychosocial stressors can have detrimental impacts on physical health and may lead to engagement in unhealthy coping behaviors (e.g., tobacco, alcohol, and substance abuse),

which in turn can lead to poorer cognitive health outcomes (Gilbert et al., 2016). Moreover, racial/ethnic minorities, including Black men, tend to be overrepresented in lower-wage and manual labor occupations with lower occupational complexity and less cognitive reserve (Gonzales et al., 2022). Collectively, these factors may account for some cognitive health inequities experienced by older Black men (Gonzales et al., 2022).

Both U.S.-born and foreign-born Latino older adults experience cognitive health disadvantages, partly attributable to their employment in physically demanding fields in the U.S., such as agriculture, which may increase the risk of cognitive impairment in late life (Garcia, Downer, et al., 2019; Rote & Angel, 2021). However, foreign-born Latinos may exhibit better cognitive health than their U.S.-born counterparts, partially due to the healthy immigrant effect (Garcia, Downer, et al., 2019; Rote & Angel, 2021). However, foreign-born Latinas, who often migrate with their husbands or for the purpose of family reunification, may experience lower health selectivity and weaker immigrant health advantages on cognition than their male counterparts (Garcia, Tarraf, et al., 2019).

In addition, regardless of race/ethnicity, women generally have more friends, engage in more frequent contact with friends, and receive more friend support than men, which may benefit the former's cognitive health (Taylor, 2006). On the other hand, Latinx older adults, especially foreign-born ones, tend to receive less friend support than their White counterparts. They also tend to have more family-oriented social networks, possibly due to the loss of non-kin social ties during migration (Almeida et al., 2009). As such, factors such as race/ethnicity, gender, and nativity likely intersect to shape the variable association between friendship and cognition, ultimately contributing to cognitive health disparities.

## **HYPOTHESES**

Previous research provides limited empirical results regarding the impact of late-life friendship on cognition among older adults, and only a few studies have analyzed the intersection of the structural and qualitative characteristics and their differential effects. Based on the convoy model and the intersectional approach, I investigated several hypotheses about how structural and qualitative characteristics of friendship contribute to cognitive health disparities among older adults across race/ethnicity, gender, and nativity.

*Hypothesis 1:* The structural and qualitative characteristics of friendship vary across race/ethnicity, gender, and nativity. Racial/ethnic minority older adults experience disadvantages in the structure of friendships (i.e., the number of close friends, frequency of contact with them, and composition of their social network) and the quality of them (i.e., relationship support or strain from friends) compared to those of their White counterparts.

*Hypothesis 2:* The differences in the structural and qualitative characteristics of friendships contribute to cognitive health disparities by race/ethnicity, gender, and nativity status (this demonstrates the mediation effect).

*Hypothesis 3:* The impact of the structural and qualitative characteristics of friendship on cognitive health varies among different racial/ethnic, gender, and nativity groups (this demonstrates the moderation effect).

## **METHODS**

### *Data*

This study used data from the HRS spanning from 2010 to 2016. HRS is a nationally representative panel study that surveys American adults aged 50 or older every two years. HRS

oversamples Black and Latinx people to allow reliable comparisons in health disparities. Social relationships and psychosocial data were collected biennially using the self-administered Psychological Leave-Behind Questionnaire (LBQ). Due to the rotational study design of LBQ, the 2010 wave of LBQ-eligible subsamples was combined with the 2012 wave to form the complete LBQ sample (i.e., wave 1), and similarly, the 2014 wave was combined with the 2016 one (i.e., wave 2). Several exclusions were made from the sample: respondents who did not complete the Center for Epidemiological Studies-Depression scale (CES-D) (n=126), individuals under the age of 50 at the time (n=375), those who identified their race as “other” (n=445), those with missing key demographic information (n=18), and individuals with dementia at the baseline (N=1023). The final analytic sample consisted of 8,316 individuals aged 50 to 104 years old. Multiple imputations by chained equations were performed to handle missing values in the relationship variables (M=20).

### *Measures*

#### *Dependent Variable: TICS*

Cognitive function was measured by the modified version of the Telephone Interview for Cognitive Status (TICS) in the HRS. However, a small percentage of respondents (0.8%–3.1%) declined to participate in immediate and delayed recall tests and the serial 7s test, for which the HRS has developed an imputation strategy for cognitive variables for all waves (Servais, 2010). For this study, a final summary score of global cognition was calculated by combining the scores of various cognitive items, including immediate and delayed recall of a list of 10 words (1 point for each), five trials of serial 7s (1 point for each), and backward counting (2 points). The final summary score ranges from 0 (severely impaired) to 27 (high functioning) (Crimmins, Saito, & Kim, 2016).

### Race/ethnicity/nativity Status and Gender

This study examined the intersection of race/ethnicity/nativity and gender categories. An eight-category variable was used: non-Hispanic White male (labeled as White male [reference]), non-Hispanic White female (labeled as White female), non-Hispanic Black male (labeled as Black male), non-Hispanic Black female (labeled as Black female), U.S.-born Latino, U.S.-born Latina, foreign-born Latino, and foreign-born Latina. A limited number of respondents who self-identified as “other” (including American Indian, Asian, and native Hawaiian) were excluded from the statistical analysis. Additionally, the nativity status of White and Black respondents was not included due to the small proportion of foreign-born individuals in these groups. The sample sizes for the eight analytic groups are presented in Table 4.1.

### Independent Variables: Quantity and Quality of Relationship with Friends

To investigate late-life friendships among older adults, this study measures three structural and two qualitative characteristics of the friend network. Regarding structural characteristics, network size (i.e., *number of close friends*) was measured by asking respondents how many of their friends they felt close to. *Composition* refers to the distribution of family and friends within one’s network and is measured by the proportion of friends in the non-spouse and non-child network (i.e., friends and family members; see Li & Dong, 2018). *Contact frequency* was determined by calculating the mean of three items that asked about the frequency of in-person meetings, phone conversations, and written or email communication with friends. These items were initially scored on a scale of 1 (three or more times a week) to 6 (less than once a year or never) and were reverse-coded, with higher scores indicating greater contact frequency. The analysis for contact frequency was limited to the sample of individuals who reported having at least one friend.

*Relationship quality* with friends was evaluated in terms of both positive aspects (i.e., friend support) and negative ones (i.e., friend strain). *Friend support* was assessed using the mean of three items: participants were asked to rate the extent to which friends understood their feelings, their reliance on friends during serious problems, and their ability to open up to friends about worries. Each item was rated on a four-point Likert scale ranging from 1 (a lot) to 4 (not at all). All items were reverse-coded for consistent scoring, with higher scores indicating greater friend support. *Friend strain* was evaluated using the mean of four items that measured friendship strain experienced by participants. The items inquired about the frequency of demands, criticism, letdowns, and irritation from friends. Participants rated each item on a four-point Likert scale ranging from 1 (a lot) to 4 (not at all). All items were reverse-coded so that higher scores indicated higher levels of friend strain.

#### *Covariates*

This study controlled for several sociodemographic covariates and health conditions at the baseline. These covariates included *age* (in years), *marital status* (married/cohabiting [reference], divorced/separated, widowed, and never married), *education* (less than high school [reference], high school graduate, some college, and college graduate or beyond). *Household income* was measured by total earnings from all sources, including investment returns, pensions, annuities, and welfare payments in the previous calendar year. *Household wealth* was assessed as the net value of total assets, including second homes, vehicles, bank accounts, and stocks minus debts (e.g., mortgages and other loans). Both income and wealth were in dollars and log-transformed to reduce skewness. This study utilized the RAND version of household income and wealth data in which missing values were imputed (RAND HRS, 2016). *Depressive symptoms* were evaluated using an eight-item version of the Center for Epidemiologic Studies Depression

scale (CES-D) modified for a yes/no format. Higher scores indicated a greater number of depressive symptoms. *Chronic disease* was determined by summing the self-reported presence or absence of six chronic diseases at the baseline wave: hypertension, diabetes, cancer, lung disease, heart problems, and arthritis.

### *Analytic Strategy*

First, descriptive bivariate analyses (Pearson's chi-square and t-test) were used to examine the differences in structural and qualitative characteristics of friendships across eight racial/ethnic/nativity and gender groups. Then, this study used a mixed-effects linear regression model to estimate the association between friendship (including its structural and quality characteristics) and late-life cognitive function. In addition, moderation analyses were conducted to test the interaction between racial/ethnic/nativity and gender groups and the structural and qualitative characteristics of friendships in late-life cognition.

Mixed-effects models account for the unobserved heterogeneity nested within the longitudinal data by allowing random effects to vary across individuals. Additionally, this analysis controlled for socioeconomic and health factors as covariates without adjustment for sampling weights. A linear mixed-effects model with a random intercept was used to account for the repeated observations from the same individuals. The formula for testing the mixed-effects model was as follow:

$$TICS_{ij} = \beta_0 + \beta_1 X_{ij} + b_i + \varepsilon_{ij}$$

$\beta_0$  represents the fixed intercept, which is the overall mean response across all individuals when friendship variables are zero.  $\beta_1$  is the fixed slope, indicating the change in the response for a one-unit change in friendship variable  $X_{ij}$ .  $X_{ij}$  is the observed value of the friendship variables for the  $i$ -th individual at the  $j$ -th time. The random intercept  $b_i$  captures individual-specific

differences that are not explained by the fixed effects.  $\varepsilon_{ij}$  is the residual or error term, accounting for unexplained variability in the dependent variable that is not captured by the fixed and random effects.

Overall, the mixed-effects models were employed to investigate the influence of structural and quality characteristics of friend relationships on racial/ethnic/nativity/gender differences in late-life cognitive health. Specifically, Model 1 assessed the association between race/ethnicity/nativity/gender and cognitive function, controlling for sociodemographic and health covariates and survey year. Models 2a through 5a added the numbers of close friends, frequency of contact with friends, and friend support/strain, respectively, to examine how these characteristics may explain the cognitive disparities experienced by specific groups.

Additionally, the Karlson-Holm-Breen (KHB) method was utilized to decompose cognitive function disparities into portions explained by the structural and qualitative characteristics of friendship. Finally, Models 2b through 5b explored the moderation effect or interaction between these focal variables and those racial/ethnic/nativity/gender groups.

## **RESULTS**

### *Descriptive Statistics of Key Variables*

Table 4.1 shows the descriptive statistics of analytical variables by race/ethnicity/nativity and gender of the baseline sample. Regarding TICS, Whites demonstrated a significant cognitive advantage over all minority groups, with White females reporting the highest cognitive function of any group. On the other hand, Black males exhibited the lowest cognitive function of any group, while Black females showed significantly higher cognitive function than their male counterparts. Regarding nativity status, U.S.-born Latinas displayed slightly higher cognitive function than their foreign-born counterparts. However, no significant difference in cognitive

function was found between U.S.-born and foreign-born Latinos. Meanwhile, Black females reported similar levels of cognitive function compared to all nativity-gender groups within the Latinx population.

Regarding the structural characteristics of friendship, older adults, on average, reported having approximately four close friends. Generally, men tend to have an equal or slightly greater number of friends than females. In direct comparison, U.S.-born Latinos had the highest number of friends (mean=4.97), whereas foreign-born Latinas had the lowest (mean=3.81). Moreover, there was no significant difference in the number of close friends between Black males and Black females or between U.S.-born Latinos and Latinas. Regarding network components, both White males and females had the highest proportion of friends in their non-spouse and non-child social networks among all groups. Racial/ethnic minority older adults tended to have a comparatively lower portion of friends in their networks, with Black females and foreign-born Latinas reporting the lowest numbers. Regarding contact frequency, women were likelier than men to contact their friends, regardless of race/ethnicity or nativity status. Among women, White females reported the highest frequency of contact with friends, followed by Black females and U.S.-born Latinas, while foreign-born Latinas reported the lowest frequency. Similarly, White males had the highest contact frequency among men, followed by Black males and U.S.-born Latinos, with foreign-born Latinos reporting the lowest frequency.

Regarding friendship quality, women generally experienced more relationship support and less strain than men, regardless of race/ethnicity. In direct comparison, Black and White females received higher levels of friendship support than foreign-born Latinas, and U.S.-born Latinas faced even lower levels. However, among men, Black males reported the highest level of friend support, whereas White males, U.S.-born Latinos, and foreign-born Latinos exhibited

similar levels. As for friendship strain, men generally reported more than women. Moreover, foreign-born Latinas and Latinos and Black males and females experienced the highest levels of friend strain, followed by U.S.-born Latinas and Latinos, whereas White males and females reported the least strain.

Regarding socioeconomic status and health profiles, significant differences were observed across the eight race/ethnicity/nativity and gender groups, as shown in Table 5.2. Overall, minority older adults were younger (mean age from 62.64 to 64.26) than their White counterparts (mean age of white males = 67.48; mean age of white females = 67.62). Black females had the lowest marriage rate and relatively high rates of being divorced/separated, widowed, or never married. On average, White males had the highest socioeconomic status. Racial/ethnic minority groups generally had lower educational attainment than White individuals, with nearly half of the foreign-born Latinos and over half of the foreign-born Latinas achieving an education level below high school. Furthermore, all racial/ethnic minority groups had lower household incomes and wealth than their White counterparts, with foreign-born Latinos and foreign-born Latinas reporting the lowest income and Black females having the lowest household wealth. In terms of chronic disease, U.S.-born Latinas, foreign-born Latinos, and foreign-born Latinas had a similar number of chronic diseases to White males. However, U.S.-born Latinos, Black males, and Black females had a higher prevalence of chronic conditions than White males. All the racial/ethnic/nativity and gender groups exhibited a higher number of depressive symptoms compared with White males. In particular, foreign-born Latinas reported the highest number of depressive symptoms, followed by U.S.-born Latinas and Black females.

### *Regression Analysis*

Table 4.3 presents the results of mixed-effects linear regression models that examine the association between the structural and quality characteristics of friendship and late-life cognitive function. All models control for sociodemographic and health information of older adults. Across all racial/ethnic/nativity and gender groups, white females experienced significant cognitive function disadvantages compared to White males (Model 1). Specifically, Black males and females faced the most substantial cognitive health disadvantage, followed by U.S.-born Latinos and foreign-born Latinas. Regarding the structural characteristics of friendship, Model 2a demonstrates that having more close friends was not significantly associated with cognitive health among older adults. Model 3a indicates that the number of friends in the non-spouse and non-child networks was not statistically related to depressive cognitive health in older adults. As for contact frequency, Model 4a suggests that having a higher frequency of contact with friends was significantly associated with higher cognitive health, controlling for the number of close friends. Specifically, a one-point increase in contact frequency score was associated with a 0.21-point increase in cognitive function score. Regarding relationship quality, Model 5a shows that having a higher level of friend support was not significantly associated with cognitive health. However, Model 6a demonstrates that a higher level of friend strain was associated with lower cognitive function, with a one-point increase in friend strain score associating with a 0.11-point decrease in cognitive function score.

Next, KHB analysis was conducted to examine the degree to which the structural and qualitative characteristics of friendship jointly mediate the association between race/ethnicity/nativity/gender and cognitive function; the results are presented in Table 5.4. The findings suggest that friendship explains some cognitive health differences among some

racial/ethnic/nativity and gender groups. Specifically, compared to White males, White females reported better cognitive function, and their relationships with friends, particularly contact frequency, accounted for about 7% of their cognitive health advantages (indirect effect=0.07,  $p<0.05$ ). However, Black males experienced poorer cognitive health than their White male counterparts, and about 4.20% of disparities were attributable to disadvantages in their friend relationships, such as having lower contact frequency and higher levels of friend strain (indirect effect=-0.07,  $p<0.05$ ). As for foreign-born Latinos, friendship mediated 15.52% of the association between being a foreign-born Latino and experiencing cognitive health disadvantages (indirect effect=-0.08,  $p<0.05$ ), with contact frequency accounting for 10.27% and friend strain explaining 3% of the association. However, the indirect or mediating effect of friendship for other racial/ethnic/nativity and gender groups was not significant. Overall, Hypothesis 2 was partially supported, indicating that differences in friendship, especially contact frequency, explained a modest proportion of cognitive health advantages enjoyed by White females and the cognitive health disadvantages Black males and foreign-born Latinos faced.

Because the effects of friendship on cognitive function may vary across racial/ethnic/nativity and gender groups, this study conducted a moderation analysis to test the interaction between racial/ethnic/nativity and gender groups and the number of close friends, the proportion of friends, contact frequency, and friend support/strain on cognitive functions over time. Model 2b indicated that although the number of close friends was associated with slightly lower cognitive function overall, the significant interaction suggested that White females and U.S.-born Latinos gained a slight cognitive health benefit from having more close friends (Interaction white female=0.03, Interaction U.S.-born Latinos=0.07;  $p_s < 0.01$ ). However, the interaction between the proportion of friends and racial/ethnic/nativity and gender groups was not

significant (Model 3b). Model 4b demonstrates that while a higher frequency of contact with friends was linked to improved cognitive function, the protective effect was notably weaker for Black males and U.S.-born Latinos than for all other groups (Interaction<sub>Black males</sub> = -0.34, Interaction<sub>U.S.-born Latinos</sub> = -0.39;  $p$ s < 0.01). This finding suggests that Black males and U.S.-born Latinos are less likely to derive the benefits from the increased friend contact that other groups enjoy. On the other hand, neither the interaction between relationship support and racial/ethnic/nativity and gender groups nor the interaction between relationship strain and all groups achieved statistical significance (Model 5b and Model 6b), suggesting that the effect of friend support or strain on cognitive function did not differ across racial/ethnic/nativity or gender groups.

## **DISCUSSION**

Drawing on nationally representative longitudinal data of Americans aged 50 years or older, this study contributes to research on health disparities and aging by examining the relationship between racial/ethnic, nativity, and gender differences in the structural and qualitative characteristics of friendship disparities in cognitive health in late life. First, the findings reveal that racial/ethnic minority older adults experienced specific disadvantages in both the structural and qualitative aspects of friendship. They had a smaller proportion of friends within their networks and a lower frequency of contact with friends, despite having a similar number of close friends as White older adults. Additionally, all racial/ethnic/nativity and gender groups faced higher levels of friend strain, although they received friend support no less than White older adults. Second, this study demonstrates that contact frequency positively contributed to better cognitive health, while friend strain negatively affected it. Moreover, variations in friend contact and friend strain explain a small portion of the cognitive health advantages of

White women relative to White men, and it explains some of the cognitive health disadvantages experienced by Black men and foreign-born Latinos. Finally, this study indicates that the protective effect of the frequency of contact with friends on cognitive function was less beneficial for older Black men and foreign-born Latinos than it was for other groups, which contributed to their disproportionate cognitive health issues.

#### *Racial/ethnic/nativity and Gender Differences in Cognitive Health*

This study expands upon existing research on cognitive health disparities in later life by examining cognitive function differences by race/ethnicity/nativity and gender. The findings display that Black older adults face the greatest cognitive health disadvantages of all groups, with Black males reporting the lowest cognitive function scores. This finding is consistent with the empirical evidence demonstrating that Black men exhibit some of the poorest health profiles (e.g., higher overall age-adjusted cancer and hypertension rates) and shortest life expectancies of all race/ethnicity and gender groups in the U.S. (Gilbert et al., 2016). Research employing the stress exposure approach attributes Black men's health inequities to their excessive exposure to stress (Brown & Hargrove, 2018). Specifically, Black men are subjected to gender and racial discrimination across various domains, such as education, employment, and interactions with law enforcement. They also encounter constrained economic opportunities and restricted access to protective resources throughout their lives. Moreover, Black men, similar to Latinos, face societal pressure to conform to gendered social norms and cultural expectations of being financial providers for their families. This additional stress exposure may negatively shape their coping behaviors (e.g., tobacco and alcohol use and obesity) and overall health, resulting in poorer cognitive health (Brown & Hargrove, 2018; Gilbert et al., 2016; Williams & Mohammed, 2009).

Concerning Latinx older adults, these findings provide limited evidence for the healthy immigrant effect on cognitive health, contrary to what has been observed in other health outcome studies (Garcia, Downer, et al., 2019; Rote & Angel, 2021). Specifically, foreign-born Latinos show a similar level of cognitive health compared with their U.S.-born counterparts. Foreign-born Latinas, however, have poorer cognitive health than U.S.-born Latinas, although a substantial portion of the cognitive health gap can be attributed to socioeconomic status (e.g., education attainment) and health factors. The absence of a cognitive function advantage among foreign-born Latinx may be attributed to their long-term engagement in physically demanding occupations such as agriculture and construction, which can contribute to poorer cognitive function in late life due to workplace hazards, limited control and autonomy, and physical strain on the body (Fisher et al., 2017; Grzywacz et al., 2016; Rote & Angel, 2021).

#### *Racial/ethnic/nativity and gender differences in friendship*

Partially supporting Hypothesis 1, the results of this study indicate that minority older adults experience some similarities and disadvantages in friendships relative to their White counterparts. Regarding the structural aspect of friendships, foreign-born Latinas reported having fewer friends, whereas all other racial/ethnic and gender groups showed no significant differences in the number of close friends. Notably, this is inconsistent with previous studies that suggest that Black older adults may have fewer friends than Whites (Ajrouch, Antonucci, & Janevic, 2001; Lisa L Barnes et al., 2004). However, in terms of network components, racial/ethnic minority older adults had a lower proportion of friends in their non-spouse and non-child social networks than Whites did, which is consistent with previous research (Ajrouch, Antonucci, & Mary R. Janevic, 2001; Lisa L Barnes et al., 2004).

Regarding friendship quality, the present study indicates certain gender differences in friend support. Among men, Black older adults reported slightly higher levels of friend support than their White peers, while U.S.-born and foreign-born Latinos showed no significant differences in friend support. Among women, Black women and foreign-born Latinas received a similar level of friend support as White women, while U.S.-born Latinas had relatively lower friend support. In terms of friend strain, all racial/ethnic minorities (regardless of gender or nativity) reported significantly higher levels of strain with friends than their White peers. This finding provides limited support for prior research suggesting that Whites enjoy support advantages that minority groups do not (Almeida et al., 2009; Flores et al., 2020; Mouzon, 2014). This highlights an understudied aspect of social relationships by demonstrating that racial minorities experience higher levels of relationship strain than Whites.

#### *Friendship Characteristics and Cognitive Health*

Based on the convoy model of the effects of relationships on health, this study further examines how structural and qualitative characteristics of friendships may influence late-life cognitive health and whether that influence varies across race/ethnicity, nativity, and gender. The results reveal that frequency of contact with friends plays a significant role in shaping cognitive health, with more frequent contact being linked to better cognitive function. However, the number and proportion of friends in the network were not associated with cognitive function. Similar findings have shown in prior research that frequency of contact with friends is a stronger predictor of slower subsequent decline in episodic memory and executive functioning than contact with children or other families; social support from friends, family, or children; or overall social network size (Zahodne et al., 2019; Sharifian et al., 2019). Overall, this finding aligns with the cognitive enrichment hypothesis, suggesting that friendships may be beneficial for cognitive

health among older adults because they require more interpersonal interaction and active maintenance (e.g., shared leisure or intellectual activities) than the more obligatory family relationships do (Roberts & Dunbar, 2011; 2015). In addition, friendship and frequency of contact with friends have been shown to provide a better source of cognition-related health assistance in a variety of forms, such as information exchange, advice on health behaviors, and companionship among peers who share similar characteristics, cohort experiences, and lifestyles (Hertzog et al., 2009; Roberts & Dunbar, 2011; 2015; Thoits, 2011). Thus, this study suggests that the frequency of contact with friends, rather than the quantity or proportion of friends in one's network, protects against age-related cognitive decline in later life.

The analysis goes beyond previous literature by examining structural characteristics and determining whether friendship quality affects late-life cognitive health. Interestingly, the findings of this study indicate that friend support does not independently affect cognitive function in older adults. Nevertheless, friend strain was found to be detrimental to cognitive function among older adults, regardless of race/ethnicity/nativity and gender. While some studies suggest that qualitative aspects of relationships, such as relationship support, play a more critical role than structural aspects in protecting against health issues and promoting well-being through stress-coping mechanisms (Qin et al., 2020), the results of this study do not support this argument. Instead, the current findings are aligned with some empirical findings on social relationships and cognitive aging that suggest that structural characteristics, such as frequent interactions with friends, are a better predictor of subsequent cognitive trajectories than friend support (Zahodne et al., 2018; Zahodne, Ajrouch, et al., 2019b).

Furthermore, considering the previously limited attention to and knowledge of the negative aspects of relationships, such as friend strain and its impact on health, this study

provides novel evidence that friend strain contributes to poorer late-life cognitive health. There is increasing recognition that greater social strain is associated with poorer cognitive function, including executive function and episodic memory, which can be understood through the lens of stress exposure (Kelly et al., 2017; Wilson et al., 2016). While the socioemotional selectivity model proposes that friendships in later life maintain higher quality as individuals tend to prune peripheral partners (Carstensen et al., 1999), the nature of friendships, like other social ties, is still ambivalent. Moreover, friendship may become increasingly important when other forms of relationship support are less available due to the loss of a spouse or other family members (Walen & Lachman, 2000). As such, the ambivalence and strain within friendship could have detrimental impacts on well-being and health (Walen & Lachman, 2000), especially if individuals feel that they have to rely heavily on such support due to the limited options and availability in late adulthood. Given that relationship strain remains understudied in comparison to relationship support and that it is rarely separately assessed in terms of specific types of relationships (e.g., with family members or friends) (Blieszner et al., 2019), there is a need for a more comprehensive examination of the influence of relationship strain on cognitive health. Hence, future studies must delve into the longer-term effects of friend strain and its potential impact on health and well-being in later life.

*The variation in friendship characteristics and race/ethnic/nativity and gender differences in cognitive function*

The findings of this study suggest that the variations in friendship characteristics, particularly frequency of friend contact and friend strain, contribute to some cognitive health advantages for White women and disadvantages faced by Black men and foreign-born Latinos. Notably, White women were the only group to exhibit significantly higher cognitive function

than White men, even after adjusting for sociodemographic and health factors. Additionally, White women reported the highest contact frequency and the lowest level of friend strain among all groups, which partly explains their cognitive function advantages. These findings are consistent with previous research on gendered differences in health and gendered coping responses to stress (Gilbert et al., 2016). Specifically, females are more inclined than males to seek social support, receive greater support, and be more satisfied with/effectively in utilizing such support (Williams, 2008). It is likely that frequent social interactions with close friends among White women provide greater opportunities for cognitive enrichment and serve as sources of cognitive-related health behaviors, which may contribute to better cognitive function (Hertzog et al., 2008; Roberts & Dunbar, 2011).

On the other hand, Black men and foreign-born Latinos experienced the poorest cognitive health, partly due to having the lowest frequency of contact with friends and the highest level of friend strain among all groups. Research on minority men's health and health equity, especially Black men's health, provides possible explanations for this finding. In particular, males were less likely than females to seek social support and tended to engage in risky behaviors as a coping response to constrained financial opportunities and life choices because of societal norms concerning masculinity (Brown & Hargrove, 2018; Gilbert et al., 2016).

In addition, the impact of socioeconomic status on friendship inequality could account for some of the disparities in cognitive health among different racial/ethnic groups. Previous studies have emphasized that financial and time constraints faced by the working class, particularly for men, could contribute to their difficulty in maintaining frequent contact with friends (Schafer & Vargas, 2016). Specifically, the long working hours, irregular schedules, shift work, and demanding labor involved in working-class jobs could hinder the abilities of Black men and

Latinos to form and sustain friendships, resulting in fewer opportunities for leisure, socializing, and meeting with friends (Schafer & Vargas, 2016; Walker, 1995). In contrast, middle-class White individuals retain social advantages due to their higher status and financial resources (Walker, 1995). These advantages may allow them to engage in various cognitively enriching activities, including shared leisure time and expansive networks of intellectually stimulating friends. Therefore, although Black men and foreign-born Latinos reported similar numbers of friends as White men and women, their less-frequent contact with friends explains some of their disadvantages in late-life cognitive health.

#### *Differential Effect of Friendship from an Intersectional Perspective*

Drawing from an intersectional perspective, the findings of this study provide evidence that “diminished return” is a potential mechanism contributing to racial/ethnic disparities in cognitive health among old Black men and foreign-born Latinos. Specifically, while the frequency of contact with friends contributed to better cognitive function, the protective effect of friend contact was less beneficial to the cognitive health of Black males and foreign-born Latinos than White males. This finding aligns with the differential effect hypothesis, which posits that marginalized groups may experience diminished returns in health benefits due to their comparatively weak ability to effectively utilize their assets and protective resources compared to more dominant or privileged groups (Assari, 2018; Williams & Mohammed, 2013). This can be attributed to structural barriers such as racism, discrimination, and socioeconomic disadvantages that impede marginalized groups’ access to and leveraging of protective resources, thereby diminishing the potential health benefits of friendship (Assari, 2018).

Although research grounded in intersectional frameworks suggests that Black women may experience higher psychological distress due to the emotional burden and obligation of

resolving social and psychological concerns within their family and friend networks (Woods-Giscombe et al., 2019), this study did not find evidence that frequent interaction with close friends affects the cognitive health of Black women differently than other racial/ethnic/nativity and gender groups. However, research on the stress–health link among Black men implies that older Black men may experience vicarious stress due to close friends being exposed to race-based and general stressors (Brown & Hargrove, 2018). In addition, the cumulative adversity resulting from various forms of racism and social inequality to which older Black men are exposed has led to substantial health disadvantages that cannot be adequately offset or ameliorated through protective resources such as friends (Brown & Hargrove, 2018). As a result, compared to White men, Black men may derive fewer benefits to cognitive health from social interactions with close friends who may share similar cohort experiences, socioeconomic adversities, and lifestyles (Assari, 2018; Williams & Mohammed, 2013).

This study also reveals that the health benefits of friend contact on cognitive function are less pronounced among older foreign-born Latinos. Foreign-born Latinos face multiple challenges that contribute to poor cognitive health. They often reside in rural communities characterized by a lack of medical resources, and their long-term employment in agriculture offers limited control and autonomy, low benefits, and a lack of access to healthcare services, all of which can negatively impact cognitive health (Andrade et al., 2021; Cheney et al., 2018; Rote & Angel, 2021). While family members play a significant role in supporting the health of Latinx older adults, friendships and frequency of contact with friends, provide additional cognitive stimulation and cognitive reserve through the exchange of information and health advice and engagement in leisure activities (Hertzog et al., 2009; Roberts & Dunbar, 2011; 2015; Thoits, 2011). However, the findings of this study indicate that foreign-born Latinos have less contact

with friends than White men, and the impact of friend contact on their cognitive health is diminished. This can be attributed, at least partially, to structural inequalities and cumulative adversities that hinder their ability to navigate systems such as healthcare. Consequently, foreign-born Latinos are unable to derive as much benefit from friend contact as privileged older White males. Future research must delve deeper into the pathways and mechanisms through which nativity influences cognitive health inequalities among foreign-born older adults.

## **LIMITATIONS**

This study has several limitations. First, although the HRS is one of the few nationally representative studies with an oversampling of minority populations, the LBQ samples for racial/ethnic/nativity and gender groups were relatively small compared with Whites (Ofstedal & Weir, 2011). Second, the present findings were based on self-reported measures, and the measures for frequency of contact and activity engagement are limited. In particular, detailed information regarding the quality and duration of contact is lacking. Additionally, whether the respondents are meeting with friends for cognitive or physical activities (reading versus playing board games) or information exchanges was unavailable in the current data set. This may weaken the conclusions in the mechanism that contact with friends contributes to cognitive health through activity engagement or information exchange. Therefore, future studies should replicate these findings with more objective and detailed measures of quality and duration of friend interaction and more detailed information regarding contact with friends. Third, this study demonstrated the association between structural and qualitative characteristics of friendship and cognition over six years with only two instances of friendship and cognitive data collection. Therefore, the current study could only examine linear associations. Future research should

examine these associations across multiple waves to assess associations between friendship and cognitive trajectories across race/ethnicity/nativity and gender groups over a longer period.

## **CONCLUSION**

Prior literature has suggested that relationships with friends contribute to positive late-life cognitive health. This study extends the research on health disparity and aging by demonstrating how patterns of structural and qualitative characteristics of friendship are associated with late-life cognitive health across race/ethnicity/nativity and gender from an intersectional approach. The findings of this study suggest that racial/ethnic minority older adults have similar numbers of friends and slightly disadvantaged friendships compared with their White peers. Moreover, contact frequency and relationship strain independently affect cognitive function among older adults, regardless of race/ethnicity/nativity or gender. Additionally, the structural and qualitative characteristics of friendship account for a small proportion of cognitive health advantages observed among White women as well as some cognitive health disadvantages faced by Black men and foreign-born Latinos. Furthermore, this study highlights that by yielding fewer cognitive health benefits for Black men and foreign-born Latinos, the differential effect or diminished return of friend contact is an underlying factor contributing to cognitive health inequalities. These findings have implications for interventions aimed at promoting healthy cognitive aging, suggesting that interventions could focus on facilitating contact with friends and reducing friend strain to benefit cognitive aging naturally.

## CHAPTER 5: CONCLUSION

Because many health disparities cannot be fully explained by socioeconomic status, chronic health conditions, or health behaviors, an emerging number of health disparity studies have recently explored how psychosocial mechanisms, especially stress exposure and protective factors, may contribute to mental and cognitive health in later life. Drawing on the SPM, this dissertation investigates racial/ethnic differences in stress exposure and social relationships and their influences on mental and cognitive health inequalities through two pathways: 1) the differential exposure to stressors and access to protective resources; and 2) the differential effect of such factors (e.g., higher vulnerability and diminished return), which may jointly shape health inequalities faced by racial/ethnic minority older adults.

The findings from the three studies within the dissertation offer a nuanced understanding of racial/ethnic disparities in mental and cognitive health among older adults. The first study examined two sets of stressors and protective resources: financial circumstances and social relationships. Specifically, the findings from the first study indicate that Black and Latinx older adults experience higher levels of depressive symptoms, partially attributed to their greater exposure to financial disadvantages and relationship strain than Whites. Despite receiving more support than Whites, Black, and Latinx older adults gain less protection against depression from relationship support from spouses and children than their White peers do. The second study investigated the effect of chronic exposure to everyday discrimination on cognitive health. The results reveal that chronic exposure to everyday discrimination is associated with lower initial cognitive levels and a faster decline in cognitive function among all older adults. However, the effect magnitude of discrimination on cognitive decline varies by race/ethnicity, with higher levels of and increases in discrimination leading to a faster decline in later life, particularly

among White and Black older adults, but not among Latinx ones. Lastly, the third study explored the structural and qualitative characteristics of friend relationships and their association with cognitive health. The results indicate that racial/ethnic minority older adults have similar or slightly disadvantaged friend relationships than to their White peers. Meanwhile, contact frequency and relationship strain with friends influence cognitive function across all racial/ethnic/nativity and gender groups. However, while friend contact contributes to better cognitive health, the protective effect is weaker for older Black men and foreign-born Latinas than it is for older White men.

According to the SPM, racial/ethnic health disparities are derived from uneven exposure to stressors and access to protective resources due to pervasive structural and institutionalized inequalities. This project highlights that racial/ethnic health disparities are attributable to their greater exposure to stressors but also to an overlooked mechanism—the diminished health return from protective resources, despite the availability of some resources being higher for Black and Latinx older adults than for Whites. By examining racial/ethnic patterns of various stress exposures and social relationships, this dissertation provides a better understanding of how psychosocial factors are linked to health disparities. It also delves into the complex interplay of these factors with race/ethnicity, nativity, and gender in shaping mental and cognitive health disparities among older adults. Overall, this dissertation contributes to research on racial/ethnic inequalities in late-life health by providing population-based evidence for the differential exposure and differential effect hypotheses. It offers a nuanced comparison to comprehend racial/ethnic differences in stress exposure (e.g., financial strain and discrimination) and in relationships with spouses, children, family members, and friends in late adulthood. This dissertation provides valuable insights into the link between stressors, social relationships, and

health among older adults across racial/ethnic groups. These insights will assist with developing interventions and programs that promote healthy mental and cognitive aging and reduce health disparities in the diverse older American population.

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## APPENDIX A: CHAPTER 2 TABLES

Table 2-1. Weighted Descriptive statistics by Race/ethnicity, HRS 2014-2016 (N=12,448)

Variables	All (N=12,448)	White (N=8,636)	Black (N=2,251)	Latinx (N=1,561)
Depressive symptoms	1.38 (1.94)	1.20 (1.81)	1.72*** (2.05)	1.93*** (2.26)
Log household income	71.50 (110.21)	83.80 (125.00)	44.14*** (49.72)	42.88*** (64.19)
Log household wealth	464.89 (1046.24)	607.97 (1206.04)	122.62*** (306.57)	166.85*** (419.14)
Financial dissatisfaction	2.50 (0.96)	2.37 (0.92)	2.92*** (0.97)	2.62*** (0.95)
Food insecurity (%)	8.23	5.78	18.93***	16.31***
<b>Social Relationship</b>				
support from spouse	2.51 (1.54)	2.58 (1.55)	2.10*** (1.54)	2.69** (1.41)
Strain with spouse	1.46 (1.00)	1.41 (0.97)	1.34** (1.08)	1.65*** (1.02)
Support from children	2.88 (1.25)	2.86 (1.25)	2.89 (1.26)	2.98*** (1.19)
Strain with children	1.52 (0.81)	1.49 (0.79)	1.62*** (0.85)	1.59*** (0.81)
Support from family member	2.71 (1.10)	2.62 (1.12)	2.93*** (0.98)	2.86*** (1.09)
Strain with Family member	1.48 (0.73)	1.40 (0.69)	1.70*** (0.78)	1.56*** (0.78)
Chronic medical conditions	1.21 (1.00)	1.15 (1.00)	1.42*** (0.97)	1.21* (1.01)
Age	68.62 (10.24)	70.16 (10.31)	65.27*** (9.09)	64.91*** (9.21)
Year of schooling	12.98 (3.00)	13.55 (2.46)	12.68*** (2.68)	10.23*** (4.35)
Male (%)	46.12	46.41	41.97**	48.27
Female (%)	53.88	53.59	58.03**	51.73
<b>Marital status (%)</b>				
Married	65.16	68.47	42.09***	63.55**
Previously married	27.76	26.08	39.59***	28.46*
Never married	7.08	5.45	18.32***	8.00***

Note: Weighted Mean and Standard Deviations (SDs in parentheses) are presented; Differences by race/ethnicity are tested using Person's chi-square statistics for categorical variables; White is set as the reference group. T statistic for continuous variables. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05, + p<0.1

Table 2-2. The Negative Binomial Regression Models of Depressive Symptom (HRS, N=12,448)

Variables	M1	M2	M3	M4	M5	M6	M7
Black	1.53*** (0.08)	1.11* (0.05)	1.08 (0.05)	1.02 (0.04)	1.23*** (0.06)	1.00 (0.04)	1.02 (0.04)
Latinx	1.67*** (0.08)	1.19** (0.07)	1.18* (0.07)	1.19** (0.07)	1.29*** (0.08)	1.14* (0.07)	1.21** (0.08)
Log household income			1.00* (0.00)				1.00 (0.00)
Log household wealth			1.00+ (0.00)				1.00 (0.00)
Financial dissatisfaction				1.46*** (0.03)			1.31*** (0.03)
Food insecurity				1.42*** (0.07)			1.45*** (0.07)
Support from spouses					0.83*** (0.02)		0.84*** (0.02)
Support from children					0.90*** (0.01)		0.90*** (0.02)
Support from family members					0.90*** (0.02)		0.94*** (0.02)
Strain with spouses						1.30*** (0.03)	1.23*** (0.03)
Strain with children						1.07** (0.02)	1.09*** (0.02)
Strain with family members						1.16*** (0.02)	1.13*** (0.02)
Age		0.99*** (0.00)	0.99*** (0.00)	1.00 (0.00)	0.99*** (0.00)	0.99*** (0.00)	1.00 (0.00)
Female		1.21*** (0.04)	1.20*** (0.04)	1.20*** (0.04)	1.18*** (0.04)	1.22*** (0.04)	1.17*** (0.04)
Year of schooling		0.94*** (0.01)	0.94*** (0.01)	0.95*** (0.01)	0.93*** (0.01)	0.94*** (0.01)	0.95*** (0.01)
Previously married (ref. married)		1.57*** (0.05)	1.74*** (0.07)	1.33*** (0.04)	1.02 (0.06)	2.21*** (0.09)	1.19** (0.07)
Never married		1.67*** (0.13)	1.86*** (0.17)	1.36*** (0.09)	0.75** (0.07)	3.10*** (0.28)	1.10 (0.10)
U.S.-born (ref. foreign born)		1.03 (0.05)	1.02 (0.05)	1.02 (0.06)	1.05 (0.06)	1.01 (0.06)	1.02 (0.06)
Number of chronic diseases		1.27*** (0.02)	1.25*** (0.02)	1.20*** (0.02)	0.99*** (0.00)	0.99*** (0.00)	1.18*** (0.02)

Note: Models 2-7 controlled for age, female, year of schooling, marital status, nativity status, and number of chronic diseases. Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05, + p<0.10

Table 2-3. KHB analysis on mediating roles of financial resource, financial strain, social support, and social strain

A. Race → Financial resource (Household income, household wealth) → Depressive symptoms			
	Coefficient	SE	Percent of indirect effect
Black			
Total effect	0.109**	0.041	
Direct effect	0.076+	0.041	
Indirect (mediating) effect	0.033***	0.011	30.28%
Latinx			Percent of indirect effect
Total effect	0.180**	0.058	
Direct effect	0.164**	0.058	
Indirect (mediating) effect	0.016*	0.008	8.89%
B. Race → Financial strain (Financial dissatisfaction, food insecurity) → Depressive symptoms			
	Coefficient	SE	Percent of indirect effect
Black			
Total effect	0.142**	0.042	
Direct effect	0.023	0.042	
Indirect (mediating) effect	0.119***	0.023	83.80%
Latinx			Percent of indirect effect
Total effect	0.181**	0.055	
Direct effect	0.174**	0.055	
Indirect (mediating) effect	0.006	0.022	0%
C. Race → Relationship supports → Depressive symptoms			
	Coefficient	SE	Percent of indirect effect
Black			
Total effect	0.130**	0.042	
Direct effect	0.207***	0.043	
Indirect (mediating) effect	-0.077***	0.017	
Latinx			Percent of indirect effect
Total effect	0.194**	0.058	
Direct effect	0.256***	0.058	
Indirect (mediating) effect	-0.062***	0.016	
D. Race → Relationship strain → Depressive symptoms			
	Coefficient	SE	Percent of indirect effect
Black			
Total effect	0.104*	0.043	
Direct effect	0.003	0.043	
Indirect (mediating) effect	0.101***	0.018	97.12%
Latinx			Percent of indirect effect
Total effect	0.187**	0.063	
Direct effect	0.134*	0.064	
Indirect (mediating) effect	0.053**	0.018	28.34%

Table 2-3. (cont'd)

E. Race → All mediators → Depressive symptoms			
Black	Coefficient	SE	Percent of indirect effect
Total effect	0.143**	0.042	
Direct effect	0.021	0.043	
Indirect (mediating) effect	0.122***	0.030	85.31%
Latinx	Coefficient	SE	Percent of indirect effect
Total effect	0.199**	0.058	
Direct effect	0.194**	0.058	
Indirect (mediating) effect	0.005	0.029	

Note: All models control for age, female, year of schooling, marital status, nativity status, and number of chronic diseases; IRR = Incidence Rate Ratio; SE= Standard errors; \*\*\* p<0.001, \*\* p<0.01, \* p<0.05, + p<0.10

Table 2-4. Moderation analysis of race/ethnicity and key variables on depressive symptoms, HRS 2014-2016 (N=12,448)

Panel 1 Household income			Panel 2 Household wealth			Panel 3 Financial dissatisfaction		
	IRR	SE		IRR	SE		IRR	SE
Black	1.12*	(0.05)	Black	1.02	(0.05)	Black	1.69***	(0.27)
Latinx	1.20*	(0.08)	Latinx	1.20	(0.08)	Latinx	1.61**	(0.06)
HH income	0.99**	(0.00)	HH income	1.00	(0.00)	Financial dissatisfaction	1.36***	(0.03)
Black* HH income	0.99**	(0.00)	Black* HH income	1.00	(0.00)	Black* Financial dissatisfaction	0.84**	(0.04)
Latinx* HH income	1.000	(0.00)	Latinx* HH income	1.00	(0.30)	Latinx* Financial dissatisfaction	0.90+	(0.05)
Panel 4 Food insecurity			Panel 5 Spousal relationship support			Panel 6 Children relationship support		
Black	1.05	(0.05)	Black	0.83**	(0.05)	Black	0.84*	(0.07)
Latinx	1.23**	(0.08)	Latinx	1.09	(0.10)	Latinx	0.941	(0.11)
Food insecurity	1.52***	(0.11)	Spousal support	0.82***	(0.02)	Children support	0.89***	(0.02)
Black* Food insecurity	0.85	(0.08)	Black* Spousal support	1.10***	(0.03)	Black* Children support	1.07*	(0.03)
Latinx* Food insecurity	0.93	(0.12)	Latinx* Spousal support	1.04	(0.03)	Latinx* Children support	1.10**	(0.03)
Panel 7 Family relationship support			Panel 8 Spousal relationship strain			Panel 9 Children relationship strain		
Black	0.81	(0.11)	Black	0.96	(0.07)	Black	1.04	(0.09)
Latinx	1.21+	(0.13)	Latinx	1.34**	(0.12)	Latinx	1.20+	(0.12)
Family support	0.93**	(0.02)	Spousal strain	1.22***	(0.03)	Children strain	1.09***	(0.03)
Black* Family support	1.09+	(0.05)	Black* Spousal strain	1.05	(0.04)	Black* Children strain	0.99	(0.04)
Latinx* Family support	1.00	(0.03)	Latinx* Spousal strain	0.96	(0.03)	Latinx* Children strain	1.01	(0.05)
Panel 10 Family relationship strain								
Black	1.17	(0.11)						
Latinx	1.57	(0.17)						
Family strain	1.17***	(0.03)						
Black* Family strain	0.92	(0.03)						
Latinx* Family strain	0.85**	(0.04)						

Note: All models controlled for age, female, year of schooling, marital status, nativity status, and number of chronic diseases; IRR = Incidence Rate Ratio; Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05, + p<0.10

**APPENDIX B: CHAPTER 3 TABLES**

**Table 3-5. Descriptive statistics of analytic variables, HRS 2006–2016 (N=8195)**

Variables	Total	White N=6,531 (79.7%)	Black N=1,030 (12.3%)	U.S.-born Latinx N=320 (3.8%)	Foreign-born Latinx N=353 (4.2%)
Cognitive function 2006	16.27 (4.03)	16.87 (3.72)	14.02*** (4.37)	14.39*** (4.41)	13.90*** (4.10)
Cognitive function 2008	16.07 (4.04)	16.69 (3.73)	13.73*** (4.37)	14.06*** (4.37)	13.85*** (4.17)
Cognitive function 2010	15.54 (4.15)	16.12 (3.86)	13.19*** (4.50)	13.76*** (4.50)	13.45*** (4.20)
Cognitive function 2012	15.16 (4.26)	15.73 (4.03)	12.86*** (4.43)	13.42*** (4.53)	13.37*** (4.42)
Cognitive function 2014	15.02 (4.49)	15.60 (4.22)	12.67*** (4.79)	13.29*** (4.74)	12.92*** (4.70)
Cognitive function 2016	14.66 (4.53)	15.24 (4.31)	12.37*** (4.67)	12.84*** (4.74)	12.68*** (4.60)
Everyday discrimination 2006/2008	1.64 (0.72)	1.61 (0.68)	1.77*** (0.83)	1.75*** (0.94)	1.55 (0.75)
Everyday discrimination 2010/2012	1.53 (0.72)	1.50 (0.68)	1.67*** (0.87)	1.64*** (0.89)	1.44 (0.70)
Everyday discrimination 2014/2016	1.52 (0.70)	1.49 (0.65)	1.64*** (0.86)	1.58*** (0.86)	1.46 (0.74)
Female (%)	60.96	59.74	68.93	58.16	64.31
Age (years)	66.31 (8.52)	66.77 (8.56)	65.25*** (8.15)	64.28*** (8.00)	64.48*** (8.51)
Education (%)					
Less than high school	17.77	12.02	30.32***	44.17***	61.57***
High school	34.49	36.34	32.05**	28.73***	16.44***
Some college	22.59	23.22	22.90	19.02**	14.78***
College graduate or above	25.14	28.42	14.73***	8.08***	7.21***
Marital status (%)					
Married	67.57	71.08	46.10***	65.96***	66.17*
Divorced	13.40	11.43	24.36***	18.70***	15.08*
Widowed	15.90	15.22	23.30***	11.96**	13.60
Never married	3.13	2.27	6.24***	3.47**	4.43**
Number of chronic diseases	0.48 (0.76)	0.46 (0.74)	0.59*** (0.85)	0.54*** (0.80)	2.21*** (0.75)
Depressive symptoms	1.23 (1.84)	1.09 (1.72)	1.58*** (1.99)	1.79*** (2.06)	0.54*** (2.56)
Household income	3.82 (0.96)	3.96 (0.90)	3.34*** (0.96)	3.40*** (0.97)	3.04*** (1.10)
Household wealth	7.12 (0.41)	7.18 (0.43)	6.89*** (0.23)	6.97*** (0.30)	6.90*** (0.25)

Note: Mean and Standard Deviations (SDs in parentheses) are presented; Differences by race/ethnicity are tested using Person’s chi-square statistics for categorical variables; White is set as the reference group. T statistic for continuous variables. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05, + p<0.1

Table 3-6. Effects of Everyday Discrimination on Cognition from Latent Growth Curve, HRS 2006–2016 (N=8195).

	Latent Intercept	SE	Latent Slope	SE
Everyday discrimination intercept	-0.19***	0.08	-0.10	0.09
Everyday discrimination slope			-0.36*	0.22
Black	-2.14***	0.11	0.01	0.02
U.S.-born Latinx	-1.29***	0.18	0.01	0.03
Foreign-born Latinx	-0.99***	0.16	0.04+	0.03
Female	1.13***	0.07	-0.04***	0.01
Centered Age	-0.09***	0.00	-0.13***	0.00
Number of chronic diseases	-0.20***	0.05	-0.02*	0.01
Depressive symptoms	-0.21***	0.02	0.00	0.00
Household income	0.45***	0.05	0.00	0.01
Household wealth	0.32**	0.10	0.01	0.01
Education (ref. less than high school)				
High school graduated	1.71***	0.10	0.02	0.02
Some college	2.63***	0.11	0.01	0.02
College graduate or above	3.43***	0.12	0.04*	0.03
Marital Status (ref. married)				
Divorced	0.31**	0.11	-0.02	0.02
Widowed	0.23**	0.10	-0.03+	0.02
Never married	-0.17	0.19	0.06*	0.03
Means of growth parameters	10.35***	0.68	-0.30**	0.10
Variances in growth parameters	5.24***	0.15	0.01**	0.00
Model fit index	CFI= 0.992	TLI= 0.986	RMSEA=0.020	

Note: Models controlled for all sociodemographic covariates. Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05, + p<0.10

Table 3-7. Multiple group analyses: the effects of everyday discrimination on cognition from latent growth curve

	Latent Intercept	SE	Latent Slope	SE
<b>Whites (n=6,531)</b>				
Everyday discrimination intercept	-0.11	0.07	-0.20*	0.10
Everyday discrimination slope			-0.38*	0.16
<b>Blacks (n=1,030)</b>				
Everyday discrimination intercept	-0.09	0.11	-0.47*	0.23
Everyday discrimination slope			-0.71*	0.32
<b>U.S.- born Latinx (n=320)</b>				
Everyday discrimination intercept	-0.23	0.453	0.11	0.40
Everyday discrimination slope			0.18	0.73
<b>Foreign-born Latinx (n=353)</b>				
Everyday discrimination intercept	-0.49	0.517	0.22	1.14
Everyday discrimination slope			-1.43	5.78
Model fit index	CFI= 0.986	TLI= 0.979	RMSEA=0.018	

Note: Models controlled for all sociodemographic covariates. \*\*\*p < .001, \*\*p < .01, \*p < .05

## APPENDIX C: CHAPTER 4 TABLES

Table 4-1. Descriptive statistics of the friend characteristics at baseline by race/ethnicity/nativity and gender, HRS 2006-2016

	White Male N= 2,546	White female N=3,726	Black male N= 397	Black female N=814	U.S.- born Latino N=143	U.S.-born Latina N= 199	Foreign- born Latino = 145	Foreign -born Latina N=222
Cognitive function	16.06 <sup>bcdefgh</sup> (3.53)	16.83 <sup>acdefgh</sup> (3.66)	13.56 <sup>abdfg</sup> (3.96)	14.07 <sup>abc</sup> (3.78)	14.11 <sup>ab</sup> (3.74)	14.55 <sup>abch</sup> (4.50)	14.30 <sup>abc</sup> (3.80)	13.84 <sup>abf</sup> (4.08)
Number of close Friend	4.60 <sup>bdgh</sup> (6.06)	4.21 <sup>aceg</sup> (3.93)	4.69 <sup>h</sup> (7.04)	4.16 <sup>ag</sup> (5.20)	4.97 <sup>bh</sup> (8.42)	4.34 <sup>g</sup> (7.95)	4.76 <sup>abdfgh</sup> (6.99)	3.81 <sup>aceg</sup> (3.41)
% of Friend in network	0.59 <sup>bcdefgh</sup> (0.25)	0.56 <sup>acdefgh</sup> (0.23)	0.48 <sup>ab</sup> (0.23)	0.46 <sup>abg</sup> (0.21)	0.47 <sup>ab</sup> (0.23)	0.48 <sup>ab</sup> (0.21)	0.50 <sup>abd</sup> (0.23)	0.46 <sup>abg</sup> (0.21)
Contact frequency	3.83 <sup>bcdegh</sup> (1.04)	4.10 <sup>acdefgh</sup> (1.02)	3.59 <sup>abdfg</sup> (0.99)	3.90 <sup>abcegh</sup> (1.00)	3.55 <sup>abdfg</sup> (1.12)	3.79 <sup>bceg</sup> (1.11)	3.30 <sup>abcdefh</sup> (1.12)	3.65 <sup>abd</sup> (1.01)
Friend support	2.89 <sup>bcdh</sup> (0.71)	3.22 <sup>acefg</sup> (0.71)	2.97 <sup>abdefgh</sup> (0.72)	3.25 <sup>acefg</sup> (0.67)	2.85 <sup>bcdh</sup> (0.71)	3.10 <sup>abcdeg</sup> (0.77)	2.84 <sup>bcdh</sup> (0.66)	3.20 <sup>aceg</sup> (0.70)
Friend strain	1.40 <sup>bcdegh</sup> (0.45)	1.37 <sup>acdefgh</sup> (0.44)	1.66 <sup>abdefh</sup> (0.64)	1.50 <sup>abcf</sup> (0.53)	1.54 <sup>abcf</sup> (0.60)	1.43 <sup>bcdegh</sup> (0.53)	1.62 <sup>abdfh</sup> (0.58)	1.51 <sup>abcf</sup> (0.54)

Note. Differences by race/ethnicity, nativity and gender were examined using Pearson's chi-square test for categorical variables, and t-test for continuous variables. SD = standard deviation

<sup>a</sup> Significantly different from white males at the p<0.05 level.

<sup>b</sup> Significantly different from white females at the p<0.05 level.

<sup>c</sup> Significantly different from Black males at the p<0.05 level.

<sup>d</sup> Significantly different from Black female at the p<0.05 level.

<sup>e</sup> Significantly different from U.S.-born Latino at the p<0.05 level.

<sup>f</sup> Significantly different from U.S.-born Latina at the p<0.05 level.

<sup>g</sup> Significantly different from foreign-born Latino at the p<0.05 level.

<sup>h</sup> Significantly different from foreign-born Latina at the p<0.05 level.

Table 4-2. Descriptive statistics of the socioeconomic and health covariates at baseline by race/ethnicity/nativity and gender, HRS 2006-2016, N= 8,316

	White Male N=2,546	White female N=3,726	Black male N= 397	Black female N=814	U.S.-born Latino N=143	U.S.-born Latina N= 199	Foreign-born Latino = 145	Foreign-born Latina N=222
Age	67.48	67.62	63.77***	63.20***	64.26***	63.23***	63.02***	62.64***
(9.50)	(9.54)	(9.57)	(8.45)	(8.64)	(8.04)	(8.28)	(8.21)	(9.00)
Marital status (%)								
Married	77.21	57.46***	56.22***	30.91***	72.66***	56.30	84.75***	59.52**
divorce/ separated	11.27	14.22***	24.35***	29.76***	19.48**	23.59***	8.16	18.57**
widowed	7.33	24.97***	9.30***	27.41***	2.62**	12.87***	4.26	17.62**
never married	4.19	3.35	10.12***	11.92***	5.24	7.24 *	2.84	4.29
Education (%)								
less thanHS	9.16	8.91	20.79***	19.44***	27.34***	23.86***	48.94***	54.29***
High school	30.10	36.77***	34.88	30.98	32.21	31.90	21.99*	18.33***
some college	22.99	27.30***	25.58	29.70***	23.60	32.17**	19.50	16.19*
College and above	37.75	27.02***	18.74***	19.89***	16.85***	12.06***	9.57***	11.19***
Household income (Unit: 10k)	9.11	7.28***	5.57***	4.07***	4.89***	5.12***	3.73***	3.76***
(11.69)		(9.11)	(6.08)	(4.66)	(3.88)	(5.26)	(3.81)	(5.84)
Wealth (Unit: 10k)	60.43	53.39*	17.48***	10.56***	20.38***	28.90***	12.40***	13.30***
(98.73)	(98.73)	(87.11)	(37.82)	(23.32)	(37.59)	(63.44)	(27.15)	(35.94)
Chronic diseases	1.19	1.02***	1.37**	1.37***	1.42**	1.14	1.14	1.15
(0.99)	(0.99)	(0.94)	(0.99)	(0.95)	(1.05)	(0.98)	(0.99)	(1.01)
Depressive symptoms	0.85	1.16***	1.30***	1.69***	1.31**	1.82 ***	1.40 ***	2.00 ***
(1.48)	(1.48)	(1.76)	(1.74)	(2.06)	(1.77)	(2.17)	(1.97)	(2.36)
Survey year 2010 (%)	58.93	58.34	52.26*	54.94*	62.55	52.82	50.35 *	58.33
Survey year 2012 (%)	41.07	41.66	47.74	45.06	37.45	47.18	49.65	41.67

Note: Standard errors in parentheses. \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Table 4-3. Mixed-effects linear regression of friend relationships and late-life cognitive function, HRS 2006-2016, N= 8,316

	Null		1 Demographic factors adjusted		2a Numbers of close friend		2b Race*numbers of close friend	
White female	0.67***	(0.09)	0.96***	(0.07)	0.98***	(0.08)	0.84***	(0.20)
Black male	-2.21***	(0.18)	-1.83***	(0.16)	-2.03***	(0.16)	-1.60***	(0.36)
Black female	-1.95***	(0.13)	-1.52***	(0.12)	-1.57***	(0.12)	-1.36***	(0.28)
U.S.-born Latino	-1.61***	(0.29)	-1.00***	(0.25)	-1.10***	(0.25)	-1.87**	(0.59)
U.S.-born Latina	-1.13***	(0.25)	-0.62**	(0.21)	-0.87***	(0.22)	-0.99	(0.55)
Foreign-born Latino	-1.62***	(0.28)	-0.60*	(0.25)	-0.57*	(0.25)	-0.88	(0.59)
Foreign-born Latina	-1.89***	(0.24)	-0.70***	(0.21)	-0.71**	(0.21)	-0.53	(0.48)
Numbers of close friend					-0.01	(0.00)	-0.02**	(0.01)
White female* numbers of close friend							0.03**	(0.01)
Black male* numbers of close friend							0.02	(0.02)
Black female* numbers of close friend							-0.01	(0.02)
U.S.-born Latino* numbers of close friend							0.07**	(0.03)
U.S born Latina* numbers of close friend							0.03	(0.02)
Foreign-born Latino* numbers of close friend							0.02	(0.03)
Foreign-born Latina* numbers of close friend							-0.02	(0.04)
Control							-0.02**	(0.01)
Center age			-0.10***	(0.00)	-0.10***	(0.00)	-0.10***	(0.00)
Divorce/separated (ref. married)			-0.09	(0.09)	-0.10	(0.09)	-0.08	(0.09)
Widowed			-0.00	(0.09)	-0.05	(0.09)	0.00	(0.09)
Never married			-0.09	(0.15)	-0.16	(0.14)	-0.07	(0.15)
High school (ref. less than HS)			1.41***	(0.11)	1.78***	(0.10)	1.41***	(0.11)
Some college			2.27***	(0.11)	2.68***	(0.11)	2.26***	(0.11)
College and above			3.37***	(0.11)	3.79***	(0.11)	3.36***	(0.11)
Log household income			0.42***	(0.03)	0.44***	(0.03)	0.42***	(0.03)
Log household wealth			-0.73***	(0.06)	-0.74***	(0.06)	-0.74***	(0.06)
Chronic diseases			-0.20***	(0.03)	-0.20***	(0.03)	-0.20***	(0.03)
Depressive symptoms			-0.14***	(0.02)	-0.15***	(0.01)	-0.14***	(0.02)
Survey year (ref. 2010)			-0.06	(0.06)	-0.05	(0.06)	-0.06	(0.06)
Constant	15.90***	(0.07)	18.13***	(0.52)	18.21***	(0.48)	18.44***	(0.50)

Note: Standard errors in parentheses; \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Table 4-3. (cont'd)

	3a		3b		4a		4b	
	Proportion of friend		Race*proportion of friend		Friend contact frequency		Race*friend contact frequency	
White female	1.00***	(0.08)	1.04***	(0.17)	0.92***	(0.08)	0.70***	(0.24)
Black male	-1.97***	(0.16)	-2.00***	(0.31)	-2.00***	(0.16)	-0.78	(0.47)
Black female	-1.53***	(0.13)	-1.51***	(0.24)	-1.58***	(0.12)	-0.96**	(0.36)
U.S.-born Latino	-1.07***	(0.25)	-1.28**	(0.49)	-1.07***	(0.25)	-1.02	(0.70)
U.S.-born Latina	-0.77***	(0.22)	-1.30**	(0.45)	-0.87***	(0.21)	-1.40*	(0.62)
Foreign-born Latino	-0.56*	(0.26)	-0.39	(0.48)	-0.53*	(0.25)	0.76	(0.65)
Foreign-born Latina	-0.65**	(0.22)	-0.37	(0.42)	-0.74***	(0.21)	-1.08	(0.59)
<b>Proportion of friend</b>	0.05	(0.11)	0.09	(0.19)	-0.01*	(0.00)	-0.01*	(0.00)
White female* proportion of friend			-0.01	(0.25)			0.03**	(0.01)
Black male* proportion of friend			0.06	(0.54)			0.02	(0.02)
Black female* proportion of friend			-0.04	(0.42)			-0.01	(0.02)
U.S.-born Latino* proportion of friend			0.46	(0.86)			0.07**	(0.03)
U.S born Latina* proportion of friend			1.23	(0.81)			0.03	(0.02)
Foreign-born Latino* proportion of friend			-0.42	(0.82)			0.02	(0.03)
Foreign-born Latina* proportion of friend			-0.57	(0.74)	0.21***	(0.03)	0.24***	(0.05)
<b>Contact frequency</b>							0.03	(0.06)
White female* contact frequency							-0.34**	(0.12)
Black male* contact frequency							-0.16	(0.09)
Black female* contact frequency							-0.01	(0.19)
U.S.-born Latino* contact frequency							0.14	(0.16)
U.S-born Latina* contact frequency							-0.39*	(0.18)
Foreign-born Latino* contact frequency							0.10	(0.15)
Foreign-born Latina* contact frequency							0.03	(0.06)
<b>Control</b>								
Center age			-0.10***	(0.00)	-0.10***	(0.00)	-0.10**	(0.00)
Divorce/separated (ref. married)			-0.11	(0.09)	-0.10	(0.09)	-0.08	(0.09)
Widowed			0.02	(0.09)	-0.05	(0.09)	0.00	(0.09)
Never married			-0.02	(0.15)	-0.16	(0.14)	-0.07	(0.15)

Table 4-3. (cont'd)

High school (ref. less than HS)	1.37***	(0.11)	1.78***	(0.10)	1.41***	(0.11)
Some college	2.25***	(0.11)	2.68***	(0.11)	2.26***	(0.11)
College and above	3.32***	(0.12)	3.79***	(0.11)	3.36***	(0.11)
Log household income	0.40***	(0.03)	0.44***	(0.03)	0.42***	(0.03)
Log household wealth	-0.68***	(0.06)	-0.74***	(0.06)	-0.74**	(0.06)
Chronic diseases	-0.20***	(0.03)	-0.20***	(0.03)	-0.20**	(0.03)
Depressive symptoms	-0.15***	(0.02)	-0.15***	(0.01)	-0.14**	(0.02)
Survey year (ref. 2010)	-0.07	(0.07)	-0.05	(0.06)	-0.06	(0.06)

Note: Standard errors in parentheses; \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Table 4-3. (cont'd)

	5a		5b		6a		6b	
	Friend support		Race*friend support		Friend strain		Race* friend strain	
White female	0.94***	(0.08)	0.89***	(0.26)	0.95***	(0.07)	0.84***	(0.20)
Black male	-1.83***	(0.16)	-2.61***	(0.50)	-1.82***	(0.16)	-1.60***	(0.36)
Black female	-1.54***	(0.12)	-2.00***	(0.40)	-1.52***	(0.12)	-1.36***	(0.28)
U.S.-born Latino	-1.00***	(0.25)	-0.76	(0.77)	-1.00***	(0.25)	-1.87**	(0.59)
U.S.-born Latina	-0.63**	(0.21)	-0.84	(0.73)	-0.64**	(0.21)	-0.99	(0.55)
Foreign-born Latino	-0.60*	(0.25)	-0.37	(0.80)	-0.59*	(0.25)	-0.88	(0.59)
Foreign-born Latina	-0.71***	(0.21)	-0.71	(0.70)	-0.70***	(0.21)	-0.53	(0.48)
<b>Friend relationship support</b>	0.05	(0.04)	0.01	(0.07)				
White female*friend support			0.02	(0.08)				
Black male* friend support			0.27	(0.16)				
Black female* friend support			0.15	(0.12)				
U.S.-born Latino* friend support			-0.09	(0.26)				
U.S.-born Latina* friend support			0.07	(0.23)				
Foreign-born Latino*friend support			-0.08	(0.27)				
Foreign-born Latina*friend support			0.00	(0.21)				
<b>Friend relationship strain</b>					-0.11*	(0.05)	-0.13	(0.10)
White female*friend strain							0.08	(0.13)
Black male* friend strain							-0.13	(0.21)
Black female* friend strain							-0.11	(0.17)
U.S.-born Latino* friend strain							0.59	(0.37)
U.S.-born Latina* friend strain							0.26	(0.36)
Foreign-born Latino* friend strain							0.19	(0.35)
Foreign-born Latina* friend strain							-0.11	(0.29)

Table 4-3. (cont'd)

Control								
Center age	-0.10***	(0.00)	-0.10***	(0.00)	-0.10***	(0.00)	-0.10***	(0.00)
Divorce/separated (ref. married)	-0.09	(0.09)	-0.09	(0.09)	-0.08	(0.09)	-0.08	(0.09)
Widowed	-0.01	(0.09)	-0.01	(0.09)	0.00	(0.09)	0.00	(0.09)
Never married	-0.09	(0.15)	-0.09	(0.15)	-0.07	(0.15)	-0.07	(0.15)
High school (ref. less than HS)	1.41***	(0.11)	1.41***	(0.11)	1.41***	(0.11)	1.41***	(0.11)
Some college	2.27***	(0.11)	2.27***	(0.11)	2.27***	(0.11)	2.26***	(0.11)
College and above	3.36***	(0.11)	3.36***	(0.11)	3.37***	(0.11)	3.36***	(0.11)
Log household income	0.42***	(0.03)	0.42***	(0.03)	0.42***	(0.03)	0.42***	(0.03)
Log household wealth	-0.73***	(0.06)	-0.73***	(0.06)	-0.74***	(0.06)	-0.74***	(0.06)
Chronic diseases	-0.20***	(0.03)	-0.20***	(0.03)	-0.20***	(0.03)	-0.20***	(0.03)
Depressive symptoms	-0.14***	(0.02)	-0.14***	(0.02)	-0.14***	(0.02)	-0.14***	(0.02)
Survey year (ref. 2010)	-0.06	(0.06)	-0.06	(0.06)	-0.06	(0.06)	-0.06	(0.06)
Constant	18.05***	(0.49)	18.13***	(0.52)	18.42***	(0.49)	18.44***	(0.50)

Note: Standard errors in parentheses; \*\*\* p<0.001, \*\* p<0.01, \* p<0.05

Table 4-4. KHB analysis of relationship with friends on cognitive functions. N= 8,316

1. White females (ref. white males)			
	Coefficient	Z	% explained
Total effect	0.99***	15.35	
Direct effect	0.91***	13.97	
Indirect effect	0.07*	1.90	7.00
Number of close friends			0.58
Contact frequency			6.77
Proportion of friends			-0.15
Friend support			-1.18
Friend strain			1.00
2. Black males			
Total effect	-1.93***	-12.83	
Direct effect	-1.65***	-12.22	
Indirect effect	-0.07*	-1.97	4.21
Number of close friends			0.11
Contact frequency			2.19
Proportion of friends			0.52
Friend support			0.04
Friend strain			1.35
3. Black females			
Total effect	-1.37***	-13.25	
Direct effect	-1.38***	-13.10	
Indirect effect	0.01	-0.15	
4. U.S.- born Latinos			
Total effect	-0.84***	-4.05	
Direct effect	-0.80***	-3.81	
Indirect effect	-0.04	-1.25	
5. U.S.- born Latinas			
Total effect	-0.43*	-2.40	
Direct effect	-0.45*	-2.49	
Indirect effect	-0.02	0.48	
6. Foreign-born Latinos			
Total effect	-0.522*	-2.49	
Direct effect	-0.44*	-2.10	
Indirect effect	-0.08*	-2.27	15.52
Number of close friends			1.41
Contact frequency			10.27
Proportion of friends			1.04
Friend support			-0.13
Friend strain			2.94
7. Foreign-born Latinas			
Total effect	-0.52	-2.90	
Direct effect	-0.53	-2.99	
Indirect effect	-0.02	0.45	

Note: Estimated are derived from full model with all focal relationship variables adjusting for age, marital status, education, income, wealth, chronic diseases, depressive symptoms, and year of survey.

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

## APPENDIX D: CHAPTER 2 FIGURE

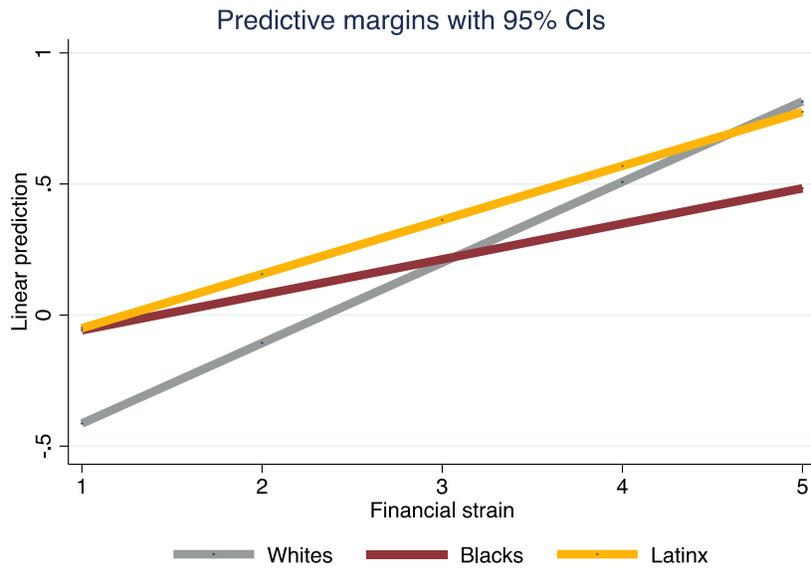


Figure 2-1. Predicted number of depressive symptoms by race/ethnicity and financial strain

Note: The predicted number of depressive symptoms was calculated from a negative binomial regression model at the means of covariates. The interaction between financial strain and Black older adults was significant at the 5 percent level and at the 10 percent level for Latinx older adults.

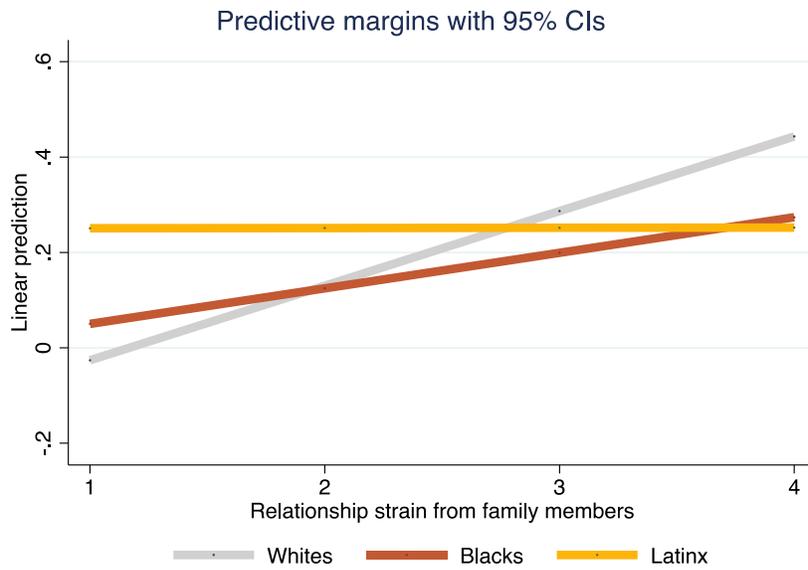


Figure 2-2. Predicted number of depressive symptoms by race/ethnicity and family members  
 Note: The predicted number of depressive symptoms was calculated from a negative binomial regression model at the means of covariates. The interaction between financial strain and Blacks was significant at the 5 percent level and at the 10 percent level for Latinx older adults

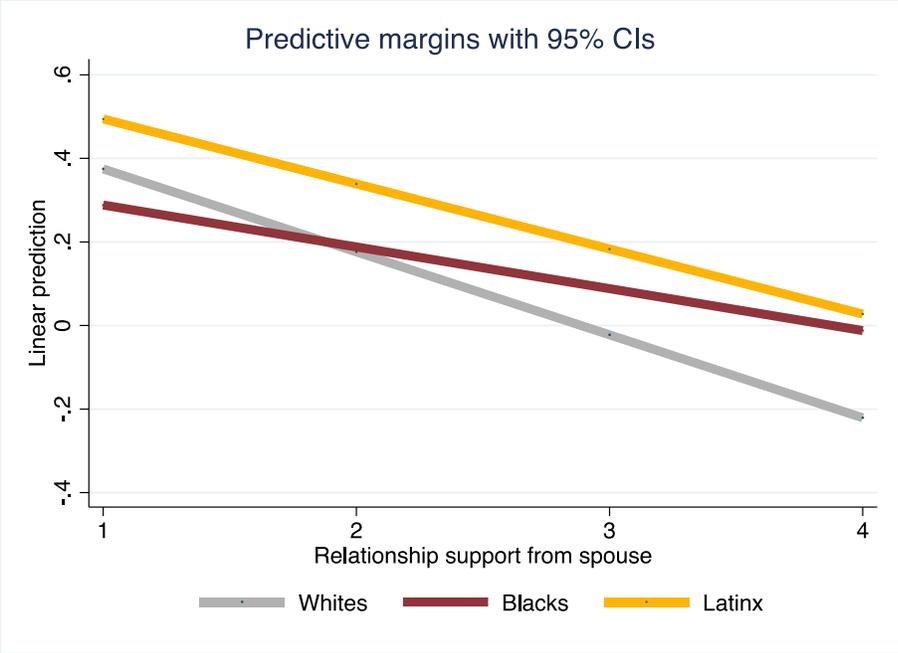


Figure 2-3. Predicted number of depressive symptoms by race/ethnicity and relationship support from spouse, and support from children

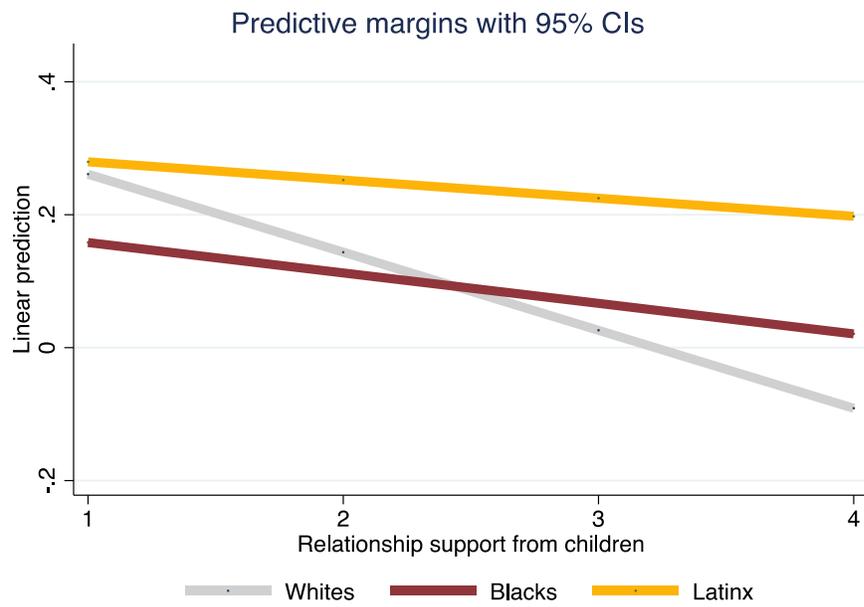


Figure 2-4. Predicted number of depressive symptoms by race/ethnicity and relationship support from children.

**APPENDIX E: CHAPTER 3 FIGURE**

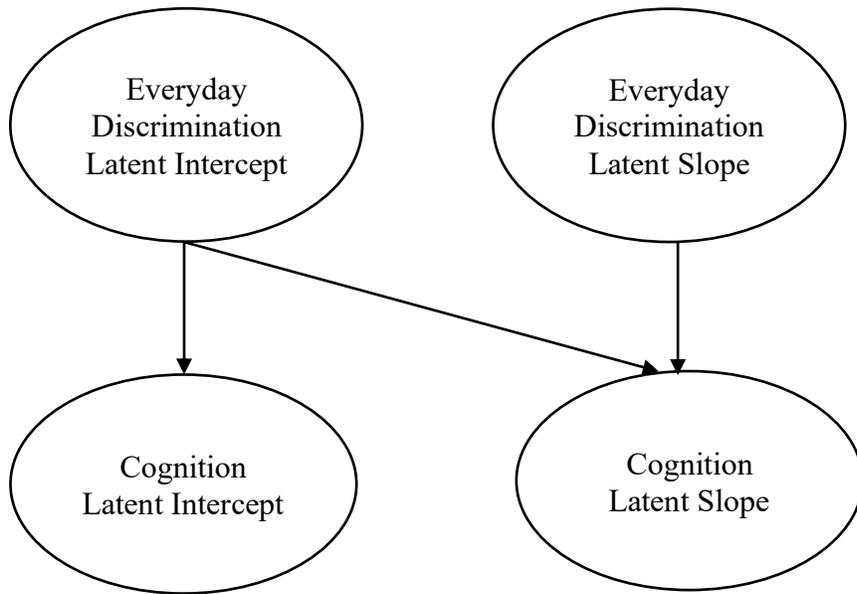


Figure 3-5. Graphical Depiction of a General Latent Growth Curve Model