

Racial Disparities in Adversity During Childhood and the False Appearance of Race- Related Differences in Brain Structure

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Table 1: Demographic characteristics of participants in a study of childhood adversity and brain structure

Characteristic	Total N	White American		Black American		Analysis		
		Mean	SD	Mean	SD	Statistic	df	p
Age (months)	9,382	119.03	7.50	118.82	7.26	t=1.09	9380	0.28
		N	%	N	%			
Gender	9,382					$\chi^2=5.86$		0.02
Male		3,989	53.1	934	50.1			
Female		3,527	46.9	932	49.9			
Parental education	9,373					t=33.15 ^a	2802	<0.001
Grade school		288	3.8	221	11.9			
High school diploma or equivalent		520	6.9	449	24.1			
Some college		1,054	14.0	436	23.4			
Associate's degree		907	12.1	314	16.9			
Bachelor's degree		2,490	33.1	237	12.7			
Master's degree		1,719	22.9	179	9.6			
Doctoral or professional degree		534	7.1	25	1.3			
Parental employment	9,121					$\chi^2=344.90$		<0.001
Not currently employed		409	5.6	342	19.0			
Currently employed		6,914	94.4	1456	81.0			
Annual family income	8,654					t=40.30 ^a	1985	<0.001
<\$5,000		88	1.2	225	14.2			
\$5,000–\$11,999		128	1.8	178	11.2			
\$12,000–\$15,999		97	1.4	93	5.9			
\$16,000–\$24,999		226	3.2	155	9.8			
\$25,000–\$34,999		301	4.3	194	12.2			
\$35,000–\$49,999		463	6.5	211	13.3			
\$50,000–\$74,999		987	14.0	221	13.9			
\$75,000–\$99,999		1,164	16.5	122	7.7			
\$100,000–\$199,999		2,611	36.9	153	9.7			
>\$200,000		1,004	14.2	33	2.1			

Table 1: Demographic characteristics of participants in a study of childhood adversity and brain structure, CONT'D

		Mean	SD	Mean	SD			
Neighborhood disadvantage ^b	8,840	90.30	23.91	105.94	22.25	$t = -25.66^a$	2706	<0.001
Family conflict ^b	9,363	1.96	1.94	2.43	2.01	$t = -9.17^a$	2786	<0.001
Material hardship ^b	9,296	0.30	0.89	1.01	1.49	$t = -19.63^a$	2166	<0.001
Trauma history ^b	9,043	0.48	1.10	0.67	1.02	$t = -7.26^a$	2965	<0.001

^a The test was corrected for unequal variances because of violation of Levene's test for homogeneity of variance.

^b Neighborhood disadvantage, family conflict, material hardship, and trauma history are four of the seven indices of adversity included in the statistical models. Neighborhood disadvantage was quantified using the weighted Area Deprivation Index sum score. Family conflict was quantified using the Youth Family Conflict Scale. Material hardship was quantified using the questions in the participant demographic screener. Trauma history was assessed using the Schedule for Affective Disorders and Schizophrenia for School-Age Children for DSM-5. See the Methods section for further detail.

Figure 1: Race-related differences in regional gray matter volume in a study of childhood adversity and brain structure

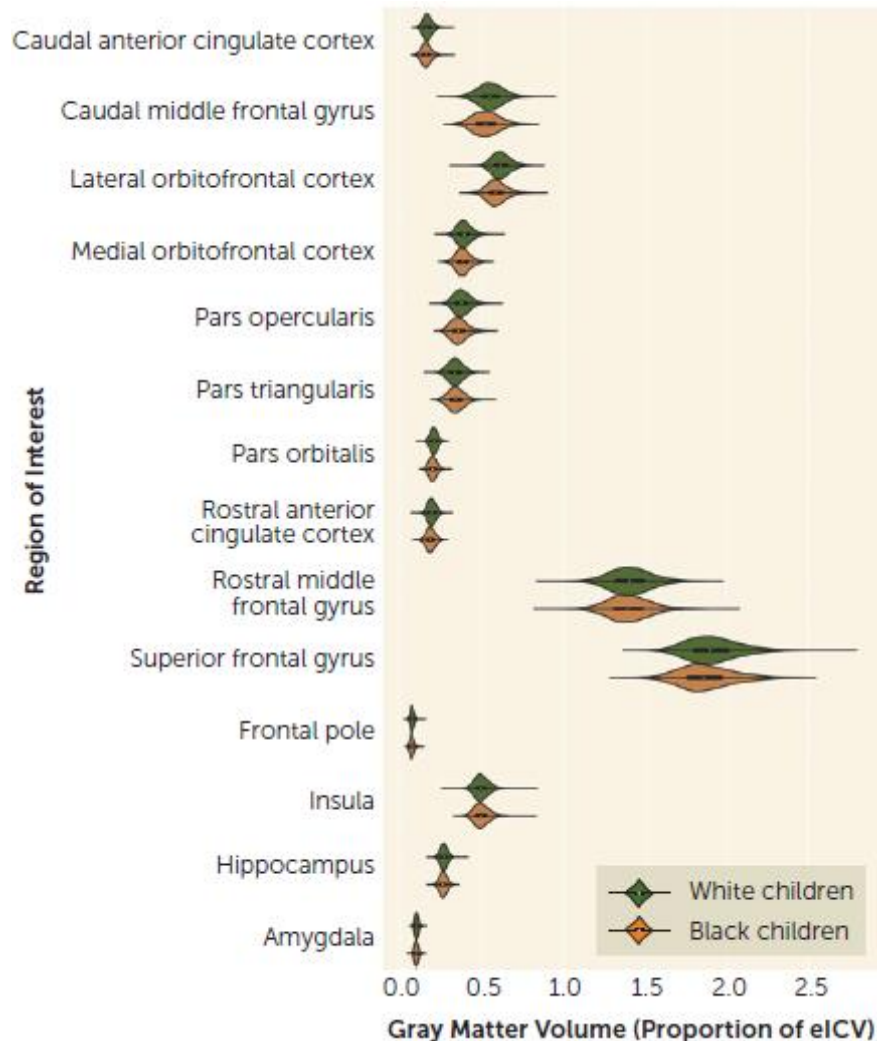


Table 2: Race-related differences in gray matter volume (in mm³) of a priori regions of interest in a study of childhood adversity and brain structure

Region	White American		Black American		t	p
	Estimated Marginal Mean	SE	Estimated Marginal Mean	SE		
Caudal anterior cingulate cortex	0.173	0.000	0.168	0.001	6.00	<0.001 ^b
Caudal middle frontal gyrus	0.558	0.001	0.536	0.002	10.53	<0.001 ^b
Lateral orbitofrontal cortex	0.631	0.001	0.610	0.001	16.13	<0.001 ^b
Medial orbitofrontal cortex	0.406	0.001	0.405	0.001	0.95	0.340
Pars opercularis	0.385	0.001	0.370	0.001	11.32	<0.001 ^b
Pars triangularis	0.346	0.001	0.353	0.001	-4.77	<0.001 ^b
Pars orbitalis	0.210	0.000	0.207	0.001	6.85	<0.001 ^b
Rostral anterior cingulate cortex	0.199	0.000	0.191	0.001	10.54	<0.001 ^b
Rostral middle frontal gyrus	1.421	0.002	1.423	0.003	-0.53	0.593
Superior frontal gyrus	1.939	0.002	1.912	0.004	7.09	<0.001 ^b
Frontal pole	0.080	0.000	0.078	0.000	6.77	<0.001 ^b
Insula	0.502	0.001	0.504	0.001	-1.53	0.127
Hippocampus	0.272	0.000	0.270	0.001	4.26	<0.001 ^b
Amygdala	0.109	0.000	0.108	0.000	4.93	<0.001 ^b

^a N=8,237 for this analysis. The t statistics were obtained from linear mixed-effects models that also accounted for effects of scanner type, age, gender, and family relatedness.

^b The t test result was significant after Bonferroni correction (0.05/14=0.0035).

Table 3: Summary of mixed-effects analyses predicting gray matter volume in a study of childhood adversity and brain structure

Region	Material Hardship		Parental Employment		Family Income	
	b	t	b	t	b	t
Caudal anterior cingulate cortex	-0.001	-2.34*	0.002	1.22	<0.001	2.21*
Caudal middle frontal gyrus	-0.002	-2.48*	-0.001	-0.14	0.002	4.54***
Lateral orbitofrontal cortex	<-0.001	-0.36	0.001	0.32	0.002	6.26***
Medial orbitofrontal cortex	<-0.001	-0.87	-0.001	-0.52	0.001	2.20*
Pars opercularis	<0.001	0.09	<-0.001	-0.05	0.002	4.67***
Pars triangularis	<-0.001	-0.46	-0.002	-0.86	<-0.001	-0.94
Pars orbitalis	<-0.001	-0.49	-0.001	-1.25	0.001	3.67***
Rostral anterior cingulate cortex	<-0.001	-0.83	-0.002	-1.55	0.001	4.61***
Rostral middle frontal gyrus	-0.003	-1.92	-0.009	-1.44	0.001	1.51
Superior frontal gyrus	-0.002	-1.04	<-0.001	-0.03	0.005	5.30***
Frontal pole	<-0.001	-1.59	-0.001	-1.18	<0.001	3.06**
Insula	<-0.001	-0.34	-0.003	-1.55	<0.001	1.30
Hippocampus	<-0.001	-0.14	0.001	0.48	<0.001	1.23
Amygdala	<0.001	0.41	0.001	2.35*	<0.001	0.73

Table 3: Summary of mixed-effects analyses predicting gray matter volume in a study of childhood adversity and brain structure, CONT'D

Parental Education		Family Conflict		Neighborhood Disadvantage		Trauma History	
b	t	b	t	b	t	b	t
<0.001	0.72	<-0.001	-0.60	<0.001	0.37	<-0.001	-1.03
<0.001	0.11	-0.001	-1.61	<-0.001	-1.05	<-0.001	-0.14
<-0.001	-0.31	<-0.001	-1.34	<-0.001	-0.32	0.001	2.00*
-0.001	-1.49	<0.001	1.07	<0.001	0.77	<0.001	0.90
-0.001	-2.92**	<0.001	0.55	<0.001	0.10	<0.001	0.56
-0.001	-1.81	<0.001	1.01	<0.001	2.01*	<-0.001	-0.18
<0.001	1.06	<0.001	1.22	<-0.001	-0.43	<0.001	1.41
<0.001	0.63	<0.001	0.33	<0.001	0.30	<0.001	0.71
0.003	2.88**	-0.001	-1.26	<0.001	0.94	0.002	1.79
<0.001	0.16	-0.001	-0.84	<0.001	0.37	0.001	1.09
<0.001	0.81	<-0.001	-0.19	<0.001	1.08	<-0.001	-0.57
-0.001	-2.45*	<0.001	0.11	<0.001	3.10**	<-0.001	-0.31
<-0.001	-0.12	<0.001	0.36	<0.001	1.51	<-0.001	-1.37
<0.001	0.66	<-0.001	-0.44	<-0.001	-0.65	<-0.001	-1.51

Table 4: Summary of parallel mediation analyses of race-related effects on gray matter volume accounting for adversity

Region	Total Effect (c)	p	Total Indirect Effect (ab)	p	Direct Effect (c')	p	Percentage Mediated ^b (%)
Caudal anterior cingulate cortex ^c	-0.17	<0.001	-0.04	0.006	-0.13	<0.001	26.04
Caudal middle frontal gyrus ^c	-0.29	<0.001	-0.09	<0.001	-0.20	<0.001	30.58
Lateral orbitofrontal cortex ^c	-0.45	< 0.001	-0.03	0.034	-0.41	<0.001	7.40
Medial orbitofrontal cortex	-0.03	0.333	-0.02	0.287	-0.01	0.748	—
Pars opercularis	-0.31	<0.001	0.01	0.613	-0.32	<0.001	2.57
Pars triangularis ^c	0.13	<0.001	0.06	<0.001	0.08	0.02	42.42
Pars orbitalis ^c	-0.19	<0.001	-0.04	0.008	-0.15	<0.001	21.88
Rostral anterior cingulate cortex	-0.29	<0.001	-0.03	0.098	-0.27	<0.001	8.93
Rostral middle frontal gyrus	0.02	0.597	-0.09	<0.001	0.10	0.001	—
Superior frontal gyrus ^c	-0.20	<0.001	-0.10	<0.001	-0.10	0.003	50.76
Frontal pole ^c	-0.19	<0.001	-0.04	0.006	-0.15	<0.001	23.28
Insula	0.05	0.116	0.02	0.155	0.02	0.501	—
Hippocampus	-0.12	<0.001	-0.01	0.765	-0.11	<0.001	4.27
Amygdala	-0.14	<0.001	-0.01	0.582	-0.13	<0.001	6.67

Figure 2: Effects of racial disparities in childhood adversity on race-related differences in brain structure

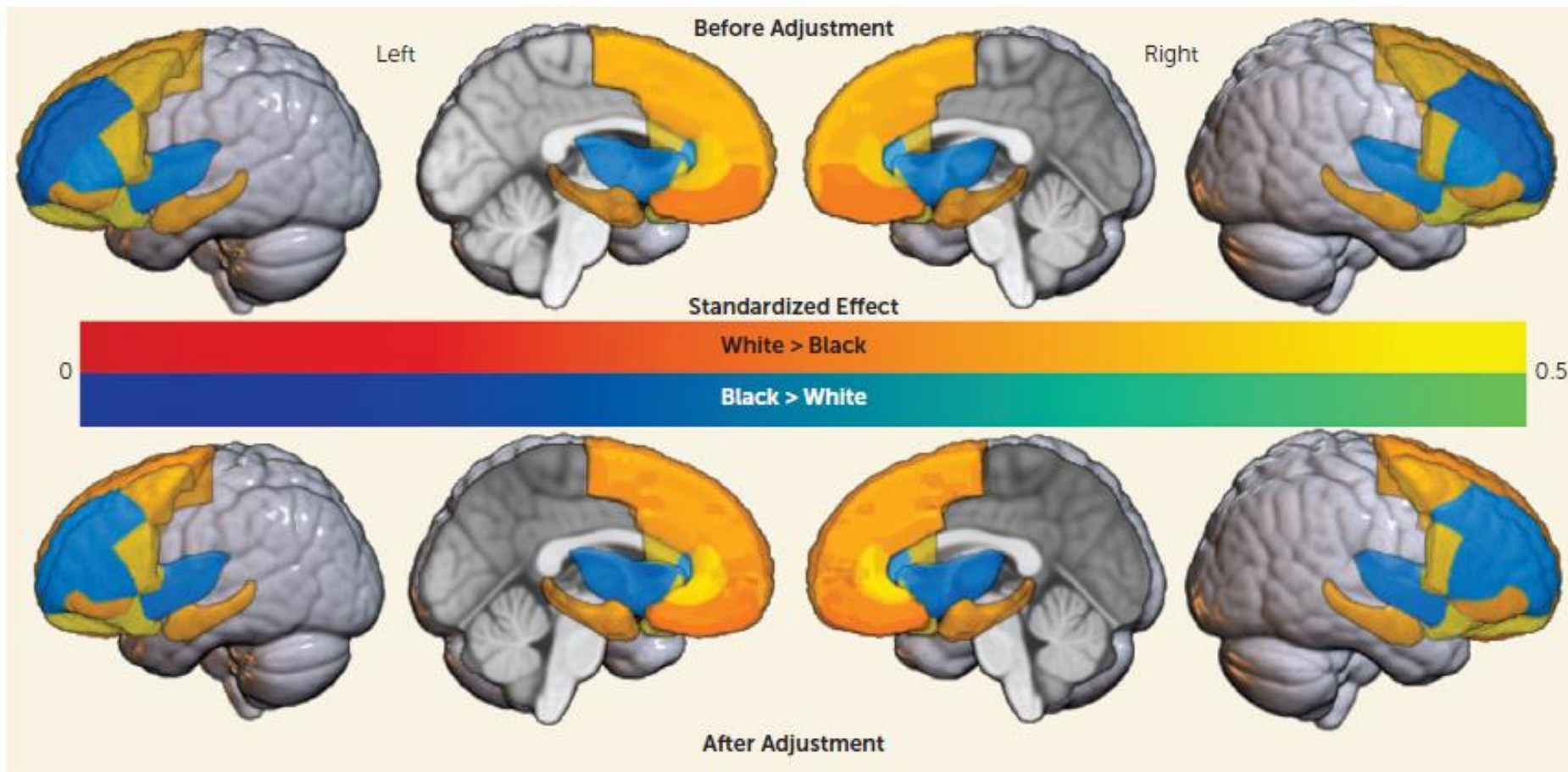


Figure 2: Effects of racial disparities in childhood adversity on race-related differences in brain structure, CONT'D

B

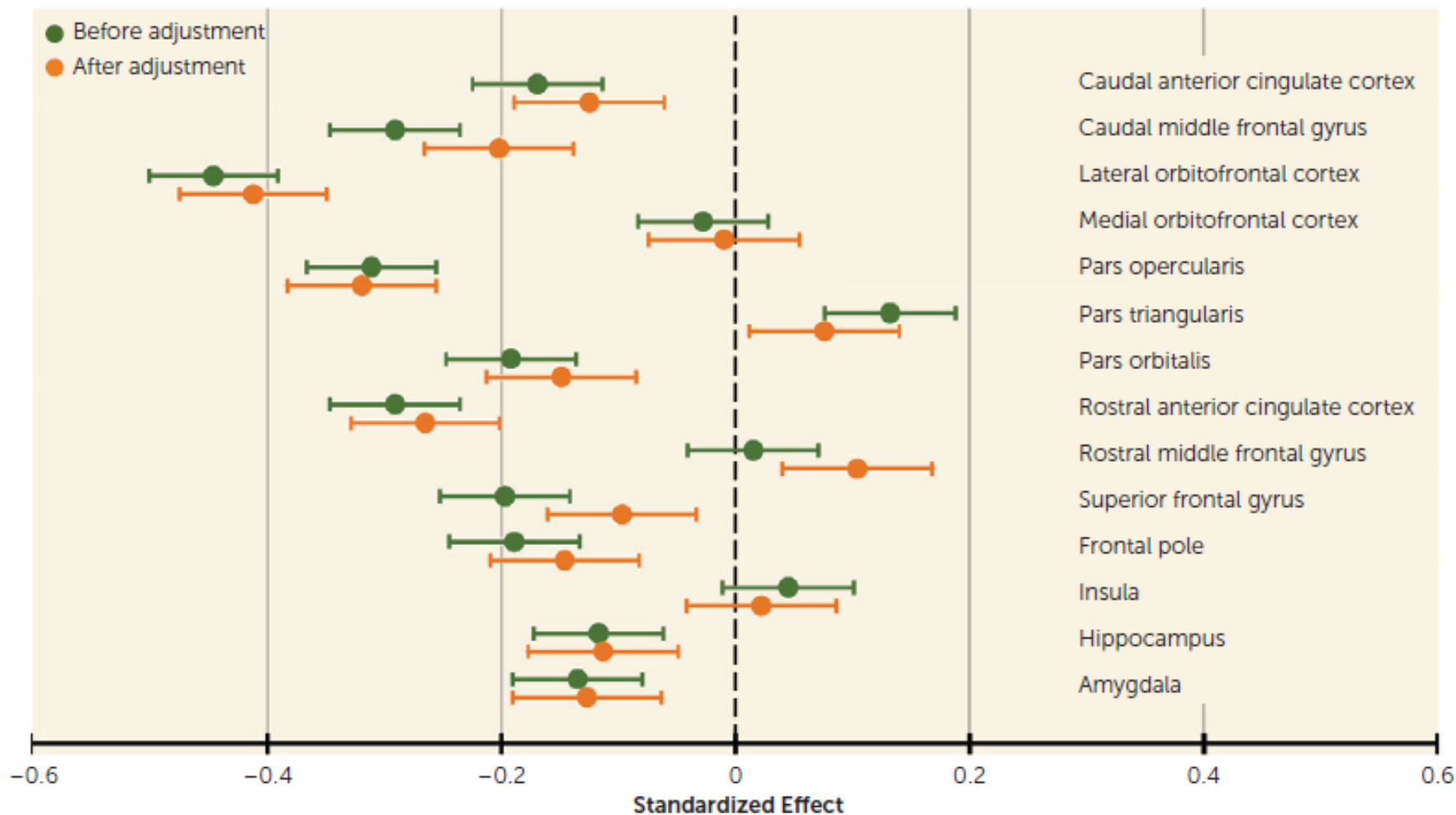


Figure 3: Graphical representation of parallel mediation results in a study of childhood adversity and brain structure

