
Original Article

Disentangling the Stress Process: Race/Ethnic Differences in the Exposure and Appraisal of Chronic Stressors Among Older Adults

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Abstract

Objectives: Exposure to stressors is differentially distributed by race/ethnicity with minority groups reporting a higher stress burden than their white counterparts. However, to really understand the extent to which some groups bear a disproportionate stress burden, we need to consider race/ethnic differences in stress appraisal, specifically how upsetting stressors may be, in addition to stress exposure. We examine racial/ethnic differences in both the number of reported chronic stressors across five domains (health, financial, residential, relationship, and caregiving) and their appraised stressfulness among a diverse sample of older adults.

Method: Data come from 6,567 adults ages 52+ from the 2006 Health and Retirement Study.

Results: Results show older blacks, U.S. and foreign-born Hispanics report more chronic stress exposure than whites and are two to three times as likely to experience financial strain and housing-related stress. Socioeconomic factors fully explain the Hispanic–white difference in stress exposure, but black–white differences remain. Despite experiencing a greater number of stressors, blacks and U.S.-born Hispanics are less likely to be upset by exposure to stressors than whites. U.S.-born Hispanics are less upset by relationship-based stressors specifically, while blacks are less upset across all stress domains in fully-adjusted models. Foreign-born Hispanics are only less upset by caregiving strain.

Discussion: The distinction between exposure and appraisal-based measures of stress may shed light on important pathways that differentially contribute to race/ethnic physical and mental health disparities.

Keywords: Coping, Diverse aging, Health and Retirement Study, Minority aging, Stress appraisal

Stress process frameworks (Pearlin, Menaghan, Lieberman, & Mullan, 1981) have positioned stress exposure as a foundational component in the manufacturing of social inequalities in health. Chronic stressors maintain a dominant theoretical role within these frameworks due to their ongoing and recurrent nature, which forces individuals to adapt over extended periods of time (Pearlin, 2010; Wheaton, Young, Montazer, & Stuart-Lahman, 2013). Despite this attention, an understanding of the complexity

of the chronic stress process is largely missing from the empirical stress literature. For example, stress is often measured using a count of acute or event-based stressors, and this approach to conceptualizing stress exposure overlooks three key features of the stress experience: (a) that stressors can be ongoing, with no foreseeable end; (b) the multiple life domains in which stressors can originate; and (c) whether a stressor is perceived as upsetting. Importantly, there is a lack of research examining how the stress experience, including

appraisal-based measures, differs according to social characteristics that shape exposure to stress.

A persistent quandary among stress researchers is that racial/ethnic minorities tend to report more exposure to stressors compared to whites, but don't exhibit the expected increase in psychological distress. Researchers have found seemingly paradoxical evidence showing lower rates of stress-related psychopathology, such as depressive and anxiety disorders, among blacks relative to non-Hispanic whites, despite large disparities in stress exposure in mid and late life (Mezuk et al., 2013). Similarly, researchers have noted a healthy immigrant effect despite greater exposure to multiple hardships and stressors among the foreign-born population. For instance, Hispanic immigrants have comparable or even better mental health than whites (Gallo, Penedo, Espinosa de los Monteros, Karla, & Arguelles, 2009). Although it may seem counterintuitive for groups experiencing more stressors to have similar, or better mental health, these patterns may reflect important differences between experiences of acute and chronic stressors and between exposure and appraisal that have yet to be fully examined in the stress disparities literature.

The objective of the current study is to examine race/ethnic differences in stress burden using a framework that integrates exposure to stressors that are chronic in nature with appraisals of how upsetting these stressors are perceived to be. Additionally, this study focuses both on total stress exposure and domain-specific stressors. This is the first study to examine race/ethnic differences in stress among older adults that characterizes chronic stress in terms of both exposure and appraisal and across multiple life domains in which stress can be experienced.

Background

Stress process models (Brown & Harris, 1978; Kessler, 1979b; Pearlin et al., 1981) have sought to consider the extent to which exposure to life strains are unequally distributed in the population, offering a major pathway linking race/ethnicity to health disparities. Accordingly, the differential exposure hypothesis posits that racial and ethnic minorities, and blacks in particular, have worse health due to greater stress exposure (Brown & Harris, 1978; Kessler, 1979a). Similarly, the stress process model suggests social and economic stratification results in varying exposure to stressors, which explain population differences in health (Pearlin, 1989). Race and ethnicity, in this context, are classifications that reflect a set of experiences and stress exposures within social and physical environments (Williams, Spencer, & Jackson, 1999; Williams, Yan, Jackson, & Anderson, 1997). Empirical research rooted in these models demonstrates that the degree to which individuals are exposed to a set of objective life stressors is patterned by their race/ethnicity (Sterthal, Slopen, & Williams, 2011; Thoits, 2010; Turner & Avison, 2003). Race/ethnic differences in stress exposure have been linked to structural

and societal inequities including segregation, unequal levels of education, employment, wealth, and incarceration. In turn, these race/ethnic differences in stress exposure explain, in part, race/ethnic differences in health (Hatch & Dohrenwend, 2007; Sterthal et al., 2011).

Despite the foundational importance of empirical evidence establishing race/ethnic patterns in stress exposure (Sterthal et al., 2011; Thoits, 2010; Turner & Avison, 2003), there remain important methodological deficiencies in the measurement of stress in nationally representative samples. First, stress is often conceptualized in these studies as acute stressors or checklists of negative life events like job loss or divorce. However, many acute stressful life events ultimately develop into chronic strains that can be distressing (Avison & Turner, 1988). Thus, the conceptualization of stress as a count of acute or event-based experiences may provide an incomplete picture of the spectrum of stress exposures that contribute to total stress burden. Wheaton (1994) argued for the expansion of the "stress universe" to include chronic stressors, traumatic events, and a host of stressors that went far beyond acute or stressful life events. The Stress Domain Hypothesis (Turner, Wheaton, & Lloyd, 1995) suggested it was essential to distinguish acute or life events from chronic strains, focusing on the elaboration of types and sources of stress to more fully specify the stress universe and better approximate total burden. Turner, Wheaton, and Lloyd (1995) demonstrated unequivocally that consideration of the stress universe was required to accurately understand differential exposure to stressors, particularly for understanding race/ethnic differences in stress exposure. Despite these calls for an expanded conceptualization of the total stress burden, we still lack empirical studies of the total stress burden that incorporate chronic stressors, particularly in research of racially/ethnically diverse older U.S. adults.

Chronic stressors are ongoing strains, often characterizing the greater social environment, that are persistent and enduring in nature and, over time, can exceed an individual's psychological and physiological capacity to maintain normal functioning (Herbert & Cohen, 1993; Lepore, 1995; Pearlin, 2010). Chronic stressors tend to surface within major social domains such as financial stability, employment, and family, all of which are of vital importance to both the larger society and individuals (Pearlin, Schieman, Fazio, & Meersman, 2005). Critical and chronically stressful life domains, like financial and housing instability, that cannot be easily remedied, particularly in old age, may provide opportunities for intervention, outreach, and social supports. Understanding the race/ethnic patterning of chronic stress across these major life domains in older adults may be central to prevention and mediation efforts since chronic stress burdens are likely charting how life course trajectories and health of minority groups come to differ in old age (Pearlin, 2010).

An additional methodical limitation in much of the empirical work examining race/ethnic differences in stress is that most stress measures in nationally representative

surveys only focus on objectively verifiable exposures and life situations such as the death of a spouse or living in poverty, and overlook the appraisal processes through which stressors operate to impact more distal outcomes (Lazarus & Folkman, 1984; Park & Folkman, 1997; Pearlin, 1989; Thoits, 1995). These studies rely on the assumption that standardized lists of stressors are perceived similarly by individuals or members of different groups. However, all major conceptualizations of the stress process acknowledge that responses to stressors depend on their meanings to the person which is importantly linked to that individual's personal and social history (Cohen, Kamarck, & Mermelstein, 1983; Lewis, Diamond, & Forman, 2015; Williams, Mohammed, Leavell, & Collins, 2010). Individuals do not experience stress in a vacuum but rather in the context of different personal and environmental resources that shape the stressfulness of a life experience. For example, the emotional effects of ongoing caregiving strain will undoubtedly differ depending on the availability of financial resources to cope with the responsibilities, the ability to take time off work to care for that person, and the meaning of caregiving for that individual. Additional evidence from the caregiving literature suggests there is racial/ethnic variation in perceptions of caregiving as a stressor. African Americans have been shown to view caregiving as less burdensome than their white counterparts, largely due to differences in culture including familial expectations and active coping styles that confer attitudes of resilience (Roth, Dilworth-Anderson, Huang, Gross, & Gitlin, 2015). Consequently, attributions related to the stress exposure should be distinguished from those relevant to the individual's perceptions of stress since stress exposure may not manifest uniformly across groups (Amirkhan, 1994; Harrell, 2000).

Prior theoretical work in the sociological literature has attempted to incorporate concepts of group differences in the subjective experience of stress suggesting that minority status may be related to higher levels of stress appraisals since minority status is associated with a greater overall stress burden and fewer socioeconomic resources to buffer the negative consequences of stress (Brown & Harris, 1978; Kessler, 1979b). Individuals with the dual burden of socioeconomic disadvantage and race-related stressors may be at even greater risk of reporting a higher number of stress exposures, greater severity or hardship in the type of stressor, and heightened stress appraisal since they have limited access to material coping mechanisms (Myers, 2009). For example, two studies examining race differences in exposure and susceptibility to stressful life events found both greater exposure and perceived stress among low socioeconomic status (SES) non-whites (Kessler, 1979a; Ulbrich, Warheit, & Zimmerman, 1989). This work on race/ethnicity, stress exposure, and appraisal is limited, however, because it overlooks variation between U.S.-born and foreign-born Hispanics and blacks. Additionally, minority status, despite being related to experiences of prejudice, discrimination, greater stress exposure and lower SES, is also a source of psychosocial resources,

such as a collective racial identity (Sellers & Shelton, 2003) and larger and more supportive religious and social networks (Mouzon, 2017; Thoits, 1995), that can protect against the effects of these stressors (Kessler & Neighbors, 1986). Thus, racial/ethnic minorities may be more prone to stress exposure and have less access to resources related to SES, but have access to other psychosocial resources that leave them better able to manage both the emotional and physical consequences of adversity in later life relative to their white peers. Empirical stress research, however, has yet to fully investigate the race/ethnic patterning of appraisal into chronic stress measurement at the population level.

In light of this gap in the literature, the present study examines race/ethnic differences in both the number of reported chronic stressors and their appraisal in a diverse sample of older adults. We also examine the domains or types of chronic stressors that drive race/ethnic differences in both stress exposure and appraisal. Based on the differential stress exposure hypothesis, we expect racial and ethnic minorities, specifically black and both foreign and U.S.-born Hispanic older adults, will report experiencing more ongoing chronic stressors across all domains of chronic stress and will appraise these exposures as more stressful or upsetting than their white peers.

Methods

Data come from the nationally representative Health and Retirement Study (HRS), an ongoing biennial study of U.S. adults aged 51 years and older that began in 1992 with the aim of improving our understanding of the social, economic, environmental, and behavioral factors associated with aging and the health of older adults. In 2006, the HRS collected data on chronic stress using a self-administered questionnaire (SAQ) given to a random half-sample of noninstitutionalized respondents selected for a face-to-face interview. The SAQ had a 90% completion rate, leaving 7,167 cohorts eligible SAQ respondents (Smith et al., 2013). We excluded 137 respondents who did not identify as white, black, or Hispanic. Finally, 463 respondents (6.6%) were excluded who were missing on stress measures resulting in a final analytic sample of 6,567 adults with complete data on all measures assessed.

Ongoing Chronic Stress

We measure total chronic stress exposure (Aldwin, Sutton, Chiara, & Spiro, 1996; Troxel, Matthews, Bromberger, & Sutton-Tyrrell, 2003) using a count of the number of chronic stressors respondents reported experiencing (range: 0–7) during the last twelve months or longer. We include the following stressors based on respondents self-reports (yes/no): ongoing health problems (in yourself), physical or emotional problems (in spouse or child), problems with alcohol or drug use (in family member), financial strain, housing problems, problems in a close relationship, and helping at least on sick/limited/frail family member or friend on a regular basis. An

item about assessing ongoing problems in the workplace was excluded from our analysis since more than 60% of respondents are retired or out of the labor force.

We also created a stress appraisal scale by averaging across responses of how upsetting each of the seven stressors was among respondents who experienced at least one stressor (range: 1–3; $\alpha = 0.75$). Respondents who reported exposure to a chronic stressor could rate that stressor as 1 = *not upsetting*, 2 = *somewhat upsetting*, or 3 = *very upsetting*. Stress appraisal was dichotomized as somewhat or very upsetting versus not upsetting when examined by domain.

Sociodemographic Variables

Race/ethnicity was self-reported and respondents were classified as non-Hispanic white, non-Hispanic black, and Hispanic. We further differentiate between U.S.-born and foreign-born Hispanics as we expect stress experience may differ among Hispanics according to foreign-born status. We include sociodemographic and socioeconomic factors that might be related to race/ethnic differences in stress exposure and appraisal. Age is measured as a continuous variable in years. Gender was dichotomized as male or female. Educational attainment was measured using the number of years of completed schooling. Employment status was categorized as currently employed either full or part-time, unemployed/not in the labor force, and retired. Total household income is logged transformed and wealth (assets minus debts) is quartiled because these variables were highly

skewed. Marital status was categorized as married/partnered, divorced/separated, widowed, and never married.

Analytic Strategy

We first determined the prevalence of chronic stress exposure and corresponding negative stress appraisal in each of the five domains by race/ethnicity. Next, we used Poisson regression models to examine race/ethnic differences in total chronic stress exposure. We also examined race/ethnic differences in exposure across chronic stress domains using logistic models. We then examined race/ethnic differences in appraisal or how upsetting stress exposures are among those who reported experiencing any stress exposure. The stress appraisal scale was normally distributed so we used ordinary least squares (OLS) regression to estimate race/ethnic differences in appraisal. We also examined race/ethnic differences in appraisal across chronic stress domains using logistic regression. All analyses were weighted using the self-administered questionnaire sample weights, which adjust for differential probability of selection and response rates and produce estimates representative of the older U.S. population. We accounted for the complex sample design using the SVY suite of commands in Stata 14.

Results

Table 1 presents weighted demographic and socioeconomic characteristics for the full sample and by race/ethnicity. The

Table 1. Descriptive Statistics for the Full Sample and by Race/Ethnicity, Health and Retirement Study, 2006

	Full sample (<i>n</i> = 6,567)	Whites (<i>n</i> = 5,294)	Blacks (<i>n</i> = 809)	U.S.-born Hispanics (<i>n</i> = 228)	Foreign-born Hispanics (<i>n</i> = 236)
	%	%	%	%	%
Age in years (mean [SE])	65.3 (0.2)	65.6 (0.3)	63.8 (0.5)	62.1 (1.0)	63.8 (1.2)
Female	53.7	53.2	59.9	50.8	53.9
Education in years (mean [SE])	13.0 (0.1)	13.4 (0.1)	11.8 (0.2)	11.0 (0.4)	8.9 (0.5)
HH Income (mean [SE])	10.7 (0.0)	10.8 (0.0)	10.0 (0.1)	10.2 (0.1)	9.4 (0.2)
HH Wealth					
First quartile	24.3	19.2	56.0	46.1	52.0
Second quartile	25.2	25.3	25.9	26.5	17.9
Third quartile	25.1	27.0	11.8	15.3	20.4
Fourth quartile	25.4	28.5	6.4	12.1	9.8
Employment Status					
Currently Employed	38.1	38.3	33.9	42.3	41.0
Retired	51.2	52.7	52.1	38.7	24.2
Not in the Labor Force	10.6	9.0	13.9	19.1	34.7
Marital Status					
Married	69.1	71.4	49.1	71.0	61.7
Divorced/Separated	12.2	10.8	22.5	15.4	16.3
Widowed	15.1	14.7	21.1	9.2	15.0
Never Married	3.6	3.1	7.2	4.4	7.0

Note: Household (HH) income is logged.

mean age in the sample was 66.3 (range: 52–104). Women make up about 54% of the sample, 85% were white and the mean level of education was 13 years (range: 0–17). The mean logged household income for the sample was 10.7 and the wealth distribution of the sample is similar to and reflects its majority white composition. Nearly 51% were retired and 69% were married or partnered. When looking at the sample characteristics by race/ethnicity, whites on average were older, more educated, and had higher incomes and wealth than their black, foreign-born, and U.S. Hispanic counterparts. Whites and U.S.-born Hispanics were more likely to be married than blacks and foreign-born Hispanics. A little over half of Hispanics in the sample were foreign-born and reported higher levels of unemployment than their white, black, and U.S.-born Hispanic counterparts.

Table 2 shows the average total chronic stress exposure and appraisal, the prevalence of domain-specific stress exposure, and the percentage of those who reported being somewhat/very upset (vs not upset) within each stress domain by race/ethnicity. There were significant race/ethnic differences in both total chronic stress exposure and appraisal. On average, blacks had the highest level of ongoing chronic stress exposure (2.7) and whites had the lowest level (2.1). Among those who reported stress exposure, the average stress appraisal was highest for whites and foreign-born Hispanics (1.7) and lowest for blacks and U.S.-born Hispanics (1.6), which is approximately the midpoint between not being upset and being somewhat upset.

Ongoing health problems were the most prevalent chronic stress domain, with over 60% of older adults reporting problems in this domain across race/ethnic groups. Relationship strain was reported as the most upsetting type of chronic stressor and was experienced by about half of older adults across race/ethnicity. Compared to whites, older minorities (blacks, U.S.- and foreign-born Hispanics) had a higher percentage of exposure to every chronic stress domain, with the exception that U.S.-born Hispanics had a lower rate of relationship stress relative to whites. Notably, the biggest differences in exposure were in housing and financial strain where blacks reported nearly double the rate of ongoing financial strain (59.6%) and almost three times more likely to report residential strain (23.2%) compared to whites. Yet, blacks reported being upset by caregiving, relationship, residential, and financial stress at a lower rate than both whites and U.S.-born Hispanics. Foreign-born Hispanics were less upset by caregiving strain relative to all other groups.

To determine race/ethnic differences in total chronic stress exposure, Table 3 shows results from Poisson regression models. Model 1 shows race/ethnic differences in exposure after adjusting for age and gender. To determine if SES or demographic measures account for race/ethnic differences in exposure, Model 2 adds education, income, wealth, employment, and marital status. Results show that blacks were more likely to report being exposed to a greater number of ongoing chronic

Table 2. Bivariate Associations Between Race/Ethnicity, Chronic Stress Exposure, and Stress Appraisal, Health and Retirement Study, 2006 ($n = 6,567$)

	White	Black	U.S.-born Hispanics	Foreign-born Hispanics	χ^2
	%	%	%	%	
Summary stress measures (mean [SE])					
Chronic stress exposure	2.1 (0.0)	2.7 (0.1)	2.4 (0.1)	2.5 (0.1)	11.8**
Chronic stress appraisal ^a	1.7 (0.0)	1.6 (0.0)	1.6 (0.1)	1.7 (0.0)	37.2***
Health					
Exposed	60.6	67.7	61.5	66.4	3.0*
Upset ^a	56.5	56.5	55.4	66.7	1.6
Financial					
Exposed	36.9	59.6	46.8	52.3	30.5***
Upset ^a	54.0	50.4	57.6	64.0	1.8
Residential					
Exposed	8.3	23.2	19.4	14.0	52.4***
Upset ^a	52.5	47.5	63.6	44.4	1.0
Relationship					
Exposed	48.2	53.7	43.8	52.1	2.6+
Upset ^a	75.5	67.5	71.5	68.9	3.6*
Caregiving					
Exposed	35.4	39.5	36.3	38.4	1.1
Upset ^a	41.4	30.9	45.0	19.7	4.4**

Note: Upset = Somewhat/very upset vs not upset.

^aAmong those who reported any stress exposure ($n = 5,519$).

+ $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3. Poisson Regression Models Predicting Exposure to Chronic Stress by Race/Ethnicity, Health and Retirement Study, 2006 (*n* = 6,567)

Independent variables	Model 1			Model 2		
	IRR	SE		IRR	SE	
Race/Ethnicity (ref = white)						
Black	1.26	0.04	***	1.09	0.03	**
U.S.-born Hispanic	1.10	0.06	+	0.98	0.06	
Foreign-born Hispanic	1.18	0.05	***	1.03	0.04	
Age (years)	0.99	0.00	***	0.99	0.00	***
Female	1.09	0.03	***	1.07	0.03	**
Education (years)				1.01	0.00	+
HH Income				0.96	0.01	**
HH Wealth (ref = first quartile)						
Second quartile				0.79	0.02	***
Third quartile				0.71	0.02	***
Fourth quartile				0.66	0.02	***
Employment Status (ref = employed)						
Retired				1.12	0.03	***
Not in labor force				1.13	0.05	*
Marital Status (ref = married)						
Divorced/Separated				0.95	0.03	
Widowed				0.92	0.03	*
Never Married				0.82	0.04	**
Intercept	3.78	0.25	***	7.28	0.95	***

Note: IRR = Incidence Rate Ratio.
 +*p* < .10; **p* < .05; ***p* < .01; ****p* < .001.

stressors compared to whites (Model 1: incidence rate ratio [IRR] = 1.26, *SE* = 0.04; *p* < .001) when controlling for age and gender. After adjusting for SES and demographic measures the black–white disparity was reduced but remains significant (IRR = 1.09; *SE* = 0.03; *p* < .01). U.S.-born (Model 1: IRR = 1.10; *SE* = 0.06, *p* < .10) and foreign-born Hispanics (Model 1: IRR = 1.18; *SE* = 0.07, *p* < .01) also report higher levels of stress exposure compared to whites, however, the difference between whites and both U.S.- (Model 2: IRR = 0.98, *SE* = 0.06, *p* > 0.10) and foreign-born Hispanics (Model 2: IRR = 1.03, *SE* = 0.04, *p* > 0.10) diminished after adjusting for income and wealth.

While we find that, overall, blacks and Hispanics report more stress exposure, we are interested in whether this increased exposure is due to greater likelihood of exposure across every domain or if specific domains are driving these race/ethnic differences. Thus, we examined separate models for each stress domain using logistic regression models that predicted the likelihood of having any ongoing chronic stress exposure in health, financial, residential, relationship and caregiving domains adjusting for age and gender. We then plotted the predicted probabilities from each model in Figure 1. Figure 1 shows that older blacks have a higher probability of reporting ongoing health problems (69%; odds ratio [OR] 1.43, *p* < .01), financial (58%, OR: 2.40, *p* < .001), residential (23%, OR: 3.24, *p* < .001), and relationship strain (53%, OR: 1.20, *p* < .05) relative

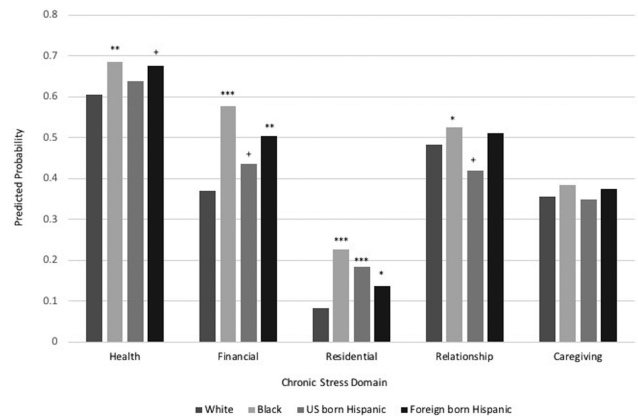


Figure 1. Predicted probabilities of stress exposure by race/ethnicity and chronic stress domain. Note: +*p* < .10; **p* < .05; ***p* < .01; ****p* < .001. From logistic models adjusted for age and gender.

to older whites, all of which are likely driving the overall black–white differences in total stress exposure found in Table 3. U.S.-born Hispanics have a higher probability of reporting financial (44%, OR: 1.33, *p* < .10) and residential strain (18%, OR: 2.52, *p* < .001) than whites but are less likely to report relationship strain (42%, OR: 0.78, *p* < .10). Foreign-born Hispanics report higher probabilities of health problems (68%, OR: 1.37, *p* < .10), financial (50%, OR: 1.77, *p* < .01) and residential strain (14%, OR: 1.75, *p* < .05) relative to whites. Race/ethnic differences in ongoing health problems and financial strain were fully explained

by accounting for SES differences between the groups while black–white and U.S.-born Hispanic–white differences in residential strain remained.

In Table 4, we show OLS regression models examining race/ethnic differences in stress appraisal among respondents reporting exposure to at least one chronic stressor. In these models, to isolate race/ethnic differences in appraisal from differences in exposure, we also account for the total number of chronic stress exposures reported. Model 1 shows that blacks, on average, report being less upset by their chronic stress exposure compared to whites ($\beta = -0.10$; $SE = 0.03$, $p < .01$). This difference between blacks and whites increased after adjusting for SES and demographic measures in model 2 ($\beta = -0.13$; $SE = 0.03$, $p < .001$). U.S.-born Hispanics were also, on average, less upset by chronic stress exposure relative to whites (M1: $\beta = -0.10$; $SE = 0.06$; $p < .10$) and differences remained after controlling for SES and demographic characteristics (M2: $\beta = -0.11$; $SE = 0.05$; $p < .10$). These race/ethnic differences remained after adjusting for psychological distress and recent experience of major acute stressors, suggesting these results are not confounded by feelings of distress or other sources of stress.

Since chronic stressors within certain domains may be experienced as particularly stressful by race/ethnicity, Figure 2 graphs the predicted probabilities of reporting chronic stress exposure as upsetting across each domain for whites, blacks, U.S.-born, and foreign-born Hispanics separately. Predicted

probabilities come from logistic regression models that predicted the likelihood of reporting ongoing chronic stress exposure as somewhat or very upsetting versus not upsetting in health, financial, residential, relationship and caregiving domains adjusting for age, gender, and total chronic stress exposure. Most strikingly, blacks consider financial (47%; OR: 0.75, $p < .05$), relationship (61%; OR: 0.49, $p < .001$), and caregiving (27%; OR: 0.52, $p < 0.01$) stress exposure less upsetting than whites. After adjusting for SES and demographic measures, blacks were less upset across every chronic stress domain including health (49%; OR: 0.68, $p < .01$) and residential (38%; OR: 0.55, $p < .05$) strain relative to whites. U.S. (69%; OR: 0.62, $p < .10$) and foreign (72%; OR: 0.57, $p < .10$) born Hispanics report being less upset than whites by ongoing relationship strain and foreign-born Hispanics were less upset than whites by caregiving strain (18%; OR: 0.29, $p < .001$). Yet, U.S.- and foreign-born Hispanic–white differences in relationship strain were attenuated after adjusting for SES measures.

Discussion

In this study, the first to examine both stress exposure and appraisal in a nationally representative and diverse sample of older adults, we found that older blacks and Hispanics, in particular foreign-born Hispanics, are more likely to be exposed to a greater number of ongoing chronic stressors relative to whites. Our findings are consistent with those

Table 4. Regression Models Predicting Chronic Stress Appraisal by Race/Ethnicity, Health and Retirement Study, 2006 ($n = 5,519$)

Independent variables	Model 1			Model 2		
	β	SE		β	SE	
Race/Ethnicity (ref = white)						
Black	-0.10	0.03	**	-0.13	0.03	***
U.S.-born Hispanics	-0.10	0.06	+	-0.11	0.05	+
Foreign-born Hispanic	-0.03	0.05		-0.04	0.05	
Age (years)	0.00	0.00		0.00	0.00	**
Female	0.12	0.02	***	0.09	0.02	***
Chronic stress exposure (0–7)	0.08	0.01	***	0.08	0.01	***
Education (years)				0.00	0.00	
HH Income				0.00	0.01	
HH Wealth (ref = first quartile)						
Second quartile				-0.08	0.03	**
Third quartile				-0.04	0.03	
Fourth quartile				-0.01	0.04	
Employment Status (ref = employed)						
Retired				0.08	0.02	***
Not in labor force				0.10	0.03	**
Marital Status (ref = married)						
Divorced/Separated				0.08	0.03	**
Widowed				0.10	0.03	**
Never Married				0.00	0.06	
Intercept	1.50	0.09	***	1.67	0.15	***

Note: + $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

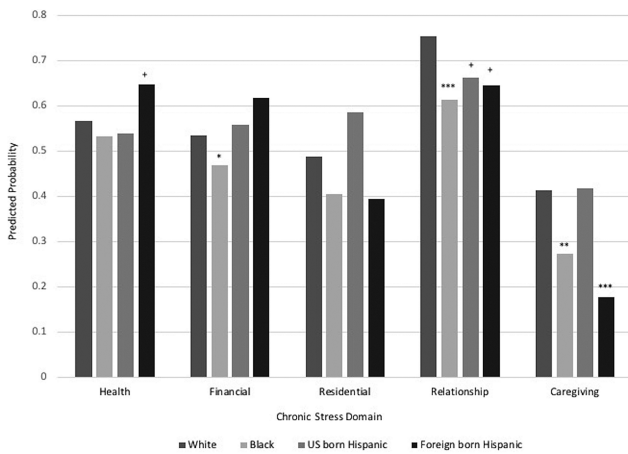


Figure 2. Predicted probabilities of stress appraisal (% upset) by race/ethnicity and chronic stress domain. Note: + $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$. From logistic models (somewhat/very upset vs not upset) adjusted for age, gender, and total chronic stress exposure.

reported in prior research on race/ethnic differences in overall stress exposure (e.g., Sternthal et al., 2011; Turner & Lloyd, 1995). However, despite having higher chronic stress burdens, we found that racial and ethnic minorities do not report higher stress appraisal. After accounting for cumulative chronic stress exposure, demographic characteristics, and socioeconomic status, the average stress appraisal was lower among blacks and Hispanics, and in particular U.S.-born Hispanics, relative to whites. This study, therefore, presents novel findings highlighting the importance of considering both exposure and appraisal in determining race/ethnic differences in the stress burden of older adults.

Importantly, we also found variability in race/ethnic differences in both exposure and appraisal by stress domain. For instance, blacks and Hispanics were more likely to be exposed to housing and financial strain compared to whites, and this seemed to largely account for the greater stress exposure of older minorities. Excess financial and housing hardship among racial/ethnic minorities in older adulthood likely reflects the cumulative effects of structural and societal inequities including segregation, English language proficiency, unequal educational attainment, longer periods of unemployment and underemployment, lower wages, pensions, and accumulation of wealth over the life course (Landrine & Corral, 2009; Williams et al., 2010). Older blacks also report exposure to health problems at a greater rate than older whites, though differences in socioeconomic status appear to explain this black–white gap. Likewise, blacks reported more relationship strain relative to whites, which is consistent with research showing blacks simultaneously experience high levels of social support and strain (Neighbors, 1997). A better understanding of the domain-specific chronic stressors underlying race/ethnic differences in cumulative stress exposure is a significant step forward for prevention and intervention efforts aimed at reducing or mitigating

the effects of stress as well as inform our theoretical models that link race/ethnicity to stress.

While we show that blacks and Hispanics are disproportionately exposed to chronic stress, the factors that account for differences in stress exposure vary among these groups. Hispanic–white disparities in stress exposure tended to be smaller relative to black–white differences and were largely accounted for by differences in SES. For foreign-born Hispanics, socioeconomic disadvantage and ethnicity or immigrant status may represent a dual disadvantage that, when combined, place individuals at greater risk of chronic stress exposure (Myers, 2009). Higher SES may act as a protective factor, shielding Hispanics from health, financial, residential, and caregiving strain. Education for Hispanics may function as an equalizer, perhaps conferring advantages in English language proficiency, putting them on par with whites in terms of occupation, earnings, housing, and wealth accumulation. However, disproportionate stress exposure among older blacks remains even after accounting for SES. As a result of a history of race–residential segregation, blacks are much more likely to live in disadvantaged environments. Segregation is considered a fundamental cause of differences in health status between blacks and whites because it shapes socioeconomic conditions at the individual, household and neighborhood levels, ultimately determining blacks’ socioeconomic mobility and residential/environmental risk factors (Phelan & Link, 2015). Thus, for many older African Americans, education, income, and even wealth do not necessarily translate into less stress exposure due to the unique conditions of living in black neighborhoods. High SES, for instance, does not confer the same protections from housing security for blacks as it does for whites and Hispanics. This is a key way in which the aging experience is different for blacks (Landrine & Corral, 2009; Turner & Avison, 2003) and may account for differences in stress exposure and coping. Nonequivalence or the benign function of SES among older blacks suggests the need to identify other protective factors that can mitigate or prevent chronic stress exposure among this group (Williams et al., 2010). These findings emphasize the varying ways SES differently influences stress exposure across racial/ethnic minority groups in older adulthood.

Despite domain-specific variation in black–white differences in stress exposure, blacks are less likely to be upset than whites across all stress domains in fully-adjusted models. Furthermore, black–white differences in appraisal increased after adjusting for SES, suggesting socioeconomic resources may be particularly important for older black adults’ experience of stress. Average stress appraisal was also lower among Hispanics compared to whites, but this difference was primarily driven by U.S. Hispanics being less likely to be upset by ongoing relationship problems. Additionally, foreign-born Hispanics, considered both relationships and caregiving to be less upsetting relative to whites. Both foreign-born and U.S.-born Hispanics had some overlap in their experience of chronic stress,

but we found unique differences in stress exposure and appraisal between these two groups, suggesting there are distinct stress experiences among Hispanics based on nativity that would be missed if Hispanics were treated as a homogenous group.

This study found race/ethnic differences in stress appraisal not previously shown, and suggests total stress burden may be better understood by measuring both exposure and appraisal. Importantly, the distinction between exposure and appraisal-based measures of stress may shed light on critical pathways that differentially contribute to race/ethnic physical and mental health disparities (Lewis et al., 2015; Williams et al., 2010). Prior research has shown appraisal-based measures of stress perform better as predictors of mental and physical health than does exposure-based measures of stress (Hayman, Lucas, & Porcerelli, 2014) likely because, in traditional psychological stress process models, subjective assessments of stress impact how individuals respond to stressors. Consequently, examining race/ethnic differences in stress appraisal may represent a key component in understanding behavioral and coping responses to stress, and ultimately race/ethnic health disparities.

A few hypotheses may explain why minority groups would appraise chronic stress as less upsetting relative to whites, despite reporting greater chronic stress exposure. First, minority status is a source of unique psychosocial resources and positive coping strategies (Jackson, Knight, & Rafferty, 2010), such as religious participation (Chatters, Taylor, Jackson, & Lincoln, 2008) and social support (Thoits, 2010; Thomas, 2016), which might minimize or influence the perception of certain experiences as stressful. Thus, when measuring respondents' stress appraisal, it may reflect this stress buffering or modifying the response of these protective resources with lower subjective perceptions of stress (Dohrenwend, 2006). Second, and more relevant for older adults, there is a life course dynamic overlooked in stress processes frameworks that may be important when examining aging populations. Earlier and more frequent exposure to stressors may position older minority groups to be more accustomed to dealing with stress or enable them to develop more effective, context-specific coping (Lewis et al., 2015; Williams et al., 2010). Underlying this hypothesis is the idea that groups who are exposed to a high stress burden earlier in life are better able to manage both the emotional and physical consequences of social stressors and adversity later in life.

Finally, minority groups may be collectively and actively reframing the meaning or significance of chronic stress exposure in an attempt to reduce its adverse mental or emotional impact. Individuals and minority groups do not always conform to dominant interpretations of their life circumstances as is generally assumed in stress literature. They may instead develop alternative interpretations that allow them to construct their own meaning of what is generally thought of as a stressful experience (McLeod, 2012).

This adaptation may also represent a common pathway by which people have responded to different cultural and life histories. Measuring stress appraisal in these groups may highlight how racial/ethnic minorities observe their chronic stress burden and simultaneously adapt, thereby recognizing their resourcefulness, coping, and agency.

In considering stress appraisal in older adults, it is important to note that emotional reactivity declines with age and this may influence how upsetting experiences are perceived to be. According to the socioemotional selectivity theory and positivity effect, older adults regulate their emotional states to optimize wellbeing resulting in greater focus on positive information and diminished attention on negative information (Carstensen, Isaacowitz, & Charles, 1999; Mroczek, 2001). Consequently, older adults, in the appraisal process, may trivialize many stressors. However, this may also suggest that when older adults do report upsetting or stressful experiences they are likely highly salient or of significant importance.

Limitations

There are some limitations in the way stress exposure and appraisal are conceptualized. First, while we use a measure of appraisal utilized in prior studies (Aldwin et al., 1996), the retrospective nature of the questions means respondents may be reporting the stressfulness of ongoing chronic situations that are no longer or less problematic. Individuals may be reporting stress exposure during any time in the past 12 months, but at the time of the interview may be feeling less bothered by the stressor. Respondents may be relying on memory to report their stress response and retrospective reporting can be biased. Additionally, selective mortality among blacks and Hispanics may mean we have a select group of individuals who cope well with or respond well to stressors and may be more likely to survive to old age. Importantly, we are measuring chronic stress using a cross-sectional snapshot, but the relationship between race/ethnicity, stress exposure and appraisal may vary over time. Finally, although we examined a variety of stressors, the "stress universe" includes a wider array of race-based or related stressors (e.g., vicarious discrimination, incarceration, intersectional stressors) and additional research on race/ethnic differences in the stress processes is needed that attends to these stressors as well (see Brown & Hargrove, 2018).

The stress experience consists of both exposure to stressors and subjective appraisals, yet prior stress work at the population level has not evaluated differences in appraisal among a diverse sample of older adults. Our findings show that appraisals of objectively equivalent stressors differ systematically by race/ethnicity. The separation of chronic stress exposure from stress appraisals highlights that minority groups report ongoing chronic stress exposure, but they may experience these stress exposures differently. Studies that do not take the subjective meaning of stress

into account may miss an important pathway through which social stress affects wellbeing. Future research should evaluate the extent to which social characteristics and subsequent life experiences influence an individual's interpretations of otherwise objective life circumstances. Additionally, future research should explore heterogeneity within race/ethnic groups (e.g., gender, skin tone, place, sexuality). By doing so, this work has the potential to enrich models of the stress process through which social arrangements and race/ethnicity contribute to differences in health.

Author Contributions

L. Brown planned the study, conducted the data analysis, and wrote the paper. U. Mitchell contributed to revising the paper. J. Ailshire supervised statistical analyses, helped plan the study, and contributed to revising the paper.

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Conflict of Interest

None reported.

References

- Aldwin, C. M., Sutton, K. J., Chiara, G., & Spiro, I. A. (1996). Age differences in stress, coping, and appraisal: Findings from the normative aging study. *The Journals of Gerontology: Series B*, *51B*, P179–P188. doi:10.1093/geronb/51B.4.P179
- Amirkhan, J. H. (1994). Criterion validity of a coping measure. *Journal of Personality Assessment*, *62*, 242–261. doi:10.1207/s15327752jpa6202_6
- Avison, W. R., & Turner, R. J. (1988). Stressful life events and depressive symptoms: Disaggregating the effects of acute stressors and chronic strains. *Journal of Health and Social Behavior*, *29*, 253–264. doi:10.2307/2137036
- Brown, T. H., & Hargrove, T. W. (2018). Psychosocial mechanisms underlying older black men's health. *The Journals of Gerontology: Series B*, *73*, 188–197. doi:10.1093/geronb/gbx091
- Brown, G. W., & Harris, T. (1978). *Social origins of depression: A study of psychiatric disorder in women* (1st American ed.). New York: Free Press.
- Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously. A theory of socioemotional selectivity. *The American Psychologist*, *54*, 165–181. doi:10.1037/0003-066X.54.3.165
- Chatters, L. M., Taylor, R. J., Jackson, J. S., & Lincoln, K. D. (2008). Religious coping among African Americans, Caribbean blacks and non-Hispanic whites. *Journal of Community Psychology*, *36*, 371–386. doi:10.1002/jcop.20202
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, *24*, 385–396. doi:10.2307/2136404
- Dohrenwend, B. P. (2006). Inventorying stressful life events as risk factors for psychopathology: Toward resolution of the problem of intracategory variability. *Psychological Bulletin*, *132*, 477–495. doi:10.1037/0033-2909.132.3.477
- Gallo, L. C., Penedo, F. J., Espinosa de los Monteros, K., & Arguelles, W. (2009). Resiliency in the face of disadvantage: Do Hispanic cultural characteristics protect health outcomes? *Journal of Personality*, *77*, 1707–1746. doi:10.1111/j.1467-6494.2009.00598.x
- Harrell, S. P. (2000). A multidimensional conceptualization of racism-related stress: Implications for the well-being of people of color. *The American Journal of Orthopsychiatry*, *70*, 42–57. doi:10.1037/h0087722
- Hatch, S. L., & Dohrenwend, B. P. (2007). Distribution of traumatic and other stressful life events by race/ethnicity, gender, SES and age: A review of the research. *American Journal of Community Psychology*, *40*, 313–332. doi:10.1007/s10464-007-9134-z
- Hayman, J., Lenwood, W., Lucas, T., & Porcerelli, J. H. (2014). Cognitive appraisal vs. exposure-based stress measures: Links to perceived mental and physical health in low-income black women. *The Journal of Nervous and Mental Disease*, *202*, 807–812. doi:10.1097/NMD.0000000000000198
- Herbert, T. B., & Cohen, S. (1993). Stress and immunity in humans: A meta-analytic review. *Psychosomatic Medicine*, *55*, 364–379. doi:10.2307/2136310
- Jackson, J. S., Knight, K. M., & Rafferty, J. A. (2010). Race and unhealthy behaviors: Chronic stress, the HPA axis, and physical and mental health disparities over the life course. *American Journal of Public Health*, *100*, 933–939. doi:10.2105/AJPH.2008.143446
- Kessler, R. C. (1979a). A strategy for studying differential vulnerability to the psychological consequences of stress. *Journal of Health and Social Behavior*, *20*, 100–108.
- Kessler, R. C. (1979b). Stress, social status, and psychological distress. *Journal of Health and Social Behavior*, *20*, 259–272.
- Kessler, R. C., & Neighbors, H. W. (1986). A new perspective on the relationships among race, social class, and psychological distress. *Journal of Health and Social Behavior*, *27*, 107–115.
- Landrine, H., & Corral, I. (2009). Separate and unequal: Residential segregation and black health disparities. *Ethnicity & Disease*, *19*, 179–184. PMID: 19537230.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping: Richard S. Lazarus, Susan Folkman* (CSZD ed.). New York: Springer Pub. Co.
- Lepore, S. J. (1995). Measurement of chronic stressors. In S. Cohen, R. C. Kessler, & L. Underwood Gordon (Eds.), *Measuring stress: A guide for health and social scientists* (pp. 102–120). New York, NY: Oxford University Press. ISBN-19-058641-4; ID: 1995-97342-005.
- Lewis, A. E., Diamond, J. B., & Forman, T. A. (2015). Conundrums of integration. *Sociology of Race and Ethnicity*, *1*, 22–36. doi:10.1177/2332649214558687
- McLeod, J. D. (2012). The meanings of stress: Expanding the stress process model. *Society and Mental Health*, *2*, 172–186. doi:10.1177/2156869312452877

- Mezuk, B., Abdou, C. M., Hudson, D., Kershaw, K. N., Rafferty, J. A., Lee, H., & Jackson, J. S. (2013). "White box" epidemiology and the social neuroscience of health behaviors: The environmental affordances model. *Society and Mental Health*, 3, doi:10.1177/2156869313480892
- Mouzon, D. (2017). Religious involvement and the Black-White paradox in mental health. *Race and Social Problems*, 9, 63-78. doi:10.1007/s12552-017-9198-9
- Mroczek, D. K. (2001). Age and emotion in adulthood. *Current Directions in Psychological Science*, 10, 87-90. doi:10.1111/1467-8721.00122
- Myers, H. F. (2009). Ethnicity- and socio-economic status-related stresses in context: An integrative review and conceptual model. *Journal of Behavioral Medicine*, 32, 9-19. doi:10.1007/s10865-008-9181-4
- Neighbors, H. W. (1997). Husbands, wives, family, and friends: Sources of stress, sources of support. In R. J. Taylor, J. S. Jackson & L. M. Chatters (Eds.), *Family life in black america / edited by robert joseph taylor, james S. jackson, and linda M. chatters* (pp. 227-292). Thousand Oaks, CA: Sage Publications.
- Park, C. L., & Folkman, S. (1997). Meaning in the context of stress and coping. *Review of General Psychology*, 1, 115-144. doi:10.1037/1089-2680.1.2.115
- Pearlin, L. I. (1989). The sociological study of stress. *Journal of Health and Social Behavior*, 30, 241-256. doi:10.2307/2136956
- Pearlin, L. I. (2010). The life course and the stress process: Some conceptual comparisons. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 65B, 207-215. doi:10.1093/geronb/gbp106
- Pearlin, L. I., Lieberman, M. A., Menaghan, E. G., & Mullan, J. T. (1981). The stress process. *Journal of Health and Social Behavior*, 22, 337-356. doi:10.2307/2136676
- Pearlin, L. I., Schieman, S., Fazio, E. M., & Meersman, S. C. (2005). Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior*, 46, 205-219. doi:10.1177/002214650504600206
- Phelan, J., & Link, B. (2015). Is racism a fundamental cause of inequalities in health? *Annual Review of Sociology*, 41, 311. doi:10.1146/annurev-soc-073014-112305
- Roth, D. L., Dilworth-Anderson, P., Huang, J., Gross, A. L., & Gitlin, L. N. (2015). Positive aspects of family caregiving for dementia: Differential item functioning by race. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 70, 813-819. doi:10.1093/geronb/gbv034
- Sellers, R. M., & Shelton, J. N. (2003). The role of racial identity in perceived racial discrimination. *Journal of Personality and Social Psychology*, 84, 1079-1092. doi:10.1037/0022-3514.84.5.1079
- Smith, J., Fisher, G. G., Ryan, L. H., Clarke, P. J., House, J., & Weir, D. R. (2013). *Psychosocial and lifestyle questionnaire 2006 - 2010: Documentation report*. (). Ann Arbor: Survey Research Center, Institute for Social Research, University of Michigan.
- Sternthal, M. J., Slopen, N., & Williams, D. R. (2011). Racial disparities in health. *Du Bois Review. Social Science Research on Race*, 8, 95-113. doi:10.1017/S1742058X11000087
- Thoits, P. A. (1995). Stress, coping, and social support processes: Where are we? What next? *Journal of Health and Social Behavior*, Extra Issue: Forty Years of Medical Sociology: The State of the Art and Directions for the Future, 53-79, doi:10.2307/2626957
- Thoits, P. A. (2010). Stress and health: Major findings and policy implications. *Journal of Health and Social Behavior*, 51, S41-S53. doi:10.1177/0022146510383499
- Thomas, P. A. (2016). The impact of relationship-specific support and strain on depressive symptoms across the life course. *Journal of Aging and Health*, 28, 363-382. doi:10.1177/0898264315591004
- Troxel, W. M., Matthews, K. A., Bromberger, J. T., & Sutton-Tyrrell, K. (2003). Chronic stress burden, discrimination, and subclinical carotid artery disease in African American and Caucasian women. *Health Psychology*, 22, 300-309. doi:10.2307/2136676
- Turner, R. J., & Avison, W. R. (2003). Status variations in stress exposure: Implications for the interpretation of research on race, socioeconomic status, and gender. *Journal of Health and Social Behavior*, 44, 488-505.
- Turner, R. J., & Lloyd, D. A. (1995). Lifetime traumas and mental health: The significance of cumulative adversity. *Journal of Health and Social Behavior*, 36, 360-376. doi:10.2307/2137325
- Turner, R. J., Wheaton, B., & Lloyd, D. A. (1995). The epidemiology of social stress. *American Sociological Review*, 60, 104-125. doi:10.2307/2096348
- Ulbrich, P. M., Warheit, G. J., & Zimmerman, R. S. (1989). Race, socioeconomic status, and psychological distress: An examination of differential vulnerability. *Journal of Health and Social Behavior*, 30, 131-146. doi:10.2307/2136918
- Wheaton, B. (1994). Sampling the stress universe. In W. R. Avison & I. H. Gotlib (Eds.), *Stress and Mental Health. The Springer Series on Stress and Coping*. Boston, MA: Springer. doi:10.1007/978-1-4899-1106-3_4
- Wheaton, B., Young, M., Montazer, S., & Stuart-Lahman, K. (2013). Social stress in the twenty-first century. In C. S. Aneshensel, J. C. Phelan, & A. Bierman (Eds.), *Handbook of the Sociology of Mental Health* (2nd ed., pp. 299-323). Dordrecht, The Netherlands: Springer Science + Business Media. doi:10.1007/978-94-007-4276-5_15
- Williams, D. R., Mohammed, S. A., Leavell, J., & Collins, C. (2010). Race, socioeconomic status, and health: Complexities, ongoing challenges, and research opportunities. *Annals of the New York Academy of Sciences*, 1186, 69-101. doi:10.1111/j.1749-6632.2009.05339.x
- Williams, D. R., Spencer, M. S., & Jackson, J. S. (1999). Race, stress, and physical health: The role of group identity. In R. J. Contrada & R. D. Ashmore (Eds.), *Rutgers series on self and social identity, Vol. 2. Self, social identity, and physical health: Interdisciplinary explorations* (pp. 71-100). New York, NY: Oxford University Press.
- Williams, D. R., Yan Yu, Jackson, J. S., & Anderson, N. B. (1997). Racial differences in physical and mental health: Socio-economic status, stress and discrimination. *Journal of Health Psychology*, 2, 335-351. doi:10.1177/135910539700200305