



Reconsidering Allostatic Load Measurement: Longitudinal Biomarker-Cognition Associations In Black And White Americans

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BACKGROUND

- Black Americans are twice as likely to develop Alzheimer’s disease and related dementias (ADRD) than White Americans
- Allostatic load (AL), representing cumulative multisystem physiological dysregulation from chronic psychosocial stress, could be a potential mechanism for racial disparities in ADRD
- Current information on biological pathways underlying adverse cognitive changes is based on studies of primarily White samples; thus population-level research including Black adults is needed to better understand racial disparities
- AL measurement is not standardized; understanding biomarker contributions and patterns of missingness is important for interpreting the composite measure

RESEARCH AIMS

- To explore longitudinal relationships between cognitive function, multisystem biomarkers, and multiple measures of AL in midlife and older adults in the Health and Retirement Study (HRS), stratified by race.

METHODS

Study sample: Non-Hispanic Black (NHB) and Non-Hispanic White (NHW) participants >50 years old in the 2006-2016 HRS waves

Key Variables

- Biomarkers:** Systolic/diastolic blood pressure, waist circumference (WC), and weight were collected during in-home exams. Weight-Adjusted Waist Index (WWI) was calculated as WC divided by the square root of weight. Remaining biomarkers were measured from dried blood spot samples using NHANES-adjusted values (Table 1)
- Allostatic Load (AL):** Biomarkers were categorized into race-specific quartiles. High risk was defined as the highest quartile for all biomarkers except HDL, where the lowest quartile indicated high risk. Then binary high-risk indicators were summed as a count variable (range:0-8). AL measures are as follows:
1) Included participants regardless of missing biomarkers
2) Set AL to missing if ≥50% of biomarkers were missing
3) Set AL to missing if any biomarker was missing
4) Replaced WC with WWI and set AL to missing if any biomarker was missing

Analyses

- Descriptive statistics:** Differences in baseline characteristics and biomarkers between NHB and NHW samples were examined using chi-square and t-tests
- Mixed linear regression models with random intercepts:** Predicted the relationship between cognitive function, quartile biomarkers, and AL
 - Between-person effects indicate how differences between individuals impact the outcome
 - Within-person effects indicate how change within an individual across waves influences the outcome

RESULTS

Table 1. Means (SDs) and proportions (%) based on person-wave observations (N=37,413) for NHW and NHB, HRS 2006–2016

	NH White (N=29,801)	NH Black (N=7,612)
Cognitive Function	15.7 (4.1)	12.9 (4.3)***
Biomarkers/Allostatic Load (AL)		
Glycosylated Hemoglobin (HBA1C)	5.8 (0.88)	6.3 (1.31)***
High-Density Lipoprotein (HDL)	54.8 (17)	54.8 (17)
Total Cholesterol	196.6 (43)	194.3 (42)***
Cystatin C	1.1 (0.47)	1.1 (0.71)
C-reactive Protein (CRP)	3.8 (7.5)	5.4 (9.9)***
Waist Circumference (WC)	40.0 (6)	41.1 (6)***
Weight Adjusted Weight Index (WWI)	4.44 (0.59)	4.42 (0.34)***
Systolic Blood Pressure	129.2 (20)	133.7 (22)***
Diastolic Blood Pressure	78.0 (11)	81.6 (13)***
AL 1. With WC, missingness not adjusted	1.85 (1.43)	1.80 (1.40)**
AL 2. With WC, > half missing set to missing	1.93 (1.43)	1.91 (1.39)
AL 3. With WC, any missing set to missing	1.99 (1.45)	1.98 (1.41)
AL 4. With WWI, any missing set to missing	1.97 (1.42)	1.97 (1.38)
Demographics		
Age	69.2 (10)	64.7 (10)***
Women	57%	62%***
Income (logged \$)	10.74 (1.14)	10.00 (1.67)***
Wealth (logged \$)	12.05 (2.23)	9.23 (3.92)***
Number of Years in School	13.56 (5.27)	12.71 (6.60)***
Urban Dwelling	45%	64%***
Health Behaviors		
Current Smoker	44%	41%***
Never Drink	59%	70%***
Never Vigorous/Moderate Physical Activity	58%	64%***

*=p<.05;**=p<.01;***=p<.001

Figure 1. Beta coefficients and p values for regressions between biomarkers and cognitive function

