Life course socioeconomic status, allostatic load, and kidney health in Black Americans

Supplemental File

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Supplemental Table 1: Baseline characteristics of Jackson Heart Study participants stratified by inclusion status

Baseline characteristics*	**Overall *N*=5306**	**Excluded *N*=1885**	**Included *N*=3421**
Cumulative lifetime socioeconomic status			
Lowest tertile	1767 (33)	735 (39)	1032 (30)
Middle tertile	1766 (33)	594 (32)	1172 (34)
Highest tertile	1770 (33)	553 (29)	1217 (36)
Demographics			
Age, years	55 ± 13	56 ± 12	55 ± 13
Sex: male	1935 (37)	659 (35)	1276 (37)
Annual Income***	43 ± 30	40 ± 29	45 ± 30
Education: ≤12th grade	2028 (38)	800 (42)	1228 (36)
Behavioral factors			
Current/former smoker	1716 (32)	687 (36)	1029 (30)
Use of routine care	3821 (72)	1350 (72)	2471 (72)
Comorbidities			
Diabetes	1145 (22)	414 (22)	731 (21)
Diabetes medication	747 (14)	260 (14)	487 (14)
Hypertension	2996 (57)	1060 (56)	1936 (57)
BP lowering medication	2508 (47)	844 (45)	1664 (49)
Cardiovascular disease	572 (11)	203 (11)	369 (11)
Baseline kidney function			
eGFR, ml/min/1.73 m^2	94 ± 22	96 ± 18	93 ± 24
UACR, median [IQR], mg/g	6 [4-13]	7 [5-9]	6 [4-13]
Prevalent CKD	673 (13)	0 (0)	673 (20)
Allostatic load			
Composite z score****	0 ± 0.4	0 ± 0.5	0 ± 0.4
Biologic components			
Cortisol, mmol/L	9.9 ± 4.1	10.3 ± 4.2	9.6 ± 4
HBA1c, %	6 ± 1.3	6 ± 1.4	6 ± 1.2
LDL cholesterol, mg/dl	126 ± 37	126 ± 37	126 ± 37
HDL cholesterol, mg/dl	52 ± 15	53 ± 15	51 ± 14
Total cholesterol, mg/dl	199 ± 40	200 ± 40	198 ± 40
Waist circumference, cm	101 ± 16	101 ± 16	101 ± 16
Systolic BP, mmHg	128 ± 17	129 ± 17	127 ± 17
Diastolic BP, mmHg	76 ± 9	75 ± 9	76 ± 9
Resting heart rate, bpm	65 ± 11	65 ± 11	65 ± 11
CRP, median [IQR], mg/dl	0.3 [0.1-0.6]	0.3 [0.1-0.6]	0.3 [0.1-0.6]
WBC, 1000 cells/cmm	5.6 ± 2.1	5.6 ± 1.8	5.6 ± 2.2

UACR, urine albumin-to-creatinine ratio; BP, blood pressure; bpm, beats per minute; CRP, c-reactive protein; WBC, white blood cells.
*Values are n (%) or mean ±SD, unless stated otherwise
**Composite of childhood socioeconomic status, education attainment, and annual family income.
***Annual family income scaled in USD 1000

****Men and women had separate z score for waist circumference; we multiplied the HDL z score by -1.

Supplemental Table 2: Baseline characteristics of participants in the Jackson Heart Study stratified by tertiles of allostatic load

Baseline characteristics	Overall	Allostatic load, tertiles		
		Lowest	Middle	Highest
No. of participants (%)	5305	1768 (33)	1768 (33)	1769 (33)
Allostatic load range	-1.1 to 6.7	-1.1 to 6.7	-1.1 to 2.3	-1.1 to 2.9
Socioeconomic status measures				
Cumulative lifetime	-0.01 ±0.8	0.14 ±0.75	0 ±0.81	-0.15 ±0.79
Childhood	4.77 ±2.98	5.21 ±2.93	4.68 ±2.97	4.4 ±2.97
Perceived	6.29 ±2.21	6.3 ±2.15	6.33 ±2.24	6.23 ±2.23
Demographics				
Age, years	55 ±13	53 ±13	56 ±13	57 ±12
Sex: male	1935 (37)	495 (28)	690 (39)	750 (42)
Annual Income*	43 ±29.7	46.3 ±30.1	44.7 ±30.2	38.1 ±28.2
Education: ≤12th grade	2028 (38)	550 (31)	676 (38)	802 (45)
Behavioral factors				
Current/former smoker	1715 (32)	485 (27)	576 (33)	654 (37)
Use of routine care	3820 (72)	1242 (70)	1300 (74)	1278 (72)
Comorbidities				
Diabetes	1145 (22)	172 (10)	347 (20)	626 (35)
Hypertension	2996 (57)	703 (40)	1017 (58)	1276 (72)
Cardiovascular disease	572 (11)	137 (8)	188 (11)	247 (14)
Baseline kidney function				
eGFR, ml/min/1.73 m^2	94 ±22	98 ±20	94 ±21	91 ±24
Urine UACR, median [IQR], mg/g	6 [4 to 13]	5 [4 to 9]	6 [4 to 11]	9 [5 to 26]
Prevalent CKD	672 (20)	128 (11)	186 (16)	358 (33)

Values are n (%) or mean ±SD, unless stated otherwise; UACR, albumin-to-creatinine ratio.
*Annual family income scaled in USD 1000

Supplemental Table 3: Association of allostatic load with kidney outcomes with additional adjustment for diet, physical activity, and sleep in the Jackson Heart Study

Models	**Prevalent CKD Odds ratio (95% CI)**	**Incident CKD Odds ratio (95% CI)**	**eGFR decline β (95% CI)**
No. of CKD events/*N* or *N*	593/3010	225/1817	2153
Allostatic load*			
Model 1	1.89 (1.73, 2.07)	1.46 (1.29, 1.65)	0.20 (0.13, 0.26)
Model 2	1.83 (1.66, 2.03)	1.40 (1.21, 1.61)	0.12 (0.04, 0.20)
Model 3	NA	1.41 (1.21, 1.61)	0.06 (-0.02, 0.14)

*Estimates are per 1 SD higher allostatic load; CI, confidence interval; NA, not applicable
Model 1: unadjusted
Model 2: adjusted for age, sex, use of routine care, smoking status, diet, physical activity, sleep, and cardiovascular disease
Model 3: adjusted for baseline eGFR; the eGFR decline model additionally adjusted for baseline urine albumin-to-creatinine ratio

Supplemental Table 4: Direct and mediated (*via* allostatic load) associations of cumulative lifetime socioeconomic status with kidney outcomes after additional adjustment for diet, physical activity, and sleep pattern

	Prevalent CKD		Incident CKD		eGFR decline	
	Direct association OR (95% CI)	Mediated association OR (95% CI)	Direct association OR (95% CI)	Mediated association OR (95% CI)	Direct association β (95% CI)	Mediated association β (95% CI)
No. of events	593/3009		225/1817		2153	
CLSES*	1.17 (1.03, 1.33)	1.08 (1.05, 1.12)	0.95 (0.78, 1.15)	1.03 (1.01, 1.06)	-0.01 (-0.12, 0.10)	0.01 (0, 0.02)
CLSES Tertiles						
Lowest	1.48 (1.15, 1.90)	1.17 (1.1, 1.24)	0.87 (0.60, 1.26)	1.07 (1.01, 1.14)	-0.03 (-0.23, 0.17)	0.01 (-0.01, 0.03)
Middle	1.26 (0.97, 1.63)	1.08 (1.02, 1.13)	0.82 (0.55, 1.21)	1.04 (1.00, 1.09)	0.05 (-0.14, 0.24)	0.01 (0, 0.02)
Highest	Reference	Reference	Reference	Reference	Reference	Reference

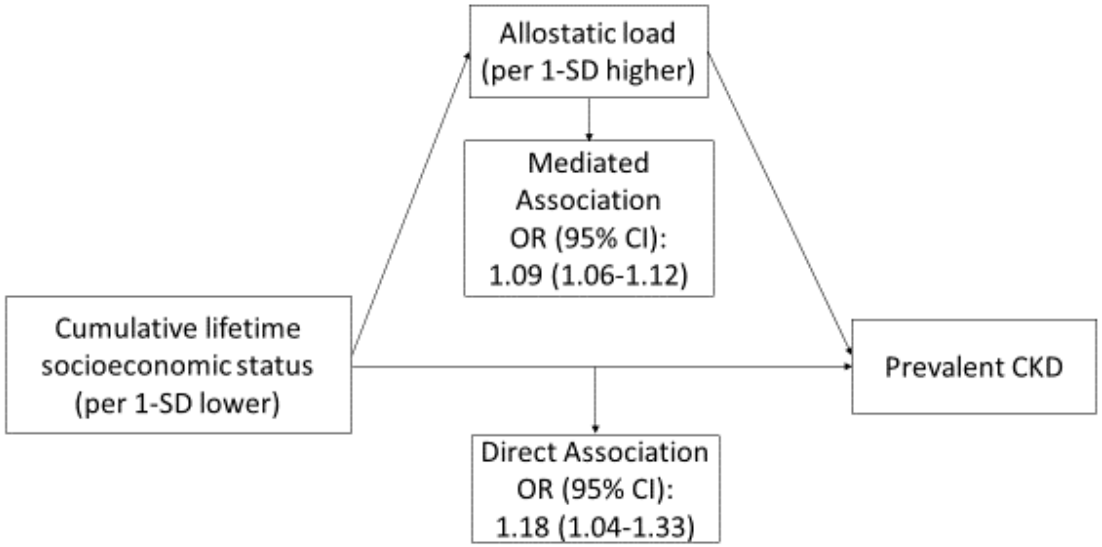
OR, odds ratio; CI, confidence interval; CLSES, cumulative lifetime socioeconomic status
*Estimates are per 1 SD lower CLSES
All models adjusted for age, sex, use of routine care, smoking status, diet, physical activity, sleep pattern, and cardiovascular disease; the eGFR decline model additionally adjusted for baseline albumin-to-creatinine ratio and eGFR.

Supplemental Table 5: Direct and mediated (*via* allostatic load) associations of different measures of socioeconomic status with kidney outcomes

SES measures*	Prevalent CKD		Incident CKD		eGFR decline	
	Direct association OR (95% CI)	Mediated association OR (95% CI)	Direct association OR (95% CI)	Mediated association OR (95% CI)	Direct association β (95% CI)	Mediated association β (95% CI)
Childhood SES	0.98 (0.93, 1.02)	1.00 (0.99, 1.01)	0.96 (0.90, 1.03)	1.00 (0.99, 1.01)	0.03 (-0.01, 0.07)	0.00 (0.00, 0.00)
Education	1.05 (1.02, 1.07)	1.01 (1.01, 1.02)	1.00 (0.97, 1.04)	1.01 (1.00, 1.01)	-0.01 (-0.03, 0.01)	0.00 (0.00, 0.00)
Income	1.08 (1.04, 1.12)	1.03 (1.02, 1.04)	1.05 (1.00, 1.10)	1.01 (1.01, 1.02)	0.00 (-0.02, 0.03)	0.00 (0.00, 0.01)
Perceived SES	0.99 (0.95, 1.03)	1.01 (1.00, 1.02)	1.04 (0.98, 1.11)	1.00 (0.99, 1.01)	0.03 (-0.01, 0.06)	0.00 (0.00, 0.00)

OR, odds ratio; CI, confidence interval; SES, socioeconomic status; CLSES, cumulative lifetime SES
*Estimates are per 1 score lower SES measure
All models adjusted for age, sex, use of routine care, smoking status, and cardiovascular disease; the eGFR decline model additionally adjusted for baseline albumin-to-creatinine ratio and eGFR.

A.



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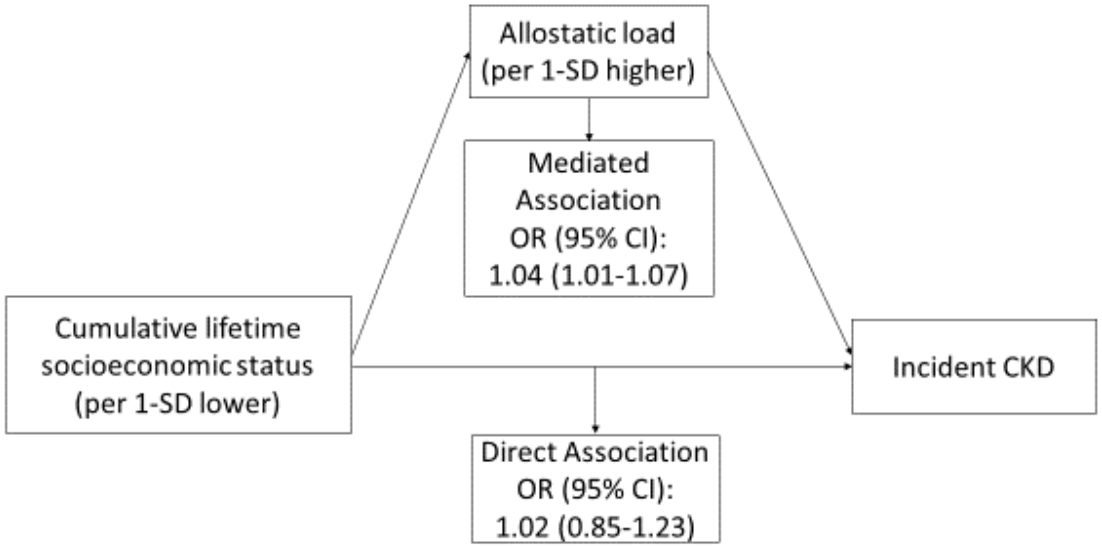

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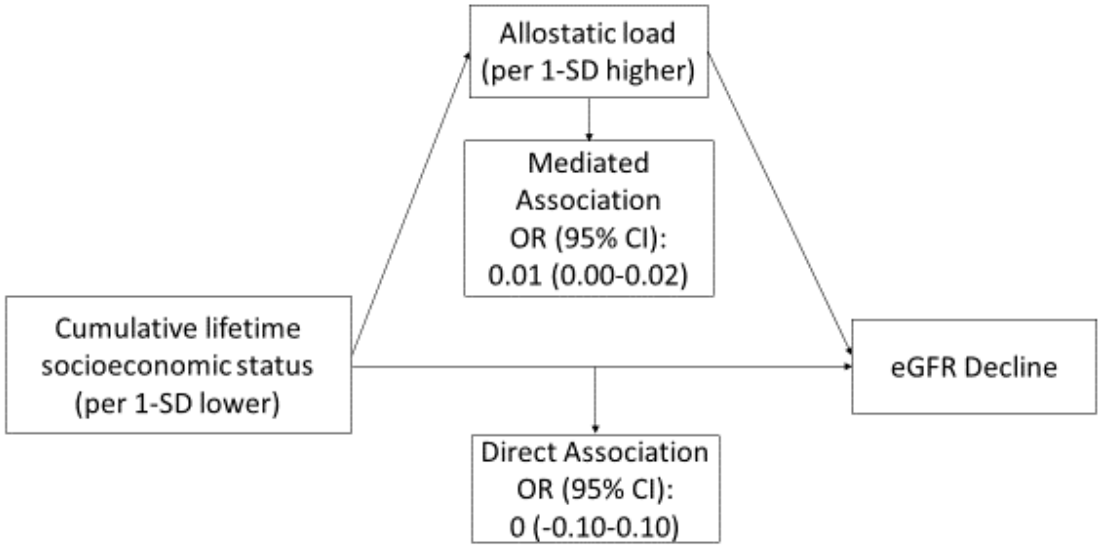

Supplemental Figure 1: Direct and mediated (via allostatic load) associations of cumulative lifetime socioeconomic status with kidney outcomes. A, Prevalent CKD; B, Incident CKD; C, eGFR Decline.