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# Interactive Effects of Chronic Health Conditions And Financial Hardship On Episodic Memory Among Older Blacks: Findings From The Health And Retirement Study

DeAnnah R. Byrd 

*Wayne State University*

Ernest Gonzales

*New York University*

Danielle L. Beatty Moody

*University of Maryland*

Gillian L. Marshall

*University of Washington*

Laura B. Zahodne

*University of Michigan*

Roland J. Thorpe Jr.

*Johns Hopkins Bloomberg School of Public Health*

Keith E. Whitfield

*Wayne State University*

Previous research links chronic health conditions and financial hardship to cognitive outcomes among older Blacks. However, few studies have explored the moderating effect of financial hardship on chronic disease burden and specific cognitive domains. This study examined whether financial hardship (as measured by difficulty paying monthly bills) modifies the impact of self-reported chronic health conditions (e.g., diabetes, stroke) on episodic memory among 871 older Blacks (50+ years) in the 2006 Health and Retirement Study . Financial hardship modified the association between chronic disease burden and episodic memory performance such that individuals who reported very little difficulty paying their monthly bills had significantly lower memory scores at high levels of disease burden compared to those reporting high financial difficulty after

controlling for age, gender and education ( $F_{2, 49} = 5.03, p = .010$ ). This cross-sectional study suggests that both financial and physical wellbeing may have joint effects on cognitive health in older Blacks.

## INTRODUCTION

Declines in cognitive functioning among older adults is a national and worldwide epidemic (Langa et al., 2017; World Health Organization, 2017). A person in the United States develops Alzheimer's disease every 65 seconds (Alzheimer's Association, 2018) and it is estimated that over 100 million people worldwide will be affected by dementia in 2050 (Alzheimer's Disease International, 2008). Total monetary costs of dementia in 2010 was between 157 USD and 215 USD billion (Hurd, 2013) and growing. Behavioral and environmental factors strongly influence secondary aging and may help to delay the onset and severity of cognitive impairment (Forrester et al., 2019; Livingston et al., 2017). This investigation maps onto the National Institute on Aging's Disparities Framework (National Institute on Aging [NIA], n.d.) and advances a national priority to investigate behavioral risk factors that shape cognitive functioning in later life among Blacks in the United States. Although Blacks are twice as likely to develop Alzheimer's disease and cognitive impairments when compared to their White counterparts (Alzheimer's Association, n.d.), there is a dearth of information and understanding about the way in which chronic health conditions and economic circumstances are associated with cognitive functioning among older Blacks in the United States.

### Chronic Health Conditions and Cognition

Chronic health conditions are associated with worse global cognition, immediate and delayed recall, as well as working memory (Koyanagi et al., 2018; Vassilaki et al., 2015; Wei et al., 2019). Others have found the greater the number of self-reported health conditions, the greater the cognitive or mobility difficulties in older Blacks (Aiken Morgan et al., 2010; Byrd et al., 2019; Carmasin et al., 2014; Mak et al., 2006; Thorpe et al., 2011). Frisoni et al., (2000)'s cross-sectional study of older adults (75–95 year-olds) reported a dose-response association of chronic health conditions with mild cognitive impairment (MCI); whereby, a higher number of chronic health conditions leads to a heightened risk of MCI. In another study, Mak et al. (2006) found an association between diabetes and hypertension on cognitive functioning in a Black-Caribbean population. They also found that the association of both diseases (diabetes and hypertension) created greater risk for poor cognitive functioning above and beyond either alone. A common finding across these studies is a dosage response: greater disease burden is associated with worse cognitive functioning. Moreover, older adults often suffer from comorbidity, or several chronic conditions, simultaneously (Verbrugge et al., 1989), thus investigating the association of multiple chronic health conditions with cognitive functioning is important.

## Financial Hardship and Cognition

Moreover, the research describing and explaining the association between financial hardship and cognitive functioning is nascent. Yet there is a large and consistent body of research evidencing financial hardship is stressful (Kahn & Pearlin, 2006, Thorpe et al., 2018), often placing a substantial burden to secure the most basic needs of life (Wilkinson, 2016). Financial hardship is associated with depressive symptomology and anxiety (Angel et al., 2003), self-rated health (Marshall & Tucker-Seeley, 2018), pain (Marshall et al., 2018), obesity (Marshall et al., 2019), as well as an increased risk of premature mortality (Tucker-Seeley et al., 2009). Furthermore, financial hardship often co-occurs and is associated with chronic health conditions (Asebedo & Wilmart, 2017; Kahn & Pearlin, 2006; Szanton et al., 2010). Szanton, Thorpe and Whitfield's 2010 study revealed that life-course financial strain (measured both in childhood and adulthood) is significantly associated with physical disability, cognition, and depression. Using data from the U.S. Carolina African American Twin Study of Aging, they found that financial strain in childhood, but not in adulthood was associated with worse cognitive functioning in later life. Given that financial hardship in later life is also prevalent and disproportionately affects older Blacks, it is important to examine the impact of economic circumstances on cognition.

## Theoretical Foundations

Cumulative dis/advantage theory by Dannefer (2003) and the Pearlin Stress Process Model (Pearlin, 1981) are two theories often used to frame the discussion around the influence of stress on health outcomes. While cumulative dis/advantage research often takes a life-course approach (e.g., the association between financial hardship in childhood and cognitive health outcomes in later life, see Szanton et al., 2010), in this study, we examine the accumulation or "pile-up" of disadvantages at a particular life stage, i.e., multimorbidity and financial hardship in later life on episodic memory (Kahn & Pearlin, 2006). We focus on episodic memory because it is an early hallmark to dementia and Alzheimer's disease and because it is essential to maintaining a sense of identity, connections with others and society. It has been found that chronic health conditions could have subclinical and deleterious effects on brain pathology prior to the development of mild cognitive impairments (Vassilaki et al., 2015). For instance, hypertension, hyperlipidemia, arthritis and cardiac diseases represent a "multisystem of dysregulation" (Wei et al., 2019, p. 5) that may underlie the etiologic mechanisms to cognitive impairment. Chains of risk are initiated in the context of multimorbidity and financial strain such as the co-occurrence of hypertension and arthritis combined with limited financial resources reduces the frequency of physical exercise and increases the risk of obesity, all of which have been shown to be associated with cognitive impairment (Vassilaki et al., 2015). Thus, there is an interconnectedness between health and economic well-being (Carolan et al., 2018; Gonzales et al., 2019). Drawing from the neo-material perspective within cumulative disadvantage theory, it is possible that there is also a direct effect of financial strain and poor mental health outcomes (Link & Phelan, 1996; Phelan, et al., 2004; Szanton et al., 2010). Stress due to financial strain may lead to an increased stress-system action that in turn leads to worse health outcomes (McEwen, 1998; Szanton, et al., 2005) and poorer cognitive functioning in particular (Forrester et al., 2019).

## Present Study

We begin this line of scientific inquiry, acknowledging a lack of empirical and theoretical investigation on the unique and joint effects of chronic health conditions and financial hardship on cognitive health among a representative sample of older Blacks in the United States. Because episodic memory is highly sensitive to age-related cognitive declines (Daselaar & Cabeza, 2013) and is a strong predictor of early dementia, analyses focus on this cognitive domain (Bäckman et al., 2001; Boraxbekk et al., 2015). Using a stress process and cumulative dis/advantage lens, the purpose of this paper is to explore associations between chronic health conditions, financial hardship and episodic memory. Informed by the stress process model, we expect that chronic health conditions and financial strain are independently associated with compromised cognitive functioning. The cumulative disadvantage lens extends this investigation by hypothesizing there will be a compounded burden of chronic health conditions and financial strain. We thus test an interaction effect to explore this heterogeneity of stress and burden of health and economics on cognitive functioning. We hypothesize that financial hardship will moderate the relationship between chronic health conditions and episodic memory.

## METHODS

### Participants

The HRS is a nationally representative longitudinal survey of non-institutionalized adults aged 51 and older. The HRS was designed to provide data (at both the individual and population levels) on the changing health and economic circumstances associated with aging (Sonnega et al., 2014). Broadly it covers four topic areas, including income and wealth; health, cognition and the use of healthcare services; work and retirement; and family connections (Sonnega et al., 2014). Using a multistage area probability design, the HRS selected a sample of US households and oversamples for Blacks, Hispanics, and residents of the state of Florida (Heeringa & Connor, 1995). Household respondents included age-eligible (those over age 50) individuals and their spouses of any age. The HRS began in 1992 and participants are re-interviewed every 2 years, e.g., 1994, 1996, etc (Chen & Botticello, 2013). Since 2006 data collection has expanded to include much greater depth in psychological and social contexts. This blend of economic, health and psychosocial information provides unprecedented potential to study increasingly complex questions about aging, health and retirement (Sonnega et al., 2014). This study is based on data from the 2006 in-person interview when psychosocial functioning was fully assessed for the first time using a leave-behind questionnaire. A total of 934 Blacks (50+ years) completed the 2006 interview, yielding the sample for the present study. The weighted analytic sample included 871 respondents who were not missing on any of the demographic, financial difficulty, chronic conditions or episodic memory measures. Due to the complex sample survey design for the HRS (using the multistage national probability sampling and intentional oversamples of Blacks, Hispanics, and Florida residents), we applied the 2006 respondent-level leave-behind sample weight to the analyses since all participants do not complete the psychosocial leave-behind questionnaire at each wave. Sample weights are

valid for age-eligible community dwelling (non-institutionalized) participants and compensate for the unequal probabilities of selection (Fisher & Ryan, 2017) and adjust for non-response.

## Primary Measures

### *Episodic Memory*

Episodic memory was assessed with a word list learning task (Ofstedal et al., 2005), administered in person or over the phone. Participants hear a list of 10 words and are asked to recall the words immediately and again following a 5-minute delay. Immediate and delayed recall scores were standardized by the mean and standard deviation of the 2006 score. To improve reliability, composite scores were then created by averaging the two standardized scores from 2006, as done by other studies (e.g., Zaheed et al., 2019).

### *Chronic Health Conditions*

A count of chronic conditions was created by summing participants' self-report of whether they had (yes/no response) any of the following conditions: high blood pressure/hypertension, diabetes, lung disease, heart disease, stroke, arthritis. We examined these conditions as they represent a "multisystem of dysregulation" (Wei et al., 2019, p. 5) that may influence the etiological pathway to declines in cognitive functioning. The goal of this study was to better understand whether multimorbidity in terms of reporting more than one health condition is associated with episodic memory. Thus, all six conditions were summed to create a variable representing the total number of health conditions, which was then categorized as having none (0; used as the reference group in all multivariate analyses), one condition (1), or two or more conditions (2). This approach provided greater variability in examining health status and/or disease burden among Blacks. Rather than using a binary scale of individual health conditions i.e., two or more health conditions versus those with one or none as done by other studies (Byrd et al., 2019; Carmasin et al., 2014; Thorpe et al., 2011).

### *Financial Hardship*

Financial hardship was assessed by a single question asking respondents "How difficult is it for (you/your family) to meet monthly payments on (your/your family's) bills?" Responses ranged from 1 = *not at all* to 5 = *completely difficult*. Due to the small number of participants reporting *very difficult* or *completely difficult*, this category was combined and the scale was recoded as 0 = *not at all* to 3 = *very/completely difficult*. Higher scores indicated greater financial hardship. Other studies have used this measure to examine the effects of material hardship among older adults in the HRS (Levy, 2015).

### *Control Variables*

Control variables included age, gender, and years of education. Age, gender, and education were included as potential confounders based on consistent evidence that they are strong predictors of verbal episodic memory performance (Van Hooren et al., 2007). Age was

measured in years and treated as continuous. Gender was dichotomized with female as the reference category. Years of education were measured by the highest grade attained and treated as categorical with less than high school serving as the reference group.

### *Statistical Analyses*

Descriptive statistics were calculated to examine the 2006 sample characteristics of respondents. Ordinary least squares (OLS) regression models tested independent associations between chronic health conditions, financial hardship and episodic memory, controlling for sociodemographic characteristics. An interaction term tested whether financial hardship (as measured by difficulty paying monthly bills) modifies the impact of self-reported chronic health conditions on episodic memory. Financial hardship was mean centered prior to the creation of the interaction term. To facilitate interpretation of our OLS estimates, we generated empirical change plots to display the predicted memory slopes in the data by each category of financial hardship for significant interaction terms. All  $p$ -values  $< .05$  were considered statistically significant. Analyses were conducted using STATA, version 15, software (StataCorp, 2017).

## RESULTS

### Sample Characteristics

Table 1 shows the demographic characteristics for the 2006 cross-sectional HRS sample. The average age of participants was 65.74 (SD = 0.42). The majority of the sample was female (39.34% male) and had higher than a high school education (64.11%). More than half of the sample reported some level of difficulty (i.e., somewhat and very/completely difficult) paying their monthly bills (51.22%) and at least one chronic health condition (54.71%).

### OLS Regression

The main effects of financial hardship and chronic health conditions on episodic memory is shown in Table 2 (see Model 1). Age was negatively associated with episodic memory ( $b = -0.03$ ,  $p < .000$ ), while education was positively associated with cognitive functioning. Gender was not significantly related to episodic memory ( $b = 0.10$ ,  $p = .151$ ). Neither difficulty paying monthly bills nor disease burden were significant predictors of cognitive health. The association between chronic health conditions and episodic memory as moderated by financial hardship is displayed in Table 2, Model 2. This model shows that interaction term between chronic health conditions and one's level of financial hardship on episodic memory is significant ( $F_{2, 49} = 5.03$ ,  $p = .010$ ). Figure 1 plots the estimated effects of the number of chronic conditions on episodic memory scores by level of financial hardship. Specifically, it plots the adjusted OLS derived estimates of the post-estimation contrasts of group differences and their 95% confidence intervals. This figure helps to quantify the significant differences in episodic memory slopes by level of financial hardship; whereby, individuals reporting very little difficulty paying their monthly bills (i.e., those financially stable) had significantly higher memory scores at low levels of disease burden (i.e., no chronic conditions)

TABLE 1  
Sample characteristics of blacks (50+ Years).  
2006 health and retirement study (N = 934)

<i>Characteristics</i>	<i>%</i>
Mean Age, years (SD)	65.74(0.424)
Female	60.66
<b>Education</b>	
Less than High School	35.89
GED	5.85
High School Diploma	26.06
Some College	21.78
College Graduate & Above	10.41
<b>Difficulty Making Payments</b>	
Not at All	18.79
Not Very	24.88
Somewhat	36.4
Very/Completely	14.82
<b>Chronic Conditions</b>	
No Conditions	13.81
1 Condition	54.71
2 or More Conditions	31.49

SD = standard deviation.

TABLE 2  
OLS regression analyses predicting episodic memory, 2006 HRS, weighted (N = 871)

	<i>Model 1</i>	<i>Model 2</i>
	<i>b(se)</i>	<i>b(se)</i>
Age (years)	-0.028***(0.003)	-0.028***(0.003)
Female	0.090(0.062)	0.079(0.059)
<b>Education<sup>a</sup></b>		
GED	-0.099(0.193)	-0.103 (0.184)
High School Diploma	0.309***(0.080)	0.327***(0.083)
Some College	0.586***(0.090)	0.585***(0.088)
College Graduate & Above	0.673***(0.097)	0.682***(0.091)
Difficulty Making Payments	-0.035(0.038)	-0.256*(0.097)
<b>Chronic Conditions<sup>b</sup></b>		
1 Condition	-0.021(0.108)	-0.059(0.098)
2 or More Conditions	0.026(0.105)	-0.158(0.103)
<b>Chronic Conditions x Difficulty Making Payments Interaction</b>		
1 Condition x Payment Difficulty		0.186(0.096)
2 or More Conditions x Payment Difficulty		0.362***(0.118)
Constant	1.180***(0.256)	1.255***(0.221)

*b* = unstandardized coefficient; *se* = standard error.

<sup>a</sup>Reference group = Less than High School.

<sup>b</sup>Reference group = No Health Conditions.

\**p* < 0.05; \*\* *p* < 0.01; \*\*\* *p* < 0.001.

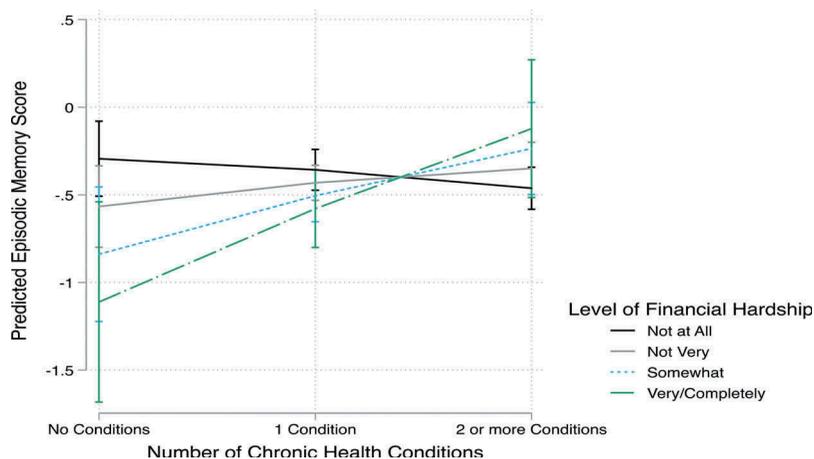


FIGURE 1 The cross-sectional relationship between the number of chronic conditions and episodic memory as moderated by financial hardship among blacks (50+ years). 2006 health and retirement study, weighted (N = 871). Adjusted for age, gender, and years of education.

compared to those reporting high financial difficulty, adjusting for age, gender, and education. In other words, this figure shows that disease burden may have the most pronounced negative effect on memory in those with no financial difficulty since individuals who are the most financially stable have significantly lower memory scores at high levels of disease burden (i.e., 2 or more chronic conditions) compared to those reporting high financial difficulty in paying their monthly bills (i.e., very/complete difficulty). Findings from the main effects model do not support our first hypothesis that both chronic health conditions and financial strain would be independently associated with compromised cognitive functioning. Findings from the moderation model support our second hypothesis that financial hardship would interact with chronic disease burden to predict episodic memory. Contrary to our specific predictions, those who exhibited the worst episodic memory were those with the greatest financial hardship and the lowest chronic disease burden. Rather than those with the greatest financial hardship and the greatest chronic disease burden.

## DISCUSSION

The present study examined whether subjective perceptions of financial hardship (as measured by difficulty paying monthly bills) modify the impact of self-reported chronic health conditions (e.g., diabetes, stroke) on episodic memory scores among older Blacks. Control variables functioned in the expected directions with age negatively associated with episodic memory, whereas education was positively associated with cognitive functioning. Importantly, our findings suggest that high disease burden influences memory more strongly in the financially well off (those reporting no difficulty paying their monthly bills) compared to those with less financial stability (individuals reporting very high difficulty). In other words, disease burden may have the most pronounced negative effect on memory in those with no financial difficulty.

These findings suggest that both financial and physical wellbeing may have joint effects on cognitive health in older Blacks.

The findings support previous literature in that multimorbidity and financial stress are associated with worse cognitive functioning (Vassilaki et al., 2015; Wei et al., 2019). For instance, Byrd et al. (2019) and Carmasin et al. (2014) demonstrated that greater chronic health burden is associated with poorer cognitive functioning and greater cognitive decline in older Blacks. The current findings also extend the prior literature in at least two key ways. First, earlier work usually considered the independent associations of chronic health conditions and financial hardship to cognitive functioning, wherein in the former approach, indicators of socioeconomic well-being were treated as control variables. Here, we examined individual self-reports of ease of paying bills, after adjusting for years of education, a traditional SES indicator. This approach provides some insight into the contribution of financial strain or ease in the context of cognitive functioning. Financial hardship is closely correlated to, but distinct from traditional SES measures (e.g., education, income) and therefore, warrants unique attention (Braveman et al., 2005). Second, individuals across the SES strata can and do experience financial hardship with resultant health effects. Indeed, among older adults paying bills and affording needed resources and material goods may present financial strain that is not captured by the assessment of their SES alone. Nor does traditional measures of SES capture having enough money or receiving assistance in paying bills. Thus, future work should consider multiple measures of financial strain. In this regard, the current work advanced our understanding of whether and how particular aspects of financial strain and hardship may modify the link between chronic health and cognitive functioning. This is a critical and understudied linkage that we have observed among Blacks given their higher burden of chronic health conditions, greater exposure to financial adversity across the life course, and earlier onset and more pronounced burden of poorer cognitive functioning.

### Other Theoretical Considerations – Diminishing Returns

At the same time we observed adverse associations between chronic health conditions and cognitive functioning among Blacks who do not experience financial hardship. This finding points to two possibilities. The first comes in the form of diminishing returns. The diminishing returns hypothesis has been referred to as a “systematically smaller health gain from economic resources and psychological assets for Blacks in comparison to Whites” (Assari, 2018, p. 1). Indeed, these concepts can also be at play within Blacks as research has demonstrated a similar pattern of diminished returns among Blacks with greater means and access not realizing better health (Farmer & Ferraro, 2005). Although there is strong evidence of a dose-response association between various markers of upward social status and health (Adler et al., 1994), the evidence is not uniform across specific racial groups in the U.S. (Nuru-Jeter et al., 2018). To the contrary, for Blacks there is evidence that more upward or more affluent status may promote or allow for greater exposure to adversity (e.g., Borrell et al., 2013; Brown, 2001; Kwate & Goodman, 2015; Paradies, 2006). In this regard, while some Blacks may experience less financial hardship in their ability to pay for goods, materials, and resources, it may also produce other opportunities for exposure to adverse experiences which are incongruent with their expectations (e.g., discrimination) or the societally held norms of treatment for this group. Related to the diminishing returns phenomenon is the importance of acknowledging the

subjective and relative perception of financial hardship (Asebedo & Wilmart, 2017). Asebedo and Wilmart (2017) note that “financial strain is a neutral event” (p. 62) until the individual is able to process the symbolic and functional components of the socioeconomic status relative to their social milieu and expected social standing. Individuals with wealth and other economic resources might not have a problem paying monthly bills, but perceive their chronic health conditions as more stressful than their counterparts. Perhaps the diminishing returns and subjective nature of financial hardship may explain why Blacks who are not facing financial hardship are performing more poorly cognitively in the context of multimorbidity than those with extreme financial hardship.

### Study Implications

The current findings demonstrate that for older Blacks, achieving ease or comfort with regard to their finances, is not protective of a key health outcome in older adulthood, cognitive functioning, across the continuum of chronic disease burden. In this regard, there are at least two key implications of the current findings. First, while extant literature on socioeconomic factors has well documented the additive burden of SES indicators such as education, income, and poverty on health outcomes overall, and cognitive outcomes specifically (Jean et al., 2018; Walsemann & Ailshire, 2020; Wright et al., 2019; Zahodne et al., 2017a), financial hardship may be of particular import to examine explicitly. Growing health inequities research on Blacks in the U.S., has been attentive to the intermingling of race and class, highlighting a complex linkage of these factors in relation to the overall disparate health profile of this group (e.g., Kawachi et al., 2005). Yet, the broader thesis has been that lower SES or more limited SES-related means and resources adversely impact their health in a linear fashion, similar to the pattern observed for the overall U.S. population and beyond (Adler et al., 1994; Braveman et al., 2005). However, this position does not adequately consider the sociohistorical context of race for Blacks in the U.S. Indeed, the emerging understanding is that greater SES and SES-related means and resources may actually expose Blacks to greater adversity and social strain across a variety of contexts they traverse in everyday life (Borrell et al., 2013; Brown, 2001; Kwate & Goodman, 2015; Paradies, 2006). This oversight, which is a central focus of the current work, is quite critical to elucidating the established, poorer cognitive outcomes in Blacks and their noted trajectory toward clinical cognitive endpoints as compared to other racial and ethnic groups in the U.S. (Mayeda et al., 2016). Altogether this work illustrates that the chains of risk (Kuh et al., 2003), which can be initiated in the interactive context of multimorbidity and financial strain to adversely impact key health endpoints (e.g., cognitive functioning), is a relevant framework for examining and interpreting these linkages and understanding nuanced associations in this group.

A second implication of the current work is the findings raise the question; *why* greater financial means and resources are not protective for older Blacks? In this regard, prior work has demonstrated that psychosocial factors such as discrimination, depressive symptoms, and external locus of control may exert significant, negative effects on cognitive functioning and memory declines in older Blacks (Ownby et al., 2006; Shankar & Hinds, 2017; Zahodne et al., 2017b). Perhaps the current work, in the context of these prior studies warrants further fine grain examination of key psychosocial factors as potential pathways or effect modifiers to more fully understand the experiences and perceptions of older Blacks (e.g., see Gallo & Matthews,

2003; Matthews et al., 2010). For instance, it is plausible that past or current experiences with discrimination in the medical setting may influence their seeking of healthcare services (Hagiwara et al., 2016), despite having the financial means to more easily access them. This could contribute to a larger disease burden vis a vis more limited engagement of needed medical services or perhaps a lack of trust in medical guidance they receive (e.g., see Burgess et al., 2008; Penner et al., 2018). In sum, the within-race approach employed in this study allowed elucidation of these nuanced associations - between financial hardship (a SES-related factor), multi-morbidity, and cognitive functioning - that may be particularly unique to the Black experience in the U.S. and perhaps obscured through use of between-race comparisons (Whitfield et al., 2008).

Issues related to selection may also have influenced the current pattern of results. Specifically, it is possible that chronic health conditions are more likely to lead to study refusal, attrition, death, or inability to complete the cognitive battery among individuals with high financial hardship. Prior analyses in the HRS have documented lower retention rates for individuals with chronic diseases (particularly cancer, stroke and diabetes) due to mortality, as well as for individuals with lower wealth due to attrition (Banks et al., 2011). As summarized in the introduction, both chronic diseases and financial hardship have also been linked to lower cognitive functioning. Finally, memory measures in the HRS are not administered if participants are too cognitively impaired to complete the interview (Ofstedal et al., 2005). If participants with the most chronic health conditions and the most financial hardship were least likely to be represented in the current analytic sample but the most likely to have memory impairments, then episodic memory scores in that group may have been overestimated. Indeed, attrition associated with cognitive impairment is repeatedly identified as a source of potential bias in longitudinal studies of aging (Chatfield et al., 2005).

### Limitations and Future Directions

Limitations of this study include its cross-sectional design, which precludes an examination of the direction of associations among the variables of interest: chronic disease burden, financial hardship, and episodic memory. It is possible that episodic memory ability influences physical health and/or financial status. An important future direction of this work is to incorporate longitudinal measures of each variable of interest in order to clarify the direction of effects. Another limitation relates to the self-report nature of the chronic disease variables. Participants may not accurately report on their chronic health conditions, which may be related to their cognitive abilities. In addition, participants suffering from health problems may not have received formal diagnoses. We also relied on a single measure of subjective financial hardship, which is both a strength as well as a weakness. Future research can incorporate other components of subjective perceptions of financial strain and hardship, as well as incorporate other objective indices. Cumulative Disadvantage and the Stress Process models clearly point to other stressors that might co-occur and proliferate from financial hardship. We kept the focus on financial hardship and multi-morbidity to carefully consider how each, as well as the combined effects, influence cognitive functioning. Future empirical studies can test other aspects of these models. Finally, data on medical treatments and adherence rates were not available. These variables may differ as a function of financial status and could moderate the impact of chronic diseases on cognitive health. Another future direction is to incorporate data on access to care and care utilization in order

to better understand the links between physical health, financial status, and cognitive abilities. Strengths of this study include the relatively large national sample of non-Hispanic Blacks, the use of objective measures of episodic memory ability, and the use of a high-quality financial hardship covariate available in the HRS. These features of the study allowed us to document the unique importance of financial difficulty for older Blacks, which is in an understudied population at relatively high risk of physical and cognitive impairments limitations.

## Conclusions

In conclusion, the present study adds to our understanding of cognitive aging among older Black Americans. Results support previous research pointing to an association between multimorbidity and financial stress and worse cognitive functioning (Vassilaki et al., 2015; Wei et al., 2019) but also extends the literature by suggesting an interactive effect. Specifically, multimorbidity was more strongly associated with worse episodic memory functioning in older Blacks with less financial hardship, which appeared to be driven by the relatively low cognitive functioning among those with the greatest financial hardship. This pattern of results suggest that financial hardship may be just as consequential for cognitive aging as chronic diseases for older Blacks.

## DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

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## ORCID

DeAnnah R. Byrd  <http://orcid.org/0000-0003-4384-6842>

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