

Title:

Sex and racial/ethnic differences in the association between childhood attention-deficit/hyperactivity disorder symptom subtypes and body mass index in the transition from adolescence to adulthood in the United States

Authors:

Yosuke Inoue, Annie Green Howard, Andrew Stickley, Aki Yazawa, Penny Gordon-Larsen

Contact:

Yosuke Inoue (corresponding author)

inoyo@live.unc.edu

Carolina Population Center, University of North Carolina at Chapel Hill, Chapel Hill

123 West Franklin Street, Chapel Hill 27516, NC, USA

Table S1. List of study variables included in the analytic models

Study variables	Wave II	Wave III	Wave IV	Memo
Body mass index	✓	✓	✓	Height and weight were directly measured. Self-reported measures were substituted for individuals who refused measurement or who weighed more than scale's capacity.
ADHD subtype		✓		Participants retrospectively described their symptoms between the ages of 5 and 12.
Socio-demographic variables	✓	✓	✓	Parental income was obtained from Wave I.
Current smoking	✓	✓	✓	
Alcohol consumption	✓	✓	✓	
Drug use (marijuana)	✓	✓	✓	
Drug use (other)	✓	✓	✓	Cocaine, inhalants, others (LSD, PCP, ecstasy, mushrooms, speed, ice, heroin, or pills) and injecting an illegal drug (Wave II); cocaine, crystal meth, others (LSD, PCP, ecstasy, mushrooms, inhalants, ice, heroin, prescription medicines not prescribed for the participants) and injecting an illegal drug (Wave III), and injecting an illegal drug and their favorite drugs (MDMA/Ecstasy, Inhalants, LSD, Heroin, PCP, other illegal drugs) (Wave IV).
Overeating with loss of control		✓		
Moderate-to-vigorous physical activity	✓	✓	✓	
Screen time	✓	✓	✓	Time spent watching TV, playing video games and sitting in front of a PC.
Depressive feelings	✓	✓	✓	Feeling depressed or not

Table S2. Interactions among ADHD subtypes, race/ethnicity and sex in relation to log-transformed BMI among participants in the National Longitudinal Survey of Adolescence and Adult Health (Wave II to IV).

	<i>coef.</i>	(95%CI)
ADHD (ref. Non-ADHD)		
ADHD-HI	0.070**	(0.026, 0.115)
ADHD-I	0.064*	(0.012, 0.117)
ADHD-C	0.040*	(0.001, 0.078)
Race/ethnicity (ref. EA)		
AA	0.046***	(0.031, 0.062)
HA	0.017†	(-0.003, 0.037)
ADHD×Race/ethnicity		
ADHD-HI×AA	-0.118**	(-0.195, -0.042)
ADHD-HI×HA	-0.065	(-0.145, 0.014)
ADHD-I×AA	-0.080	(-0.182, 0.021)
ADHD-I×HA	0.035	(-0.079, 0.148)
ADHD-C×AA	-0.088†	(-0.188, 0.012)
ADHD-C×HA	0.080	(-0.032, 0.193)
Sex (ref. Female)	0.008	(-0.002, 0.017)
ADHD×Sex		
ADHD-HI×Male	-0.066*	(-0.116, -0.016)
ADHD-I×Male	-0.059†	(-0.121, 0.003)
ADHD-C×Male	-0.010	(-0.063, 0.043)
Race/ethnicity×Male		
AA×Male	-0.036***	(-0.055, -0.017)
HA×Male	-0.003	(-0.027, 0.021)
ADHD×Race/ethnicity×Sex		
ADHD-HI×AA×Male	0.095†	(-0.012, 0.203)
ADHD-HI×HA×Male	0.070	(-0.045, 0.185)
ADHD-I×AA×Male	0.129†	(-0.004, 0.261)
ADHD-I×HA×Male	-0.005	(-0.132, 0.123)
ADHD-C×AA×Male	0.068	(-0.044, 0.180)
ADHD-C×HA×Male	-0.070	(-0.240, 0.099)
Age	0.250***	(0.229, 0.272)
ADHD×Age		
ADHD-HI×Age	-0.003	(-0.119, 0.113)
ADHD-I×Age	-0.183*	(-0.334, -0.031)
ADHD-C×Age	0.041	(-0.091, 0.174)
Race/ethnicity×Age		
AA×Age	0.013	(-0.029, 0.054)
HA×Age	0.033†	(-0.005, 0.071)
ADHD×Race/ethnicity×Age		
ADHD-HI×AA×Age	0.177	(-0.047, 0.401)
ADHD-HI×HA×Age	-0.063	(-0.450, 0.325)
ADHD-I×AA×Age	0.635***	(0.362, 0.909)
ADHD-I×HA×Age	0.001	(-0.324, 0.325)
ADHD-C×AA×Age	0.091	(-0.169, 0.351)

ADHD-C×HA×Age	0.305*	(0.058, 0.551)
Sex×Age	0.039*	(0.008, 0.070)
ADHD×Sex×Age		
ADHD-HI×Sex×Age	-0.011	(-0.152, 0.131)
ADHD-I×Sex×Age	0.193*	(0.012, 0.373)
ADHD-C×Sex×Age	-0.057	(-0.223, 0.109)
Race/ethnicity×Sex×Age		
AA×Male×Age	-0.070*	(-0.138, -0.003)
HA×Male×Age	-0.026	(-0.094, 0.042)
ADHD×Race/ethnicity×Male×Age		
ADHD-HI×AA×Male×Age	-0.089	(-0.352, 0.174)
ADHD-HI×HA×Male×Age	0.150	(-0.129, 0.429)
ADHD-I×AA×Male×Age	-0.643***	(-0.947, -0.338)
ADHD-I×HA×Male×Age	0.090	(-0.383, 0.563)
ADHD-C×AA×Male×Age	-0.088	(-0.463, 0.287)
ADHD-C×HA×Male×Age	-0.283	(-0.925, 0.359)
Age ²	-0.086***	(-0.127, -0.044)
ADHD×Age ²		
ADHD-HI×Age ²	-0.002	(-0.241, 0.237)
ADHD-I×Age ²	0.357*	(0.065, 0.649)
ADHD-C×Age ²	-0.130	(-0.346, 0.087)
Race/ethnicity×Age ²		
AA×Age ²	0.048	(-0.029, 0.125)
HA×Age ²	-0.045	(-0.125, 0.034)
ADHD×Race/ethnicity×Age ²		
ADHD-HI×AA×Age ²	-0.318	(-0.825, 0.189)
ADHD-HI×HA×Age ²	0.126	(-0.525, 0.776)
ADHD-I×AA×Age ²	-1.091***	(-1.612, -0.569)
ADHD-I×HA×Age ²	-0.030	(-0.585, 0.526)
ADHD-C×AA×Age ²	-0.083	(-0.544, 0.377)
ADHD-C×HA×Age ²	-0.503*	(-0.980, -0.026)
Sex×Age ²	-0.046	(-0.101, 0.009)
ADHD×Sex×Age ²		
ADHD-HI×Sex×Age ²	0.071	(-0.208, 0.351)
ADHD-I×Sex×Age ²	-0.351*	(-0.688, -0.013)
ADHD-C×Sex×Age ²	0.144	(-0.118, 0.406)
Race/ethnicity×Sex×Age ²		
AA×Male×Age ²	0.025	(-0.090, 0.140)
HA×Male×Age ²	0.086	(-0.042, 0.213)
ADHD×Race/ethnicity×Male×Age ²		
ADHD-HI×AA×Male×Age ²	0.151	(-0.376, 0.677)
ADHD-HI×HA×Male×Age ²	-0.226	(-0.752, 0.299)
ADHD-I×AA×Male×Age ²	1.045***	(0.474, 1.617)
ADHD-I×HA×Male×Age ²	-0.197	(-0.961, 0.568)
ADHD-C×AA×Male×Age ²	0.150	(-0.582, 0.883)
ADHD-C×HA×Male×Age ²	0.466	(-0.566, 1.498)

Age ³	0.011	(-0.009, 0.031)
ADHD×Age ³		
ADHD-HI×Age ³	0.013	(-0.109, 0.135)
ADHD-I×Age ³	-0.161*	(-0.302, -0.019)
ADHD-C×Age ³	0.071	(-0.029, 0.171)
Race/ethnicity×Age ³		
AA×Age ³	-0.021	(-0.059, 0.018)
HA×Age ³	0.025	(-0.017, 0.067)
ADHD×Race/ethnicity×Age ³		
ADHD-HI×AA×Age ³	0.138	(-0.138, 0.413)
ADHD-HI×HA×Age ³	-0.082	(-0.371, 0.206)
ADHD-I×AA×Age ³	0.459***	(0.206, 0.712)
ADHD-I×HA×Age ³	0.005	(-0.254, 0.264)
ADHD-C×AA×Age ³	0.024	(-0.187, 0.236)
ADHD-C×HA×Age ³	0.181	(-0.047, 0.408)
Sex×Age ³	0.019	(-0.008, 0.045)
ADHD×Sex×Age ³		
ADHD-HI×Sex×Age ³	-0.040	(-0.180, 0.100)
ADHD-I×Sex×Age ³	0.158†	(-0.004, 0.321)
ADHD-C×Sex×Age ³	-0.076	(-0.197, 0.045)
Race/ethnicity×Sex×Age ³		
AA×Male×Age ³	-0.006	(-0.061, 0.048)
HA×Male×Age ³	-0.044	(-0.106, 0.019)
ADHD×Race/ethnicity×Male×Age ³		
ADHD-HI×AA×Male×Age ³	-0.077	(-0.350, 0.197)
ADHD-HI×HA×Male×Age ³	0.092	(-0.164, 0.348)
ADHD-I×AA×Male×Age ³	-0.457**	(-0.742, -0.172)
ADHD-I×HA×Male×Age ³	0.106	(-0.228, 0.439)
ADHD-C×AA×Male×Age ³	-0.043	(-0.435, 0.350)
ADHD-C×HA×Male×Age ³	-0.176	(-0.649, 0.297)

Chunk tests for interaction terms

Race/ethnicity p < 0.0001

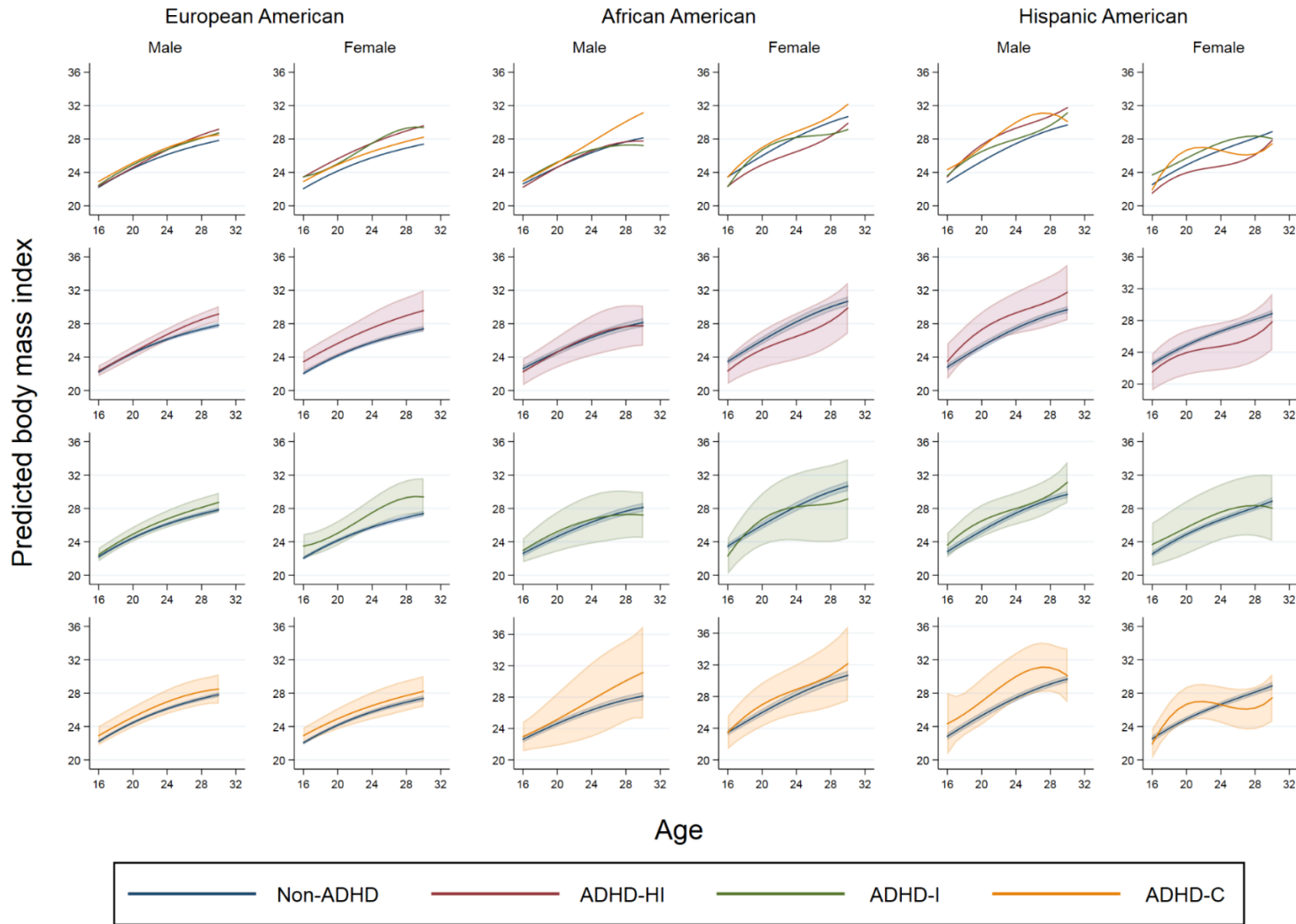
Sex p < 0.0001

***: p < 0.01; **: p < 0.01; *: p < 0.05; †: p < 0.10

EA: European American; AA: African American; HA; Hispanic American; ADHD: attention-deficit/hyperactivity disorder; ADHD-HI: the ADHD predominantly hyperactive/impulsive subtype; ADHD-I: the ADHD predominantly inattentive subtype; ADHD-C: ADHD combined, a combination of ADHD-HI and ADHD-I symptoms.

Models were adjusted for parental household income (low/middle/high), study region, smoking status, alcohol consumption, marijuana use, other drug use, moderate-to-vigorous physical activity, screen time, overeating and depressive feelings.

Figure S1. Predicted BMI values by ADHD symptom subtypes, stratified by sex and race/ethnicity among those who participated in all the three waves in the National Longitudinal Survey of Adolescence to Adult Health (waves II to IV).



The first row shows predicted BMI values by ADHD subtypes and non-ADHD while the second, third and fourth rows show predicted BMI values with 95% confidence interval, comparing between ADHD-HI and non-ADHD (the second row), ADHD-I and non-ADHD (the third row) and ADHD-C and non-ADHD (the fourth row), respectively. ADHD: attention-deficit/hyperactivity disorder; ADHD-HI: the ADHD predominantly hyperactive/impulsive subtype; ADHD-I: the ADHD predominantly inattentive subtype; ADHD-C: ADHD combined, a combination of ADHD-HI and ADHD-I symptoms; PA: physical activity. Models were adjusted for age, age-squared and age-cubed terms, parental household income (low/middle/high), study region, high education sample for AA, and ancestry and foreign-born status for HA.