

RACIAL DISPARITIES IN HEALTH

*How Much Does Stress Really Matter?*¹

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Abstract

Despite the widespread assumption that racial differences in stress exist and that stress is a key mediator linking racial status to poor health, relatively few studies have explicitly examined this premise. We examine the distribution of stress across racial groups and the role of stress vulnerability and exposure in explaining racial differences in health in a community sample of Black, Hispanic, and White adults, employing a modeling strategy that accounts for the correlation between types of stressors and the accumulation of stressors in the prediction of health outcomes. We find significant racial differences in overall and cumulative exposure to eight stress domains. Blacks exhibit a higher prevalence and greater clustering of high stress scores than Whites. American-born Hispanics show prevalence rates and patterns of accumulation of stressors comparable to Blacks, while foreign-born Hispanics have stress profiles similar to Whites. Multiple stressors correlate with poor physical and mental health, with financial and relationship stressors exhibiting the largest and most consistent effects. Though we find no support for the stress-vulnerability hypothesis, the stress-exposure hypothesis does account for some racial health disparities. We discuss implications for future research and policy.

Keywords: Race, Ethnicity, Stress, Health, Health Inequalities, Cumulative Stress

INTRODUCTION

Racial/ethnic and socioeconomic status (SES) disparities in health are pervasive and enduring across multiple health outcomes (Williams et al., 2010). The adverse physical and mental effects of stress are well documented, with the accumulation of multiple stressors associated with worse outcomes (McEwen 1998; Thoits 2010). Many models of SES and racial disparities in health argue for a central role of stress in accounting for the observed social distribution of disease (Pearlin 1989; Thoits 2010). There is a widespread assumption in the literature that racial differences in stressors exist and that stress is a key mediator linking race to poor health (Hatch and

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Dohrenwend, 2007; Paradies 2006). However, surprisingly little research explicitly tests this hypothesis.

In this paper, in the interest of economy and recognition of individual dignity, we use the term “race” to refer to all of the U.S. government’s official racial and ethnic categories and we use the most preferred terms for these categories (i.e., Black and African American, Hispanic and Latino) interchangeably (Williams et al., 2010). Researchers posit that racial health disparities may be due to differential exposure to stressors (i.e., experiencing more stressors) and/or differential vulnerability to stressors (i.e., experiencing worse health outcomes in response to stressors relative to Whites). Despite some support for the differential vulnerability hypothesis (Aneshensel 1992; Kessler 1979), the differential exposure hypothesis has generally received more attention (Turner et al., 1995). Nevertheless, the evidence to support the differential exposure hypothesis is limited. A review article on stressful life events and race found only ten studies between 1989 and 2005 that examined how stress exposure varied by race (Hatch and Dohrenwend, 2007). Studies generally show that stressful events are more frequent among Blacks and other minority groups relative to Whites, but the literature is not entirely consistent (Franko et al., 2004). Moreover, with the literature’s emphasis on acute life events, the range of stressors examined is limited. With few exceptions (Aneshensel 2009) most studies of racial differences in stress exposure compare the distribution of stressors among Blacks versus Whites, to the exclusion of Hispanics. This is problematic because Hispanics are now the largest minority population, are disproportionately poor, and experience high levels of stressors related to acculturation, job hazards, poverty, and legal status (Finch et al., 2004; Williams et al., 2010). Within the Latino population, health is patterned by nativity status, with foreign-born Hispanics typically healthier than U.S. born Hispanics (Williams et al., 2010). Variations in stress exposure by nativity status may partially account for these differences (Tillman and Weiss, 2009).

PRESENT STUDY

The present study addresses three limitations of prior research on the association between stress and health. First, the assessment of stressors has been limited in prior research on race, stress, and health, with an emphasis on measures of life events and a neglect of chronic stressors. Life events are important but incomplete measures of stress and underestimate the full health effects of stressors (Thoits 2010). Second, much prior work on the social distribution of stress examines one type of stressor at a time, or uses a simple additive count of stressors (Turner et al., 2006). Stressors often co-occur such that approaches that examine individual stressors may overestimate the effect of any given stressor (Green et al., 2010). In addition, a summary additive count of stressors obscures racial differences in exposure to individual stressors and conceals which specific stressors affect health. Third, many previous studies on racial differences in stress exposure do not adjust for SES (Hatch and Dohrenwend, 2007); this makes it challenging to interpret the findings, because SES may be a determinant of both stress exposures and health. Adjustment for SES can provide valuable information about the unique role of stress in the development of health disparities.

This paper addresses these limitations by examining associations between stressors and health in a community sample of African American, White, and Hispanic adults and stratifying the Hispanic population by nativity status. We improve upon past analyses by using a comprehensive assessment of stressors and applying a modeling strategy that accounts for the correlation between stressors as well as the

accumulation of stressors in the prediction of physical and mental health. We first investigate the prevalence and co-occurrence of stressors by race. We ask the following research questions:

- (1) How does stress exposure and the clustering of stressors vary by race?
- (2) To what extent does the racial patterning of stress depend on the specific stressor under consideration?

We then examine the association between stressors and health, asking:

- (3) How do multiple types of stressors, individually and together, relate to multiple indicators of health status, and do these associations vary by race?
- (4) What is the role of stress in accounting for racial differences in health?

METHODS

Study Population

We analyzed data from the Chicago Community Adult Health Study (CCAHS) (Morenoff et al., 2007), a household probability sample of 3,105 adults aged eighteen and over living in Chicago, Illinois, stratified into 343 neighborhood clusters previously defined by the Project on Human Development in Chicago Neighborhoods (PHDCN) (Sampson et al., 1997). The sample consists of 1240 non-Hispanic Blacks, 983 non-Hispanic Whites, 802 Hispanics, and eighty persons of other racial groups. Each neighborhood cluster typically included two Census tracts with meaningful physical and social identities and boundaries. Between May 2001 and March 2003, one individual from each of the selected households was interviewed, with a response rate of 71.8%. Data were weighted to match the 2000 Census population estimates for the city of Chicago in terms of age, race, and gender.

Measures

Race

Race (Black, White, Hispanic) was assessed by self-report. Hispanics were stratified by American-born ($n = 362$) and foreign-born ($n = 440$). Initial exploratory analyses found that persons of “other” race did not differ from Whites. Accordingly, we collapsed the “other” category into Whites to preserve responses.

Stress Domains

Based on prior research on stress and health, our assessment of stressors utilized multiple stressors, adapted from some of the best available measures, in each of eight domains (acute life events, employment, financial, life discrimination, job discrimination, relationship, early life, and community stressors) that reflect key arenas in which people operate (e.g., home, job, neighborhood) and the major roles/statuses they assume (Lantz et al., 2005; Pearlin 1989). Before fielding the CCAHS survey, a large pretest was conducted with various psychosocial instruments (including stressors) in suburban Chicago to develop shorter versions of existing scales that maintained good psychometric properties. Although some of the specific stress measures are short, our assessment reflects an effort to provide broad coverage of the critical stressors that appear to matter for health given that the failure to measure stressors

comprehensively understates the association between stressors and health (Thoits 2010).

Appendix A describes the stressors, including internal reliability scores for the subscales within each type. Correlations among our summary stressors were low (ranging from -0.1 to 0.33). The *acute life events* domain consists of standard measures of traumatic experiences (lifetime) and acute life events (past five years). *Employment stressors* (Karasek and Theorell, 1990) comprise six measures: job dissatisfaction, job autonomy, job insecurity, work demands, work-life conflicts, and job hazards. *Financial stressors* contain two measures (Pearlin and Schooler, 1978): financial strain and an inventory of economic problems. *Life discrimination* combines measures of both racial and nonracial discrimination from an abbreviated inventory of major discriminatory events and a shortened version of the Everyday Discrimination Scale (Williams et al., 1997). Preliminary analyses revealed that both racial and nonracial discrimination were similarly related to our health outcomes. *Job discrimination* includes two scales (job harassment and unfair treatment at work) adapted from the Perceived Racism Scale (McNeilly et al., 1996) and the Los Angeles Study of Urban Inequality (Bobo and Suh, 2000). The *relationship stressors* domain consists of five measures adapted from the Americans' Changing Lives study (House et al., 1994): marital stressors, marital abuse, child-related stressors, an inventory of problems experienced by one's children, and friend criticism. *Early life stressors* assess adversities prior to age twelve, including abuse, educational neglect, and hunger. Finally, *community stressors* combine measures of community disorder, community violence, and personal victimization adapted from the PHDCN (Sampson et al., 1997).

Our eight final summary stressors were created by standardizing each stressor (into a z -score) and then summing all indicators of stressors composing a given domain, restandardizing the resulting summary measure to facilitate comparisons across domains, and dichotomously scoring the final variable, to contrast scores in the top quintile ("high stress") versus all others. Focusing on the top quintile allows us to capture both severity and accumulation of stressors. We chose a top-quintile threshold based on prior research that indicates that the negative effects of stressors are most clearly evident among those experiencing chronic, cumulative, and severe stressors (Williams and Mohammed, 2009). Sensitivity analyses utilizing alternative thresholds (top tertile, top quartile) revealed similar results.

Health Outcomes

We assessed four commonly used indicators of self-reported physical and mental health status: poor self-rated health (SRH), depressive symptoms, chronic illnesses, and functional limitations. Poor SRH, predictive of mortality and other health outcomes (Idler 1992), is based on respondents' rating of their health on a five-point scale, ranging from (0) excellent to (4) poor. Depressive symptoms are assessed using the eleven-item version of the Center for Epidemiologic Studies Depression scale (CES-D) (Radloff 1975). The measure sums the frequency with which respondents reported each symptom in the past week, from (1) never to (4) most of the time ($\alpha = 0.85$). The chronic illnesses category provides a count based on self-reported history of lung disease, heart attack, diabetes, cancer, heart trouble, hypertension, leg circulation problems, emphysema or COPD, stroke, osteoporosis, chronic bronchitis, asthma arthritis, or ulcer. Functional limitations count the number of the following tasks rated as difficult: independently pulling or pushing large objects; stooping, crouching, or kneeling; lifting or carrying weights over ten pounds; extending arms above shoulder level; and writing or handling small objects (Rosow and Breslau, 1966).

Confounders

We controlled for several potential confounders, including gender, age (in years), education (less than twelve years, twelve years, thirteen to fifteen years, sixteen plus years), and family income (<\$10,000, \$10,000–\$29,999, \$30,000–\$49,999, \$50,000+, and missing). We also adjusted for language of interview (Spanish, Polish, or English), based on evidence that the language of interview can affect responses to self-reported health (Viruell-Fuentes, Forthcoming).

ANALYSIS

First, we provided descriptive information on demographic characteristics and examined the distribution of stressors by considering racial variation in the reported levels of each stressor, the number of reported stressors, and the extent of clustering of stressors.

Second, we estimated associations between the stressors and each health outcome using an identical series of models. Ordinary least-squares regression was used for poor SRH and depressive symptoms, while Poisson regressions were used for functional limitation and chronic illness. Model 1 estimated the association between each stressor and health. Model 2 estimated the effects of all eight stressors simultaneously. Model 3 included a series of indicator variables for the number of stressors. Model 4 included variables for both the types and number of stressors. In this model, the number of stressors started at exactly two, because the value of the variable for exactly one stressor domain was perfectly predicted by the eight indicator variables for types of stressor domains. All models adjusted for age, gender, race, language of interview, education, and income.

To test whether the stressor-health association varied by race, cross-product terms for each stressor and race were added to the models (based on Model 2 above). Additionally, for each outcome, we estimated three regression models to examine the extent to which stress exposure accounts for racial health disparities. Two initial models examined the association between race and health, adjusting for age, gender, and language of interview (Model 1), along with income and education (Model 2) providing a baseline estimate of racial health disparities, unadjusted and adjusted for SES. Model 3 added all of the indicators of both the types and number of stressors. Comparing the coefficients for race across these models allows an assessment of the contribution of stressors to explaining racial health disparities.

RESULTS

Racial Differences in Stress

Table 1 presents demographic characteristics and health outcomes by race. For all outcomes except poor SRH, Blacks exhibited the worst health profiles and foreign-born Hispanics displayed the best. Table 2 presents the number of stressors by race. Columns 1–3 show that the distributions of stressors varied by race, with the highest cumulative level of stressors among Blacks, compared to Whites and all Hispanics. Columns 4 and 5, however, reveal substantial heterogeneity with the Hispanic sample. Stress exposure among American-born Hispanics was comparable to Blacks, while foreign-born Hispanics had rates slightly higher but very similar to Whites.

For most stressors, the prevalence level was higher for Blacks and American-born Hispanics than for Whites and foreign-born Hispanics (Table 3, Column 1).

Table 1. Descriptive Statistics by Race

	Whites (n = 1063)		Blacks (n = 1240)		American-Born Hispanics (n = 362)		Foreign-Born Hispanics (n = 440)		P ^a
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	
<i>Covariates</i>									
Age	43.84	0.76	44.17	0.58	36.11	1.17	39.72	0.86	0.000
Male Gender	0.50	0.02	0.43	0.02	0.46	0.03	0.51	0.03	0.012
Educational Status									
<12 Years	0.10	0.01	0.23	0.02	0.31	0.03	0.55	0.03	0.000
12 Years	0.20	0.02	0.28	0.02	0.30	0.03	0.20	0.02	
13–15 Years	0.23	0.02	0.31	0.02	0.28	0.03	0.15	0.02	
16+	0.47	0.03	0.18	0.02	0.10	0.02	0.10	0.02	
Income									
<15k	0.06	0.01	0.17	0.01	0.10	0.02	0.08	0.02	0.000
15k–29k	0.18	0.01	0.31	0.02	0.32	0.03	0.34	0.03	
30k–49k	0.17	0.02	0.18	0.02	0.21	0.03	0.21	0.02	
50k +	0.37	0.02	0.19	0.01	0.21	0.03	0.16	0.02	
Missing	0.21	0.02	0.16	0.01	0.15	0.02	0.21	0.03	
Language of Interview									
English	0.91	0.02	1.00	0.00	0.89	0.02	0.30	0.03	0.000
Spanish	0.00	0.00	0.00	0.00	0.11	0.02	0.70	0.03	
Polish	0.09	0.01	—	—	—	—	—	—	
<i>Health Outcomes</i>									
Poor SRH	2.22	0.04	2.62	0.04	2.55	0.06	2.67	0.06	0.000
Depressive Symptoms	1.76	0.02	1.92	0.02	1.91	0.04	1.68	0.03	0.000
Functional Limitation	0.72	0.05	0.98	0.06	0.70	0.08	0.52	0.05	0.000
Chronic Illness	0.68	0.04	1.01	0.04	0.72	0.08	0.47	0.06	0.000

^aDifferences between multi-group comparisons using ANOVA and Chi-squared distribution.

Table 2. Distribution of Number of Stressors by Race (n = 3105)

Stressors	1		2		3		4		5	
	Whites (Mean = 1.12)		Blacks (Mean = 1.92)		Hispanics – All (Mean = 1.52)		Hispanics: American-Born (Mean = 1.90)		Hispanics: Foreign-Born (Mean = 1.23)	
	N	%	N	%	N	%	N	%	N	%
0	404	40	284	24	216	29	79	23	137	34
1	334	31	299	24	242	28	89	22	153	33
2	144	14	245	19	156	20	83	23	73	17
3	96	8	182	14	97	13	49	15	48	11
4	52	4	139	12	56	7	38	12	18	4
5+	33	3	91	7	35	3	24	5	11	2

Table 3. Weighted Prevalence of Stressors (n = 3105)

Stressors	1			2		3		4		5		
	Whites (%)	Blacks (%)	American-Born Hispanics (%)	Foreign-Born Hispanics (%)	Whites		Blacks		American-Born Hispanics		Foreign-Born Hispanics	
					% with 2+ Stressor	Mean # among Those with 2+ Stressors	% with 2+ Stressor	Mean # among Those with 2+ Stressors	% with 2+ Stressor	Mean # among Those with 2+ Stressors	% with 2+ Stressor	Mean # among Those with 2+ Stressors
Early life	16	18 ^{a,b}	25 ^{c,d}	31 ^{c,d}	64	2.34	84 ^{b,c}	3.45 ^{a,b,c}	76	2.90 ^{b,c,d}	69 ^d	2.28 ^{a,d}
Acute life events	14	27 ^{b,c}	27 ^{b,c}	8 ^{a,c,d}	70	2.62	91 ^c	3.56 ^{a,b,c}	87 ^c	3.21 ^{c,d}	79	2.82 ^d
Financial	12	22 ^{b,c}	22 ^{b,c}	12 ^{a,d}	76	2.86	92 ^{b,c}	3.53 ^{b,c}	87 ^c	3.26 ^b	69 ^{a,d}	2.69 ^{a,d}
Relationship	9	29 ^{a,b,c}	20 ^{c,d}	14 ^{c,d}	83	2.72	84	3.22 ^{b,c}	93 ^c	3.51 ^{b,c}	83	2.71 ^{a,d}
Life discrimination	13	32 ^{b,c}	27 ^{b,c}	3 ^{a,c,d}	93	3.20	90	3.42	91	3.27	90	4.10 ^c
Job discrimination	19	22 ^b	26 ^b	14 ^{a,c,d}	71	2.50	91 ^{b,c}	3.49 ^{b,c}	91 ^{b,c}	3.28 ^{b,c}	73 ^{a,d}	2.61 ^{a,d}
Community	10	24 ^{b,c}	22 ^{b,c}	15 ^{a,d}	69	2.59	83 ^c	3.18 ^{b,c}	88 ^c	2.96	80	2.77 ^d
Employment	20	18 ^b	21	26 ^d	63	2.33	86 ^{b,c}	3.29 ^{b,c}	95 ^{b,c,d}	3.13 ^{b,c}	67 ^{a,c,d}	2.17 ^{a,d}

^aDifferent from American-Born Hispanics at p < .05.

^bDifferent from Foreign-Born Hispanics at p < .05.

^cDifferent from Whites at p < .05.

^dDifferent from Blacks at p < .05.

The two exceptions were early life and employment stressors, where foreign-born Hispanics reported the highest prevalence. Columns 2–5 reveal the extent of clustering of stressors. For each racial group, we present (a) the proportion of individuals reporting each stressor and at least one additional stressor and (b) the mean number of stressors among those with two or more stressors. The co-occurrence of multiple stressors tended to be significantly higher among Blacks and American-born Hispanics than for Whites or foreign-born Hispanics. In addition, among those reporting two or more stressors, Blacks and American-born Hispanics reported a higher mean number of stressors than either Whites or foreign-born Hispanics, with Blacks on average reporting the highest.

Associations Between Stressor Domains and Health

Table 4 presents a series of linear regression models for poor SRH and depressive symptoms. Each entry in the first column (Model 1a) comes from a separate regression model and shows that all eight stressors were significantly associated with poor SRH. When all eight stressors were included in a single model simultaneously (Model 2a), financial, relationship, neighborhood, and employment stressors remained significant predictors of poor SRH, and the coefficients for all stressors were reduced. Model 3a, a model that considered the number of stressors rather than the type, showed a roughly linear relationship, whereby each additional stressor was associated with poorer SRH.

Model 4a considers both the types and number of stressors. In this model, the variable for each stressor provides information about the unique association of that stressor with SRH, independent of the other stressors and the number of stressors experienced. The indicator variables for the number of stressors represent the added burden of each additional stressor, independent of the type of stressor experienced. Financial, relationship, lifetime discrimination, neighborhood, and employment stressors maintained significant associations with poor SRH. The coefficients for these stressors can be interpreted as the increase in poor SRH for individuals who scored high only on that particular stressor, and no other stressor, compared to individuals who did not score high on any stressors. The coefficient estimates for the number of stressors were substantially attenuated and no longer associated with poor SRH once the types of stressors were accounted for. This model provides unique insight into the association between stressors and poor SRH. First, it demonstrates that several specific stressors maintained significant associations with poor SRH, after statistical adjustment for the clustering of the stressors. Second, it revealed no added effect of the cumulative number of stressors, once types of stress were accounted for.

Considering models for depressive symptoms, we observed that each stressor was predictive of greater depressive symptoms, both in models that estimated the effect of each stressor independently (Model 1b) and in models that considered all eight stressors simultaneously (Model 2b). Each additional stressor was associated with an increase in depressive symptoms (Model 3b); Model 4b shows that every stressor (life events only marginally significant) was associated with depressive symptoms when adjusting for all other stressors and the number of stressors. In addition, the coefficients for the number of stressors showed a subadditive pattern, as indicated by the increasingly negative coefficients for number of high stress domains. That is, although depressive symptoms increased with the number of stressors (Model 3), once adjusted for the types of stressors, the increasing risk of depressive symptoms with the increasing number of stressors occurs at a significantly decreasing rate as the number of these stressors increase.

Table 4. Estimated Effects of Stressors on Health Outcomes in Single Predictor, Multivariate, Cumulative, and Multivariate-Cumulative Models^a

Stressors	Poor SRH				Depressive Symptoms			
	1a ^b	2a ^c	3a ^d	4a ^e	1b ^b	2b ^c	3b ^d	4b ^e
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)
Early life	0.17** (0.06)	0.07 (0.06)		0.13 ⁺ (0.07)	0.23** (0.03)	0.13** (0.03)		0.18* (0.07)
Acute life events	0.24** (0.06)	0.07 (0.06)		0.14 ⁺ (0.08)	0.23** (0.03)	0.07* (0.03)		0.12 ⁺ (0.07)
Financial	0.38** (0.05)	0.25** (0.06)		0.32** (0.08)	0.29** (0.04)	0.14** (0.03)		0.19** (0.07)
Relationship	0.38** (0.06)	0.29** (0.06)		0.35** (0.08)	0.37** (0.03)	0.27** (0.03)		0.32** (0.07)
Life discrimination	0.25** (0.06)	0.09 (0.06)		0.17* (0.08)	0.32** (0.03)	0.16** (0.03)		0.22** (0.07)
Job discrimination	0.13* (0.05)	0.02 (0.05)		0.08 (0.07)	0.26** (0.03)	0.13** (0.03)		0.19** (0.07)
Community	0.21** (0.05)	0.12* (0.05)		0.19* (0.07)	0.21** (0.04)	0.12** (0.03)		0.18* (0.07)
Employment	0.21** (0.05)	0.16** (0.06)		0.21** (0.07)	0.24** (0.03)	0.17** (0.03)		0.22** (0.06)
Number of Stressors								
0 (Ref)			—	—			—	—
1			0.18** (0.06)	—			0.20** (0.03)	—
2			0.34** (0.06)	-0.05 (0.09)			0.32** (0.04)	-0.10 ⁺ (0.05)
3			0.45** (0.08)	-0.14 (0.15)			0.44** (0.05)	-0.16* (0.08)
4			0.53** (0.09)	-0.26 (0.20)			0.59** (0.05)	-0.22* (0.11)
5+			0.65** (0.12)	-0.43 (0.28)			0.80** (0.05)	-0.31* (0.15)
Constant		2.01** (0.10)	1.98** (0.11)	1.98** (0.11)		1.88** (0.06)	1.86** (0.06)	1.86** (0.06)

**p < 0.01, *p < 0.05, +p < 0.10

^aAll models control for age, gender, race, educational status, language of interview, and income.

^bSeparate models for each stressor.

^cSingle model including all 8 stressors simultaneously.

^dSingle model with 5 indicator variables for number of stressors.

^eSingle model including all 8 types of stressors plus indicator variables for number of stressors.

In Table 5, using Poisson regression models, we replicated models presented in Table 4 for functional limitations and chronic illnesses. For ease of interpretation, the estimated coefficients were transformed into incident rate ratios. For both outcomes, only a subset of stressors maintained significant associations with the outcomes once co-occurring high stressors were accounted for. Life events, financial, relationship, and neighborhood stressors predicted increased risk of functional limitations while life events, financial, and relationship stressors were associated with elevated risk of chronic conditions. The number of stressors was also associated with increasing risk for both outcomes. Of note, all stressors that were significantly associated with the outcomes in Models 2a and 2b maintained significance after adjusting for number of stressors (Models 4a and 4b). Across all four outcomes, relationship and financial stressors were consistently predictive of increasing risk of poor health in the final models.

Table 5. Estimated Effects of Stress on Health Outcomes in Single Predictor, Multivariate, Cumulative, and Multivariate-Cumulative: Poisson Regression with Incident Rate Ratios^a

	Functional Limitation				Chronic Illness			
	1a ^b	2a ^c	3a ^d	4a ^e	1b ^b	2b ^c	3b ^d	4b ^e
Stressors	IRR (CI)	IRR (CI)	IRR (CI)	IRR (CI)	IRR (CI)	IRR (CI)	IRR (CI)	IRR (CI)
Early life	1.26** (1.12–1.42)	1.11 ⁺ (0.99–1.25)		1.14 (0.97–1.35)	1.18* (1.03–1.34)	1.07 (0.93–1.22)		1.07 (0.90–1.27)
Acute life events	1.52** (1.34–1.71)	1.20** (1.06–1.36)		1.24* (1.03–1.50)	1.50** (1.33–1.69)	1.26** (1.11–1.43)		1.27** (1.07–1.51)
Financial	1.55** (1.35–1.80)	1.26** (1.09–1.46)		1.31* (1.06–1.62)	1.56** (1.36–1.80)	1.34** (1.15–1.55)		1.34** (1.11–1.63)
Relationship	1.57** (1.38–1.79)	1.42** (1.23–1.64)		1.47** (1.17–1.84)	1.44** (1.26–1.64)	1.29** (1.11–1.49)		1.28* (1.01–1.63)
Life discrimination	1.42** (1.21–1.67)	1.12 (0.95–1.32)		1.17 (0.95–1.43)	1.33** (1.13–1.55)	1.09 (0.93–1.28)		1.10 (0.90–1.36)
Job discrimination	1.24* (1.00–1.54)	1.06 (0.85–1.32)		1.08 (0.82–1.41)	1.04 (0.87–1.24)	0.93 (0.77–1.11)		0.92 (0.73–1.15)
Neighborhood	1.43** (1.24–1.66)	1.24** (1.07–1.43)		1.28* (1.05–1.56)	1.27** (1.09–1.47)	1.11 (0.96–1.29)		1.12 (0.91–1.38)
Employment	1.26* (1.03–1.54)	1.18 (0.96–1.45)		1.21 (0.96–1.54)	1.06 (0.89–1.27)	1.02 (0.86–1.22)		1.02 (0.83–1.26)
Number of Stressors								
0 (Ref)			—	—			—	—
1			1.27** (1.08–1.50)	—			1.18* (1.01–1.38)	—
2			1.56** (1.32–1.85)	0.97 (0.73–1.28)			1.42** (1.20–1.68)	1.02 (0.78–1.34)
3			1.75** (1.45–2.12)	0.88 (0.58–1.32)			1.69** (1.40–2.03)	1.04 (0.70–1.54)
4			2.04** (1.66–2.51)	0.82 (0.48–1.41)			1.69** (1.35–2.10)	0.88 (0.51–1.51)
5+			3.04** (2.43–3.80)	0.92 (0.43–1.97)			2.35** (1.88–2.95)	1.06 (0.50–2.22)

**p < 0.01, *p < 0.05, +p < 0.10

^aAll models control for age, gender, race, educational status, language of interview, and income.

^bSeparate models for each stressor.

^cSingle model including all 8 stressors simultaneously.

^dSingle model with 5 indicator variables for number of stressors.

^eSingle model including all 8 types of stressors plus indicator variables for number of stressors.

It is also noteworthy that life events stressors were at least marginally significant (p < .10) in the final model for all of our measures of health status.

To examine whether the associations between stressors and health varied by race (differential exposure hypothesis), we tested for interactions between each stressor and race (based on Model 2 above). The overall pattern reflected minimal differences by race (results not shown). Only two stressors (early life stressors and life discrimination) showed significant differences across multiple health outcomes (poor SRH, chronic illness, and psychological distress); for both stressors, the adverse associations between the stressors and health were significantly greater for Whites than for Blacks, American-born Hispanics, and foreign-born Hispanics.

Stressors and Racial Disparities in Health

Table 6 presents racial disparities in health and investigates the extent to which stressor exposure accounts for them. Across all four health outcomes, after adjustment for age, gender, and language of interview (Model 1), Blacks followed by

Table 6. Estimated Effects of Race on Health Outcomes, Before and After Controlling for Stressors

	Poor SRH			Depressive Symptoms			Functional Limitation			Chronic Illness		
	1a ^a	2a ^b	3a ^c	1b ^a	2b ^b	3c ^c	1c ^a	2c ^b	3c ^c	1d ^a	2d ^b	3d ^c
	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	B (SE)	IRR (CI)	IRR (CI)	IRR (CI)	IRR (CI)	IRR (CI)	IRR (CI)
Race												
White (Ref)	—	—	—	—	—	—	—	—	—	—	—	—
Black	0.42** (0.05)	0.23** (0.05)	0.13** (0.05)	0.14** (0.03)	0.05+ (0.03)	-0.05+ (0.027)	1.30** (1.11-1.53)	1.07 (0.91-1.26)	0.97 (0.82-1.14)	1.47** (1.29-1.69)	1.24** (1.08-1.44)	1.16 (1.00-1.34)
American-born Hispanics	0.41** (0.07)	0.21** (0.07)	0.13+ (0.07)	0.11* (0.05)	0.03 (0.05)	-0.05 (0.045)	1.16 (0.93-1.44)	0.97 (0.77-1.23)	0.87 (0.69-1.10)	1.41** (1.18-1.70)	1.17+ (0.97-1.40)	1.06 (0.87-1.28)
Foreign-born Hispanics	0.19* (0.09)	0.07 (0.09)	0.09 (0.09)	-0.13* (0.05)	-0.17** (0.06)	-0.15** (0.046)	0.66* (0.46-0.97)	0.59** (0.41-0.87)	0.61* (0.41-0.92)	0.80 (0.58-1.11)	0.71* (0.52-0.98)	0.74+ (0.53-1.02)
Education												
<12 Years (Ref)	—	—	—	—	—	—	—	—	—	—	—	—
12 Years	-0.16* (0.07)	-0.16* (0.06)	-0.15* (0.06)	-0.06+ (0.04)	-0.06+ (0.04)	-0.05 (0.03)	1.00 (0.84-1.20)	1.00 (0.84-1.20)	1.03 (0.88-1.21)	0.80** (0.68-0.93)	0.80** (0.68-0.93)	0.81** (0.69-0.94)
13-15 Years	-0.23** (0.07)	-0.23** (0.07)	-0.22** (0.07)	-0.10** (0.04)	-0.10** (0.04)	-0.10** (0.03)	0.92 (0.76-1.12)	0.92 (0.76-1.12)	0.95 (0.79-1.13)	0.87+ (0.75-1.02)	0.87+ (0.75-1.02)	0.87+ (0.75-1.02)
16+	-0.48** (0.07)	-0.48** (0.07)	-0.43** (0.07)	-0.15** (0.04)	-0.15** (0.04)	-0.10** (0.04)	0.83+ (0.67-1.03)	0.83+ (0.67-1.03)	0.94 (0.77-1.15)	0.64** (0.53-0.78)	0.64** (0.53-0.78)	0.69** (0.57-0.83)
Income												
<15k (Ref)	—	—	—	—	—	—	—	—	—	—	—	—
15k-29k	-0.09 (0.08)	-0.09 (0.08)	-0.05 (0.09)	-0.04 (0.05)	-0.04 (0.05)	-0.03 (0.03)	0.76** (0.63-0.91)	0.76** (0.63-0.91)	0.85+ (0.71-1.01)	0.91 (0.76-1.10)	0.91 (0.76-1.10)	1.00 (0.83-1.20)
30k-49k	-0.32** (0.10)	-0.32** (0.10)	-0.22* (0.10)	-0.18** (0.05)	-0.18** (0.05)	-0.10* (0.05)	0.55** (0.43-0.70)	0.55** (0.43-0.70)	0.70** (0.56-0.89)	0.70** (0.55-0.89)	0.70** (0.55-0.89)	0.85 (0.67-1.07)
50k +	-0.36** (0.09)	-0.36** (0.09)	-0.23* (0.10)	-0.26** (0.05)	-0.26** (0.05)	-0.17** (0.05)	0.43** (0.34-0.54)	0.43** (0.34-0.54)	0.61** (0.49-0.77)	0.61** (0.57-0.86)	0.61** (0.57-0.86)	0.91 (0.73-1.13)
Missing	-0.26** (0.09)	-0.26** (0.09)	-0.14+ (0.09)	-0.22** (0.06)	-0.22** (0.06)	-0.13* (0.05)	0.61** (0.50-0.74)	0.61** (0.50-0.74)	0.78* (0.64-0.95)	0.78* (0.63-0.92)	0.78* (0.63-0.92)	0.92 (0.77-1.11)

**p < 0.01, *p < 0.05, +p < 0.10

^aControls for age, gender, and language of interview.

^bAbove plus educational status and income.

^cA single model was estimated with 8 indicators variables for types of stressors plus indicator variables for number of stressors. Above controls included.

American-born Hispanics showed the largest health disparities relative to Whites. Compared to Whites, foreign-born Hispanics had poorer SRH but better or comparable health for the other outcomes.

Considering poor SRH, after adjustment for SES (Model 2a), coefficient estimates for Blacks and American-born Hispanics were reduced by close to half, and the effect for foreign-born Hispanics was attenuated to nonsignificance. With the addition of stressors (Model 3a), the coefficients for Blacks and American-born Hispanics were reduced by another 40%, with the elevated risk for the latter group no longer significant. Interestingly, the coefficients for income were also reduced substantially in Model 3, suggesting that at least part of the SES effects were due to stress-related factors. For depressive symptoms, adjustment for SES reduced the coefficient for Blacks to borderline significance, and the coefficient for American-born Hispanics to nonsignificance. Further adjustment for stress domains did not substantively change these coefficients (Model 3b). For foreign-born Hispanics, controlling for SES widened the health advantage for depressive symptoms; after adjustment for stressors, the health advantage slightly decreased but remained significant. Once again, accounting for stress attenuated some of the effect size for SES.

Similar patterns of attenuation are evident for chronic illness in Models 2 and 3. For functional limitations, compared to Whites, Blacks had a 30% greater risk, American-born Hispanics did not differ and foreign-born Hispanics had lower risk. Adjusting for SES reduced the elevated risk for Blacks to nonsignificance but increased the health advantage of foreign-born Hispanics. However, as with other outcomes, the effect size for SES was attenuated substantially in Model 3 after adjustments for stressors, suggesting that a significant portion of the health disparities attributed to SES are driven by stress-related factors.

In supplementary analyses (not shown), we re-estimated Model 3 using three alternative operationalizations of stressors: a) only the eight types of stressors and not the number of stressors, b) only the number of stressors and not the types of stressors, and c) a global composite stressor variable created by summing the standardized values for all the eight stressors and re-standardizing the final measure. The results were robust to these alternative specifications.

DISCUSSION

The present study found significant racial differences in both the levels and clustering of stressors. Blacks exhibited a higher prevalence of stress overall, and compared to Whites, multiple stressors were more common among African Americans reporting any stressors. American-born Hispanics had greater stressor exposure compared to Whites and foreign-born Latinos; their exposure level was comparable to that of Blacks. In contrast, foreign-born Hispanics had a stress profile similar to or lower than that of Whites.

Sociological research on segregation may help explain the higher prevalence of stress exposure among Blacks and American-born Hispanics (Williams et al., 2010). Because of segregation, the conditions under which Blacks and a growing number of Hispanics live are far worse than those of the rest of the population. For those residing in areas of concentrated disadvantage—marked by pathogenic physical and social conditions (e.g., extreme poverty and unemployment, pollution, deteriorating housing, violence)—multiple stressful encounters may be normative.

The substantially lower prevalence of stressors among immigrant Latinos is consistent with past studies (Tillman and Weiss, 2009). These findings highlight the

importance of examining nativity status with Latino populations; stratification of Hispanics by nativity status revealed important differences in stress exposure that would otherwise be masked. There are several possible explanations for the marked variation by place of birth. Immigrant communities may have social support networks or communal resources that protect them from exposure to stress (Viruell-Fuentes 2007). There may also be a selection effect in which immigrants in search of better economic opportunities are predisposed to view the glass as half full rather than half empty and therefore more likely to discount or under-report stressors in their destination community. Alternatively, low rates of stress exposure could reflect measurement limitations, since relevant stressors for immigrants, such as acculturation or legal status (Finch et al., 2004), were not measured. Future research incorporating measures of acculturative stress along with traditionally assessed stressors could help explain the patterns among Hispanic subpopulations.

Our second set of findings, which examined the relationship between stress exposure and health, showed significant associations between at least some stressors and all four outcomes. Two stressors—financial strain and relationship stressors—stood out for their large and consistent association with poor health, even after adjusting for co-occurring stressors and the number of stressors. Our analyses revealed that the associations between stressors and health were remarkably consistent across racial groups. And consistent with prior research (Myers 2009), we found a graded association between the number of stressors and poor health, with each additional stressor associated with worse outcomes. In addition, our analyses showed that the effect of a given stressor will be overestimated if concurrent exposure to other stressors is not accounted for. The greater clustering of stressors and the higher rates of relationship and financial stressors among Blacks and American-born Hispanics suggest that these stressors may be especially important factors in understanding minorities' relatively worse health profiles.

Our final set of findings relates to the role of stressors in explaining health disparities. We did not find support for the stress-vulnerability hypothesis as a mechanism driving racial health disparities. However, for Blacks, and to a lesser extent, American-born Hispanics, stress exposure explained a substantial portion of the health differential, even after adjusting for SES, and regardless of how stress was operationalized. These results may be conservative estimates because of the overlap between SES and stress. In our analyses, low SES appeared to capture not only one's material resources, but also part of the stressful life situations and social environments that accompany them (Pearlin 1989). Our models suggest that stress exposure operates both apart from SES and also through exposure to stressors accompanying low SES.

Interestingly, stress exposure and vulnerability played a minimal role in explaining the health advantage of foreign-born Hispanics over Whites. Foreign-born Hispanics had rates of stress exposure roughly comparable to Whites and showed similar associations with health to those observed for Whites; as such, we would not expect to attribute their health advantage to either exposure or vulnerability to stress. Nevertheless, it remains unclear why despite having poverty levels comparable to those of Blacks, Hispanic immigrants nonetheless have levels of health that are comparable or superior to those of Whites (Williams et al., 2010).

The study has several limitations. First, the data are cross-sectional, so we cannot establish temporal order among the variables. Second, in addition to lacking measures of acculturation stress, other types of stressors were overlooked. For example, there was no assessment of gender-specific stressors such as miscarriages and rape. Third, measures of both stressors and health were self-reported, leading to the potential for shared response biases. Finally, findings from this sample may not generalize beyond Chicago.

Despite these limitations, our findings suggest that greater attention to the role of stress is warranted in future research and policy on racial health disparities. Our paper highlights the value of including a broad range of stressors to develop a more comprehensive understanding of the role of stressors in lives of social groups. In future research, longitudinal studies that examine racial variation in stressful experiences at different stages of the life course could add further insight into the role of stress in contributing to health disparities. From a policy perspective, prevention efforts to reduce racial health disparities should focus on strategies to decrease exposure to stressors and increase resources to cope with stressors for vulnerable populations. Policies and interventions that address the macrolevel structural contexts that shape exposure to a broad range of stressors may offer the most promising avenue toward achieving this aim.

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APPENDIX A: MEASURES OF STRESSORS

1. Acute Life Events (2 measures)

1. Lifetime (4-item inventory, range: 0–4)

(1) Death of child; (2) victim of serious physical attack; (3) life-threatening illness/accident; (4) life-threatening illness/accident to spouse or child.

2. Past 5 Years (11-item inventory, range: 0–11)

(1) Life-threatening illness/accident to someone close to you; (2) death of someone close; (3) involuntary job loss; (4) unemployed and seeking work for 3+ months; (5) household member unemployed and seeking work for 3+ months; (6) moved to worse home/neighborhood; (7) robbed/burglarized;

- (8) serious financial problems; (9) legal trouble; (10) anything else bad happened to you; (11) anything else bad happened to someone close to you.
2. **Employment Stressors (6 measures)**
 1. ***Job Dissatisfaction* (1 item, range: 1–5)**
(1) How satisfied are you with your job (1 = completely, 5 = not at all).
 2. ***No Control* (3-item mean index, range: 1–4, $\alpha = 0.71$)**
(1) Job requires creativity; (2) job allows decision-making; (3) job includes variety of tasks (1 = agree strongly, 4 = disagree strongly).
 3. ***Job Insecurity* (2-item mean index, range: 1–4, $\alpha = 0.24$)**
(1) Likelihood of losing main job in next couple of years (1 = not at all, 4 = very likely); (2) if job is lost, changes of finding another job that paid the same (1 = very good, 4 = poor).
 4. ***Work Demands* (3-item mean index, range: 1–4, $\alpha = 0.68$)**
(1) Not asked to do an excessive amount of work; (2) enough time to get job done; (3) free from conflicting demands (1 = agree strongly, 4 = disagree strongly).
 5. ***Job-Nonjob Conflicts* (2-item mean index, range: 1–4, $\alpha = 0.91$)**
Job leaves me feeling too tired/stressed after work to participate in: (1) activities with friends/family; (2) activities with neighborhood/community (1 = disagree strongly, 4 = agree strongly).
 6. ***Job Hazards* (3-item mean index, range: 1–3, $\alpha = 0.71$)**
(1) Problem with exposure to dangerous chemicals on job; (2) problem with exposure to air pollution on job; (3) extent job exposes you to risk of injury/accident (1 = not exposed, 3 = exposed and a sizable/great problem).
 3. **Financial Stressors (2 measures)**
 1. ***Financial Strain* (2-item mean index, range: 1–5, $\alpha = 0.68$)**
(1) How satisfied are you with your/your family's financial situation (1 = completely, 5 = not at all); (2) how difficult is it to meet monthly bill payments (1 = not at all, 5 = extremely).
 2. ***Total Economic Problems* (7-item inventory, range: 0–7)**
In the last year, which have you done as the result of economic problems to cover daily expenses: (1) sold possessions/cashed in life insurance; (2) postponed seeing a doctor/health professional; (3) been unable to purchase prescribed medications; (4) borrowed money from friends/relatives; (5) applied for government assistance; (6) obtained a loan to consolidate or pay off debt; (7) moved to cheaper living quarters/in with other people.
 4. **Life Discrimination (2 measures)**
 1. ***Life Events* (4-item summary measure, range: 0–21, $\alpha = 0.46$)**
(1) Unfairly fired from a job/unfairly denied promotion; (2) not hired for a job; (3) unfairly treated by police; (4) unfairly prevented from moving into a neighborhood (1 = only 1 time, 4 = 6 or more times).
 2. ***Everyday Discrimination* (5-item mean index, range: 1–5, $\alpha = 0.77$)**
(1) Treated with less courtesy/respect than other people; (2) poorer service than others at restaurant/store; (3) people act afraid of you; (4) threatened/harassed; (5) people act as if they think you are not smart (1 = never, 5 = at least once a week).

5. Job Discrimination (2 measures)

1. Job Harassment (2-item mean index, range: 1–5, $\alpha = 0.76$)

How often supervisor/coworkers make slurs or jokes (1) about racial or ethnic groups; (2) about women (1 = never, 5 = 1+ times/week).

2. Treated Unfairly on Job (3-item mean index, range: 1–5, $\alpha = 0.73$)

In the last 12 months, how often have you (1) worked twice as hard to get same treatment/evaluation; (2) been watched more closely than other workers; (3) been unfairly humiliated (1 = never, 5 = 1 + times/week).

6. Relationship Stressors (5 measures)

1. Marital Stressors (4-item mean index, range: 1–5, $\alpha = 0.67$)

(1) Frequency bothered/upset by marriage/relationship (1 = never, 5 = very often); (2) spouse makes too many demands (1 = not at all, 5 = a great deal); (3) spouse is critical (1 = not at all, 5 = a great deal); (4) when you disagree, how often do you work things out so that both are satisfied (1 = very often, 5 = never).

2. Marital Abuse (4-item mean index, range: 1–4, $\alpha = 0.57$)

Indicate how often your partner/spouse: (1) drinks too much; (2) pushes/slaps/hits you; (3) wastes money the family needs; (4) yells or screams at you (1 = never, 4 = all the time).

3. Child-Related Stressors (3-item mean index, range: 1–5, $\alpha = 0.57$)

(1) Children make too many demands (1 = not at all, 5 = a great deal); (2) frequency you feel bothered/upset as a parent (1 = never, 5 = almost always); (3) happy with the way children have turned out (1 = very happy, 5 = not at all).

4. Problems for Children (6-item inventory, range: 0–6)

Do any of your children currently have problems with: (1) finances; (2) employment; (3) health; (4) close relationships; (5) relationship with you/spouse; (6) anything else.

5. Friend Criticism (2-item mean index, range: 1–5, $\alpha = 0.60$)

(1) How often do friends/relatives make too many demands (1 = never, 5 = all the time); (2) are they critical of you (1 = not at all, 5 = a great deal).

7. Early Life Stressors (3 measures)

1. Parental Stressors (3-item mean index, range: 1–5, $\alpha = 0.73$)

Thinking about the years until you were 12, how much did your parents (1) make you feel loved; (2) physically threaten or abuse you; (3) verbally threaten or abuse you (1 = not at all, 5 = a great deal).

2. Parental Educational Involvement (2-item mean index, range: 1–5, $\alpha = 0.65$)

(1) How much did parents participate in school activities; (2) did parents or other adults read to you (1 = a great deal, 5 = never).

3. Hunger (1 item, range: 1–5)

(1) For most of the years before age 12, how often did you go to bed at night feeling hungry (1 = never, 5 = very often).

8. Community Stressors (3 measures)

1. *Violence (5-item inventory, range: 0–5)*

In the past 6 months, has there been (1) a neighborhood fight involving a weapon; (2) a violent argument between neighbors; (3) gang fights; (4) sexual assault or rape; (5) robbery or mugging.

2. *Total Victimization (4-item inventory, range: 0–4)*

In the past 6 months, has (1) anyone ever used violence against you or anyone in your household in your neighborhood; (2) your home been broken into; (3) anything been stolen from yard/porch/garage; (4) the exterior of your home or property been damaged.

3. *Disorder (5-item mean index, range: 1–4, $\alpha = 0.80$)*

In neighborhood, frequency of seeing (1) broken glass/trash on sidewalks and streets; (2) graffiti on buildings/walls; (3) vacant/deserted houses/storefronts; (4) drinking in public; (5) unsupervised children on the street (1 = none, 5 = a lot/often).