Supplemental Methods

Participants

The study was sampled to represent American children born in urban centers (>200,000 population) in the late 1990s with a ~3:1 oversample for non-marital births. Fragile Families and Child Wellbeing Study (FFCWS) families were interviewed at the birth of the focal child, and when the child was 1, 3, 5, 9, and 15 years of age. Participants in the FFCWS were asked if they were willing to be contacted by members of the Study of Adolescent Neural Development (SAND) team regarding participation in this follow-up study. There were 428 families in the original Detroit and Toledo subsamples of FFCWS; we attempted to contact all families from these sites. To increase the number of participants, we attempted to contact 85 families from the Chicago subsample. In total, we attempted to contact 513 FFCWS families, and 237 of these families participated in SAND data collection. Of the 237 adolescents who participated in SAND data collection, 167 had useable fMRI faces task data (Supplemental Table S1).

Procedures

Families traveled to the University of Michigan to take part in a day-long visit that included an MRI scanning session, self- and parent reports on surveys including behavioral and psychiatric outcomes and contextual stressors, a psychiatric interview, and family interaction tasks. Families were compensated for travel expenses and for participation in the study.

Behavioral Measures

Antisocial behavior. We assessed AB at age 15 using a multi-informant, multi-method approach that combined multiple indicators from three different measures via a latent variable: Parent reports from (1) the rule-breaking scale (e.g., ‘lies, cheats‘, ‘steals at home’) and (2) the aggression scale (e.g., ‘mean’, ‘screams a lot’) from the Child Behavior Checklist (CBCL;

Achenbach, 1991), with each item rated by parent on a 3-point scale (0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true); (3) Total score (excluding substance use items) of the youth-reported 62 item Self Report of Delinquency (SRD; Elliott, Huizinga, & Ageton, 1985; e.g., 'Have you been physically cruel to someone else (causing harm)?', 'Have you taken something from a store without paying for it?'), which assessed the frequency of aggressive and delinquent behavior and related offenses during the prior year, rated on a 3-point scale (0 = never; 1 = once or twice; 2 = more often); and (4) Combined total lifetime symptom count (i.e., both past and present subclinical and clinical threshold symptoms) of DSM-5 conduct disorder and oppositional defiant disorder (American Psychiatric Association, 2013) based on clinician-ratings assessed via a modified version of the Kiddie Schedule for Affective Disorders and Schizophrenia (KSADS; Kaufman et al., 1997). A trained clinical interviewer (e.g., psychology doctoral student, post-baccalaureate staff) administered the semi-structured interview to the target child and primary caregiver each individually. Assessors were trained by two licensed clinical psychologists with 25+ years combined experience with the K-SADS (authors LWH, NLD). Training included practice interviews and live supervision of interviews with families. The interviewer arrived at initial DSM-V diagnoses and symptom counts, which were then reviewed in case conferences with two licensed clinical psychologists (authors LWH and NLD) and the assessment team. Symptoms are rated on a 3-point scale (0 = not present; 1 = present at subclinical; 2 = present at clinical threshold). The four measures were modestly-to-strongly correlated (range, $r = .30\text{-}.81$, all *ps* < .001; Supplemental Table S3). To combine these four measures into a multi-informant, multi-method score for AB, we used confirmatory factor analysis (CFA) in Mplus vs 7.3 (Muthén & Muthén, 2014) with maximum likelihood estimation with robust standard errors (to account for skew and zero-inflation). Scale loadings on the latent

AB factor were moderate-to-high (range, β = .39 - .93, $p < .001$) and model fit was excellent (CFI = .99, TLI = .96, RMSEA = .08, SRMR = .01; Supplemental Table S3). We extracted latent factor scores for each individual to be used in SPM analyses.

Callous-unemotional traits. We also assessed callous-unemotional (CU) traits at age 15 using a multi-method, multi-informant approach combining three different measures into a latent construct: Total scores for (1) Parent-reported and (2) Youth-reported Inventory of Callous-Unemotional Traits (ICU; Frick, Bodin, & Barry, 2000; e.g., 'seems very cold and uncaring', 'feel(s) guilty after wrongdoing'- reverse scored). Items of the ICU are rated on a 4-point scale (0 = not at all true, 1 = somewhat true, 2 = very true, 3 = definitely true). Consistent with prior studies that have used the ICU, we used a total score for 22 of the original 24 items dropping two items based on an examination of polychoric inter-item correlations (Waller et al., 2015). The latent construct also included (3) clinician ratings of total lifetime symptom counts (i.e., both past and present subclinical and clinical threshold symptoms) using the Michigan Addendum to the K-SADS, which consists of items that are meant to overlap with the recently developed DSM-5 "with Limited Prosocial Emotions" specifier (American Psychiatric Association, 2013) based off of the Clinical Assessment of Prosocial Emotions (CAPE; Frick, 2016) and embedded into the KSADS interview (Kaufman et al., 1997). Symptoms are rated on a 3-point scale (0 = not present; 1 = present at subclinical; 2 = present at clinical threshold). The three measures were modestly correlated (range, r = .13-.35, all *ps* < .05; Supplemental Table S3). We created a latent construct of CU traits specifying scales from these measures to load onto an CU traits factor using CFA with full information maximum likelihood estimation with robust standard errors in Mplus version 7.3 (Muthén & Muthén, 2014). Scale loadings were moderate-to-high (range, β = .33 - .87, p < .001) (Supplemental Table S4).

Supplemental Results

Interactions Between AB and CU Traits

To test our primary hypotheses regarding the association between amygdala reactivity to emotional faces and AB being contingent on level of CU traits, all models included main and interactive effects of AB and CU traits as independent variables and extracted estimates for right and left amygdala reactivity. The MarsBar toolbox for SPM (Brett, Anton, Valabregue, & Poline, 2002) was used to extract BOLD parameter estimates from the structural left and right amygdala masks from the Wake Forest University PickAtlas. We ran separate models for each of the four primary contrasts of interest (i.e., fearful faces > neutral faces, angry faces > neutral faces, sad faces > neutral faces, happy faces > neutral faces) as dependent variables (with both right and left amygdala reactivity as correlated dependent variables), controlling for participant age, gender, pubertal status, family income, and race. To explore any significant interactions between AB and CU traits, we used an online tool to examine simple slopes at the mean and 1 SD below (low) and 1 SD above (high) the mean of CU traits (Aiken, West, & Reno, 1991), as well as regions of significance (Preacher, Curran, & Bauer, 2006). When interaction terms were significant bilaterally, we probed the interaction for amygdala region (i.e., left or right) with the larger effect size. Given the exploratory nature of the results, we highlight when associations would meet a strict conservative threshold to account for the four models (i.e., fearful faces > neutral faces, angry faces > neutral faces, sad faces > neutral faces, happy faces > neutral faces) that were examined (i.e., Bonferroni-correction .05/4 = $p < .0125$).

Taken together, AB was associated with increased activation to emotional faces broadly (i.e., angry, sad, happy) only at mean or low levels of CU traits. Thus, while CU traits was not directly associated with amygdala reactivity to emotional faces, CU traits were a significant moderator of numerous associations between amygdala reactivity and AB, most of which met a stricter conservative threshold ($p < .0125$; Supplemental Tale S4; Supplemental Table S5).

Three-Way Interactions Between AB, CU Traits, and Gender

As a final exploratory test, we examined whether CU traits moderated associations between AB and amygdala reactivity across the full sample or only within specific groups. To this aim, we computed models that included three-way interaction terms between AB, CU traits, and participant race, and models that included three-way interaction terms between AB, CU traits, and participant gender. To understand the nature of any significant three-way interaction terms, we used the GROUPING command in Mplus version 7.3 (Muthén & Muthén, 2014) to examine associations within groups (i.e., male or female; European American or other race; African American or other race) separately.

In the current study, there were no significant three-way interactions with race (results available upon request). However, there were significant three-way interactions with gender for three of the contrasts, and all three of the interaction terms met a stricter conservative threshold (Bonferroni correction; Supplemental Table S6). Within girls, AB was associated with increased activation to fearful, angry, and sad faces only at high levels of CU traits (Supplemental Table S6; Supplemental Table S7). In contrast, for boys, AB was associated with increased activation to angry and sad faces only at mean or low levels of CU traits (Supplemental Table S6; Supplemental Table S7).

Table S1

Sources of Data Loss for Functional Magnetic Resonance Imaging (fMRI) Data

	Number lost	Participants with data
Original sample		237
Sample with imaging data		
- Refused MRI	8	
- Exceeded MRI table weight limit	5	
- Medical restriction	2	
- Braces	12	
- Risk of pregnancy	1	
- Endorsed metal in body	1	
- Excluded for diagnosis of Autism Spectrum Disorder	2	
- Incomplete fMRI data	3	
- Pilot version of faces task	2	
Total lost	36	201
Sample with usable imaging data		
- Low amygdala coverage (< 70% left or right amygdala)	7	
- Low prefrontal cortex coverage by visual inspection	4	
- Distortion on functional scans	4	
- Low accuracy (< 70%)	19	
Total lost	31	167

Table S2

Comparison of Descriptive Statistics Between Included versus Excluded Participants

Descriptive	SAND participants included in current study (N=165)	SAND participants with neuroimaging data (N=201)	Total SAND sample (N=237)
Age M/SD	15.88 (5.71)	15.85 (.52)	15.87 (.54)
% Female	53.9%	53.2%	52.3%
Race	76.4% African American, 12.1% Caucasian, 11.5% Other	76.1% African American, 11.4% Caucasian, 12.4% Other	74.7% African American, 13.5% Caucasian, 11.8% Other
% Families Annual Income < 25000	46.7%	48.2%	47.2%
CBCL Aggression M/SD	3.54 (4.41)	3.79 (4.84)	3.86 (4.81)
CBCL Rule-Breaking M/SD	1.85 (2.66)	2.00 (2.84)	2.01 (2.83)
SRD Total Score (no drug items) M/SD	5.71 (6.48)	6.85 (6.88)	5.82 (6.92)
KSADS ODD/CD Symptoms M/SD	4.50 (8.66)	5.02 (9.30)	4.85 (9.06)
ICU Parent-Report Total Score M/SD	18.69 (8.57)	18.86 (8.98)	18.99 (9.01)
ICU Self-Report Total Score M/SD	21.31 (8.35)	21.71 (8.38)	21.78 (8.26)
CAPE/KSADS Limited Prosocial Emotions Symptoms M/SD	.93 (2.66)	.96 (2.62)	.97 (2.69)

Note. $^{\dagger}p < .10$, $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$. CBCL= Child Behavior Checklist; SRD = Self-Report of Delinquency; KSADS = Kiddie Schedule for Affective Disorders and Schizophrenia; ODD = oppositional defiant disorder; CD = conduct disorder; ICU = Inventory of Callous-Unemotional Traits; KSADS = Kiddie Schedule for Affective Disorders and Schizophrenia; CAPE = Clinical Assessment of Prosocial Emotions. Annual income was reported by the parent and included salary/wages, child support, and any other financial aid for the household. Parents chose a range of income from 14 categories: 1) $4,999 or less; 2) $5,000-$9,999; 3) $10,000-$14,999; 4) $15,000-$19,999; 5) $20,000-$24,999; 6) $25,000-$29,999; 7) $30,000-$39,000; 8) $40,000-$49,999; 9) $50,000-$59,999; 10) $60,000-$69,999; 11) $70,000-$79,999; 12) $80,000-$89,000; 13) $90,000 or more; 14) N/A.

Table S3

Descriptive Statistics and Bivariate Correlations Between Measures Included in Antisocial Behavior Factor Score

	CBCL Aggression	CBCL Rule-Breaking	SRD Total Score	KSADS ODD/CD Symptoms
CBCL Rule-Breaking	.81***			
SRD Total Score (no drug items)	.39***	.30***		
KSADS ODD/CD Symptom Count	.64***	.61***	.47***	
M (SD)	3.86 (4.80)	2.00 (2.82)	5.77 (6.88)	4.85 (9.05)
Skewness (SE)	1.76 (.16)	2.24 (.16)	2.37 (.19)	2.47 (.16)
Kurtosis (SE)	3.23 (.32)	6.35 (.32)	8.31 (.38)	6.46 (.32)
Range	0-25	0-18	0-44	0-51
Factor Loading	.88***	.93***	.39***	.69***
Chi-Square Test of Model Fit	2.67, *df* = 1, *p* = .10			
CFI, TLI, RMSEA, SRMR	.99, .96, .08, .01			

Note. †p < .10, *p <.05; **p <.01; ***p <.001. CBCL= Child Behavior Checklist; SRD = Self-Report of Delinquency; KSADS = Kiddie Schedule for Affective Disorders and Schizophrenia; ODD = oppositional defiant disorder; CD = conduct disorder; df = degrees of freedom; TLI = Tucker–Lewis index; CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean residual. Correlations were computed for whole sample (n = 237). The measures of antisocial behavior were significantly skewed. Confirmatory factor analyses were performed using maximum likelihood estimation with robust standard errors in Mplus (which can accommodate skewness) to generate a normally distributed factor score to be used in analyses (Muthén & Muthén, 2017; Yuan & Bentler, 2000). Based on modification indices, two scales (SRD Total score and KSADS ODD/CD Symptom Count) were allowed to correlate.

Table S4

Descriptive Statistics and Bivariate Correlations Between Measures Included in Callous-Unemotional Traits Factor Score

	ICU Parent Total	ICU Self Total	Limited Prosocial Emotions Symptoms
ICU Parent-Report Total Score			
ICU Self-Report Total Score	.13*		
CAPE/KSADS Limited Prosocial Emotions Symptom Count	.35***	.29***	
M (SD)	18.99 (9.00)	21.78 (8.26)	.97 (2.69)
Skewness (SE)	.87 (.16)	.00 (.16)	3.38 (.16)
Kurtosis (SE)	1.17 (.32)	-.67 (.32)	11.83 (.32)
Range	1-52	4-44	0-16
Factor Loading	.40***	.33***	.87***
Chi-Square Test of Model Fit	0, *df* = 0, *p* < .001		
CFI, TLI, RMSEA, SRMR	1.00, 1.00, .00, .00		

Note. †p < .10, *p <.05; **p <.01; ***p <.001. ICU = Inventory of Callous-Unemotional Traits; KSADS = Kiddie Schedule for Affective Disorders and Schizophrenia; CAPE = Clinical Assessment of Prosocial Emotions; df = degrees of freedom; TLI = Tucker–Lewis index; CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean residual. Consistent with prior studies that have used the ICU, we used a total score for 22 of the original 24 items dropping two items based on an examination of polychoric inter-item correlations (Waller et al., 2015). Correlations were computed for whole sample (n = 237). The measures of callous-unemotional traits were significantly skewed. Confirmatory factor analyses were performed using maximum likelihood estimation with robust standard errors in Mplus (which can accommodate skewness) to generate a normally distributed factor score to be used in analyses (Muthén & Muthén, 2017; Yuan & Bentler, 2000). Model was fully saturated.

Table S5

Significant Interactions Between Antisocial Behavior and Callous-Unemotional Traits That Were Related to Extracted Values of Amygdala Reactivity to Emotional Faces

	Right Amygdala			Left Amygdala		
Emotion	AB	CU Traits	AB x CU Traits	AB	CU Traits	AB x CU Traits
Fearful	.16*	-.03	-.02	.20*	-.04	-.03
Angry	.12*	-.03	-.04*	.15*	-.04	-.04*
Sad	.18**	.08^{+}	-.06**[1]	.20*	.06	-.07**[1]
Happy	.09	.05	-.04**[1]	.11^{+}	.03	-.04*[1]

Note. $^{+}$ = p < .10; * p < .05; ** p < .01; *** p < .001. [1] = association significant at conservative Bonferroni correction standard accounting for multiple comparisons (.05 / 4 models = .0125). AB = antisocial behavior. CU traits = callous-unemotional traits. Unstandardized beta weights from models that included gender, pubertal status, family income, race, AB, CU traits, and the interaction term for AB x CU traits. Four separate models were run for each emotion, with each of the models including both right and left amygdala reactivity.

Table S6

Simple Slopes and Regions of Significance for Significant Antisocial Behavior x Callous-Unemotional Traits Interactions in Relation to Amygdala Reactivity to Emotional Faces

Emotion	Low CU Traits				Mean CU Traits				High CU Traits				CU Traits Region of Significance (RoS)	% Sample ≥ RoS
	B	*SE*	t	p	B	*SE*	t	p	B	*SE*	t	p		
Angry > Neutral: L[1]	.19	.06	2.93	.004	.15	.06	2.42	.02	.11	.06	1.66	.10	< .60	88.5%
Sad > Neutral: L[1]	.26	.09	2.80	.006	.20	.09	2.16	.03	.13	.09	1.38	.17	< .25	83.6%
Happy > Neutral: L[1]	.15	.06	2.41	.02	.11	.06	1.84	.07	.07	.06	1.14	.26	< -.22	61.2%

Note. [1] = interaction term was significant bilaterally. When interaction terms were significant bilaterally, we probed the interaction for the hemisphere with the larger effect size. AB = antisocial behavior. CU traits = callous-unemotional traits. R = right amygdala activation. L = left amygdala activation. All models included gender, pubertal status, family income, race, AB, CU traits, and the interaction term for AB x CU traits. Four separate models were run for each emotion, with each of the models including both right and left amygdala reactivity. Models were ran using centered variables of AB (Range -.69 – 5.10, Uncentered Range -.75 – 5.04) and CU traits (Range -.60 – 4.15, Uncentered Range -.62 – 4.13). Region of significance (RoS) indicate the centered value at which the simple slopes are significantly different from zero (i.e., Angry Faces > Neutral: at centered values of CU traits less than .6, the simple slope is significantly different from zero). The last column indicates the percentage of the sample that exceeds the threshold of CU traits at which the simple slope is significantly different from zero.

Table S7

Regression Analyses of Antisocial Behavior, Callous-Unemotional Traits, and Amygdala Reactivity to Emotional Faces That Differ by Gender

Significant Three-Way Interactions (AB x CU Traits x Gender)

Emotion	Model 1: Three-Way Interactions			Model 2: Girls			Model 3: Boys		
	AB	CU	AB x CU x Gender	AB	CU	AB x CU	AB	CU	AB x CU
Fearful > Neutral: R	.12	-.08	-.38***[1]	.12	.07	.33**[1]	.20*	-.02	-.04
Fearful > Neutral: L	.09*	-.06	-.27**[1]	.09*	-.05	.21**[1]	.29*	-.03	-.06$^+$
Angry > Neutral: R	.07	-.05	-.36***[1]	.07	-.05	.30**[1]	.16*	-.03	-.06**[1]
Angry > Neutral: L	.07	-.04	-.20**[1]	.07	-.04	.15*	.20*	-.04	-.06*
Sad > Neutral: R	.12*	-.01	-.39***[1]	.12*	-.01	.29***[1]	.24**[1]	.11$^+$	-.09***[1]
Sad > Neutral: L	.07	.02	0.24**[1]	.08	.02	.14*	.31*	.08	-.11**[1]

Note. $^+$ *$p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.* [1] = association significant at conservative Bonferroni correction standard accounting for multiple comparisons (.05 / 4 models = .0125). AB = antisocial behavior. CU traits = callous-unemotional traits. All models included gender, pubertal status, family income, race, AB, CU traits, and the interaction term for AB x CU traits. Four separate models were run for each emotion, with each of the models including both right and left amygdala reactivity. Each model included both right and left amygdala reactivity. In Model 1, interaction terms were created between self-reported participant gender (coded as 0 = Female, 1 = Male), AB, CU traits, and a three-way interaction between AB, CU traits, and gender in the full sample. For the models with significant interactions, an additional model was run in Mplus using participant gender as a grouping variable. Model 2 includes the unstandardized beta weights for the model including AB, CU traits, and an interaction term between AB and CU traits only in girls (*n*= 89). Model 3 includes the unstandardized beta weights for the model including AB, CU traits, and an interaction term between AB and CU traits only in boys (*n*= 76).

Table S8

Simple Slopes and Regions of Significance for Significant Gender Interactions With Antisocial Behavior or Callous-Unemotional Traits in Relation to Amygdala Reactivity to Emotional Faces

Significant Three-Way Interactions (AB x CU Traits x Gender)														
Emotion	Low CU Traits				Mean CU Traits				High CU Traits				CU Traits Region of Significance (RoS)	% Sample ≥ RoS (Within Gender)
	B	*SE*	t	p	B	*SE*	t	p	B	*SE*	t	p		
Within Girls														
Fearful > Neutral: R[1]	-.22	.12	1.78	.08	.12	.07	1.65	.10	.45	.12	3.70	.000	> .08	13.4%
Angry > Neutral: R[1]	-.23	.11	-2.17	.03	.07	.06	1.11	.26	.37	.11	3.45	.001	< -.88 / > .19	0% / 13.4%
Sad > Neutral: R[1]	-.17	.10	-1.71	.09	.12	.06	2.07	.04	.41	.10	4.08	.000	> -.02	13.4%
Within Boys														
Angry > Neutral: R[1]	.22	.07	3.27	.002	.16	.06	2.52	.01	.10	.07	1.49	.14	< .52	85.5%
Sad > Neutral: L[1]	.41	.16	2.62	.01	.31	.15	2.02	.05	.20	.16	1.28	.20	< .04	76.3%

Note. [1] = interaction term was significant bilaterally. When interaction terms were significant bilaterally, we probed the interaction for the hemisphere with the larger effect size. AB = antisocial behavior. CU traits = callous-unemotional traits. R = right amygdala activation. L = left amygdala activation. All models included gender, pubertal status, family income, race, AB, CU traits, and the interaction term for AB x CU traits. Four separate models were run for each emotion, with each of the models including both right and left amygdala reactivity. Models were ran using centered variables of AB and CU traits. Region of significance (RoS) indicate the centered value at which the simple slopes are significantly different from zero (i.e., in girls, Fearful Faces > Neutral: at centered values of CU traits greater than .08, the simple slope is significantly different from zero). The last column indicates the percentage of the sample that exceeds the threshold of CU traits at which the simple slope is significantly different from zero within gender (Girls: *n* = 89; AB Range -.69 – 3.12, Uncentered Range: -.75 – 3.07; CU Traits Range -.6 – 3.03, Uncentered Range: -.62 – 3.01; Boys: *n* = 76; AB Range -.69 – 5.10, Uncentered Range -.75 – 5.04; CU Traits Range -.53 – 4.15; Uncentered Range -.55 – 4.13).

Table S9

Antisocial Behavior Is Associated With Amygdala Connectivity to Nodes of Salience and Default Mode Network While Viewing Emotional Faces Versus Neutral Faces, Controlling for Demographic Factors and Callous-Unemotional Traits

Contrast		Cluster size	t(164)=	*Z*	Peak Coordinates
Fearful faces > Neutral faces					
Left amygdala seed	Right PCC	81	3.90	3.80	8, -36, 30
	Right precuneus[1]	574	3.93	3.83	14, -58, 42
			3.21	3.16	-14, -54, 42
			3.15	3.09	-14, -44, 42
Fearful faces < Neutral faces					
Right amygdala seed	Right insula	169	3.48	3.41	38, 12, 8
			2.57	2.54	40, 26, -2
Left amygdala seed	Right ACC	106	4.38	4.25	6, 26, -6
	Right vmPFC	73	3.16	3.11	16 70 10
			2.53	2.50	28 54 18
			2.42	2.39	24 60 14
Angry faces > Neutral faces					
Left amygdala seed	Right ACC	121	3.30	3.24	8, 28, 28
			3.14	3.09	16, 32, 22
Angry faces < Neutral faces					
Right amygdala seed	Left vmPFC	76	3.11	3.06	-32 56 08
			3.07	3.02	-26 52 -2
			3.05	3.00	-30 56 6
Sad faces > Neutral faces					
Right amygdala seed	Right PCC	47	3.68	3.60	8, -38, 12
	Right precuneus	229	3.88	3.79	16, -50, 42
			2.92	2.88	4, -48, 38
Left amygdala seed	Right PCC	72	3.36	3.30	6, -36, 30
			3.06	3.01	-8, -38, 32

	Right precuneus	1155[1]	4.65	4.49	12, -46, 48
			3.35	3.28	-2, -46, 52
			3.30	3.24	-14, -48, 48
Sad faces < Neutral faces					
Left amygdala seed	Left insula[1]	254	3.92	3.82	-28, 24, 12
			2.74	2.70	-26, 20, -4
	Right vmPFC[1]	346	3.31	3.25	18 66 22
			3.16	3.11	14 70 14
			3.13	3.08	28 58 26
Happy faces < Neutral faces					
Right amygdala seed	Right insula[1]	473	4.06	3.95	38, 6, 14
			3.88	3.19	44, 2, 10
			3.55	3.48	40, 12, 6
	Left insula	152	3.19	3.13	-34, 24, 8
			3.07	3.02	-28, 32, 10
			2.70	2.67	-144, 16, -2
	Right PCC	108	4.33	4.21	14, -46, 18
			3.46	3.39	14, -48, 26
	Right precuneus	363	4.18	4.06	12, -46, 24
			3.97	3.87	16, -50, 24
			3.23	3.17	6, -54, 14
	Right vmPFC[1]	200	3.05	3.00	4 64 26
			2.90	2.86	16 66 22
			2.90	2.85	28 54 20

Note: [1]= exploratory finding that was significant at more stringent threshold controlling for eight models (fearful > neutral; fearful < neutral; angry > neutral; angry < neutral; sad > neutral; sad < neutral; happy > neutral; happy < neutral; p_{unc} <.01, alpha <.00625). All models included gender, puberty, family monthly income, race (two dichotomous codes), and callous-unemotional traits as covariates.

Table S10

Callous-Unemotional Traits Are Associated With Amygdala Connectivity to Nodes of Salience and Default Mode Network While Viewing Emotional Faces Versus Neutral Faces, Controlling for Demographic Factors and Antisocial Behavior

Contrast		Cluster size	t(164)=	*Z*	Peak Coordinates
Fearful faces > Neutral faces					
Right amygdala seed	Right insula	153	3.40	3.34	38, 10, 12
			2.96	2.91	44, 4, 10
			2.76	2.72	42, 26, -2
	Right vmPFC	91	3.08	3.03	36 46 30
			2.82	2.78	28 58 26
			2.70	2.67	26 50 30
Sad faces > Neutral Faces					
Left amygdala seed	Right vmPFC	100	2.99	2.94	12 64 26
			2.80	2.77	28 60 26
			2.66	2.63	36 56 22
Happy faces > Neutral faces					
Right amygdala seed	Right insula	115	2.93	2.89	44, 2, 10
			2.84	2.80	40, -4, 4
			2.46	2.44	44, 4, 0

Note: All models included gender, puberty, family monthly income, race (two dichotomous codes), and antisocial behavior as covariates. No model that was significant at more stringent threshold controlling for eight models (Fearful > Neutral; Fearful < Neutral; Angry > Neutral; Angry < Neutral; Sad > Neutral; Sad < Neutral; Happy > Neutral; Happy < Neutral; $p < .01$, alpha = .00625).

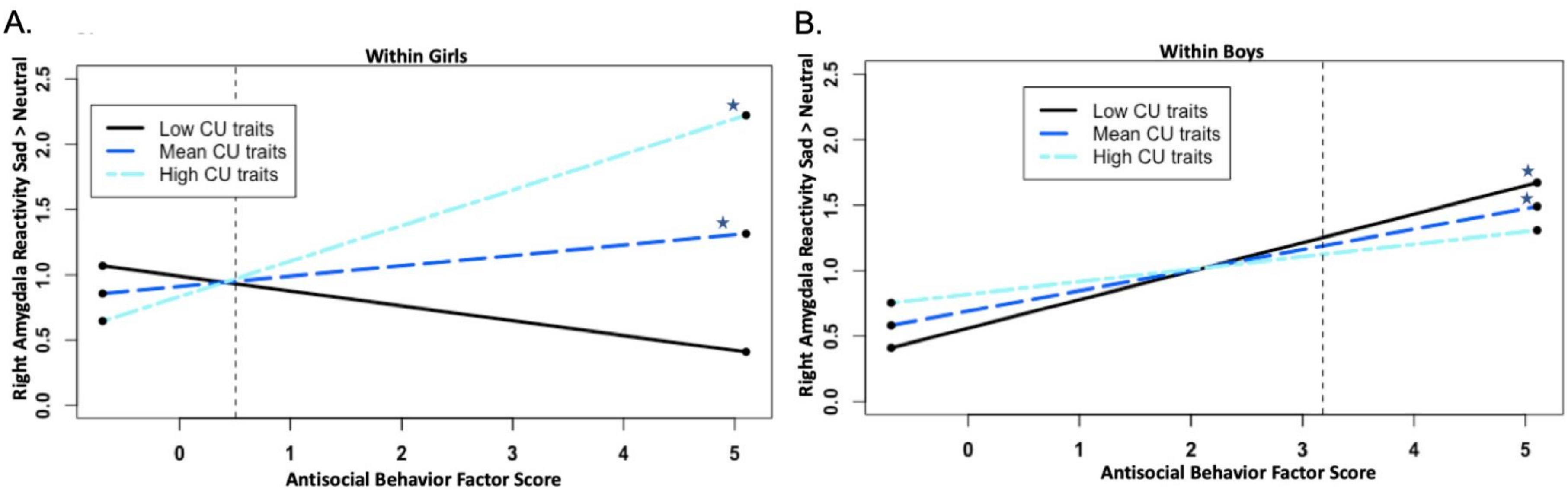

Figure S1. Gender moderated associations between antisocial behavior (AB) and amygdala reactivity to sad facial expressions. Note. CU traits = callous-unemotional traits. AB= antisocial behavior. A. CU traits as a moderator of the association between AB and right amygdala reactivity to sad greater than neutral facial expressions within girls. Simple slopes plotted at mean levels, 1 SD above the mean, and 1 SD below the mean for CU traits, as recommended by Aiken et al. (1991) and using an online computational tool (Preacher, Curran, & Bauer, 2006). Star next to line indicates significant slope. At high and mean levels of CU traits, but not low levels of CU traits, increased right amygdala reactivity to sad greater than neutral facial expressions was significantly related to higher AB. The dashed line indicates the level of AB at which the association is significant (AB factor score > .51; 12.36% of the girls in the sample). B. CU traits as a moderator of the association between AB and right amygdala reactivity to sad greater than neutral facial expressions within boys. At low and mean levels of CU traits, but not high levels of CU traits, increased right amygdala reactivity to sad greater than neutral facial expressions was significantly related to higher AB. The dashed line indicates the level of AB at which the association is significant (AB factor score > 3.18; 2.56% of the boys in the sample).

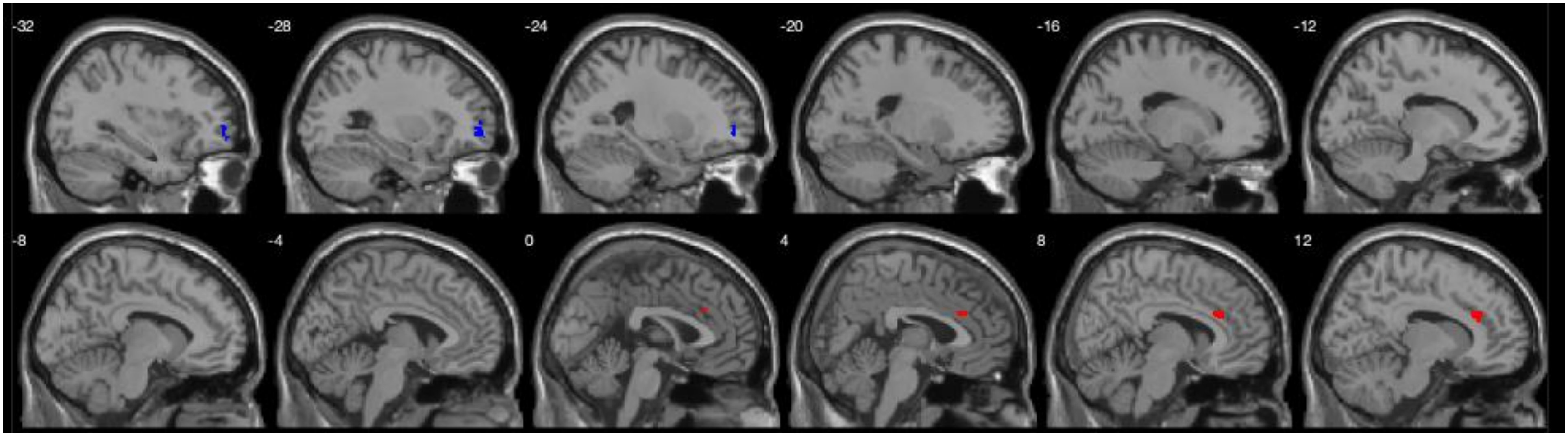

Figure S2. Group-level PPI effects of left and right amygdala connectivity associated with antisocial behavior while viewing angry versus neutral facial expressions. *N* = 165. Stronger positive connectivity group-level PPI effects of the amygdala are shown in red. Weaker positive connectivity group-level PPI effects of the amygdala are shown in blue. Details about the significant clusters (e.g., MNI coordinates, cluster size and extent) are reported in Supplemental Table S8.

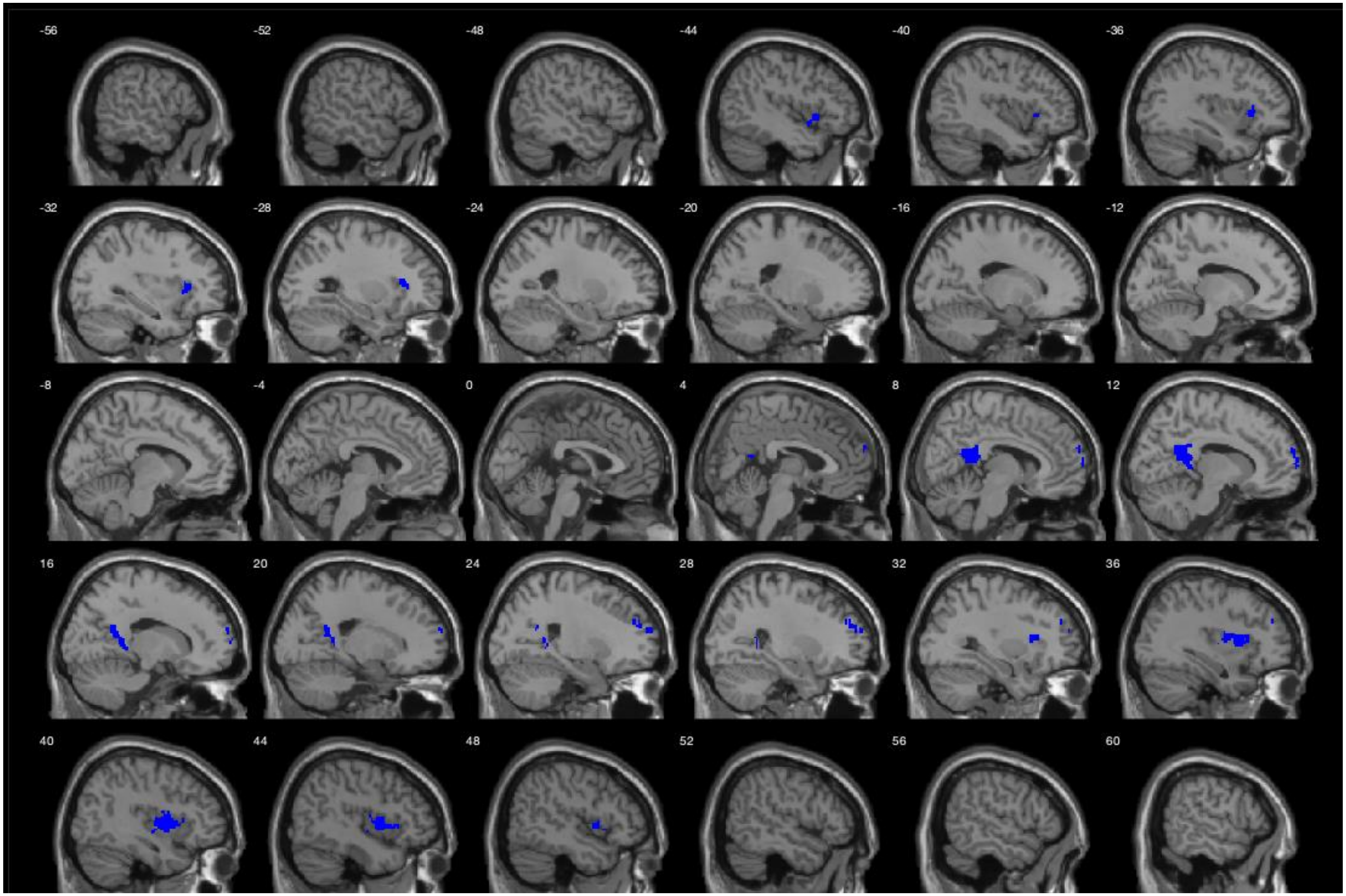

Figure S3. Group-level PPI effects of left and right amygdala connectivity associated with antisocial behavior while viewing happy versus neutral facial expressions. *N* = 165. Weaker positive connectivity group-level PPI effects of the amygdala are shown in blue. Details about the significant clusters (e.g., MNI coordinates, cluster size and extent) are reported in Supplemental Table S9.

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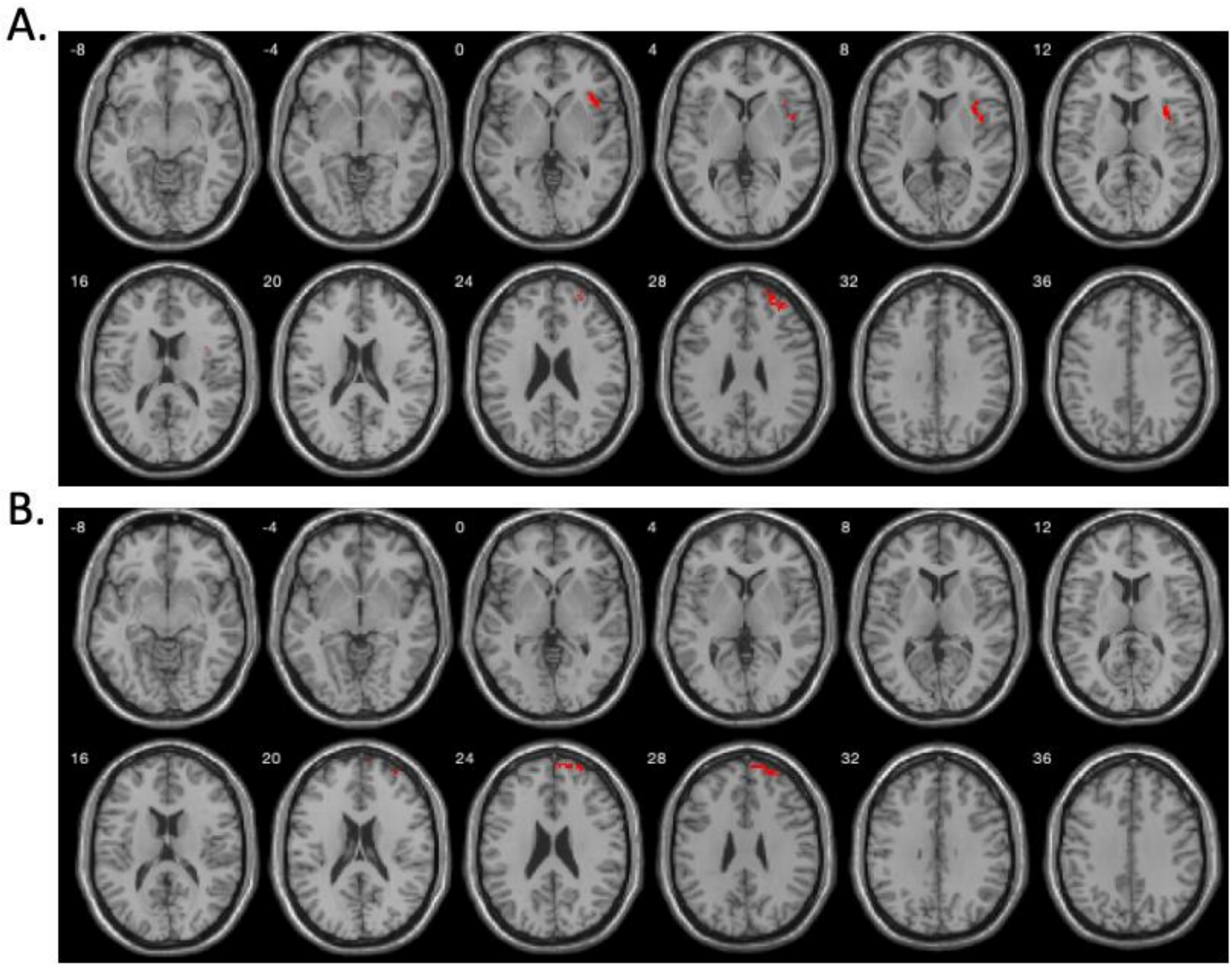
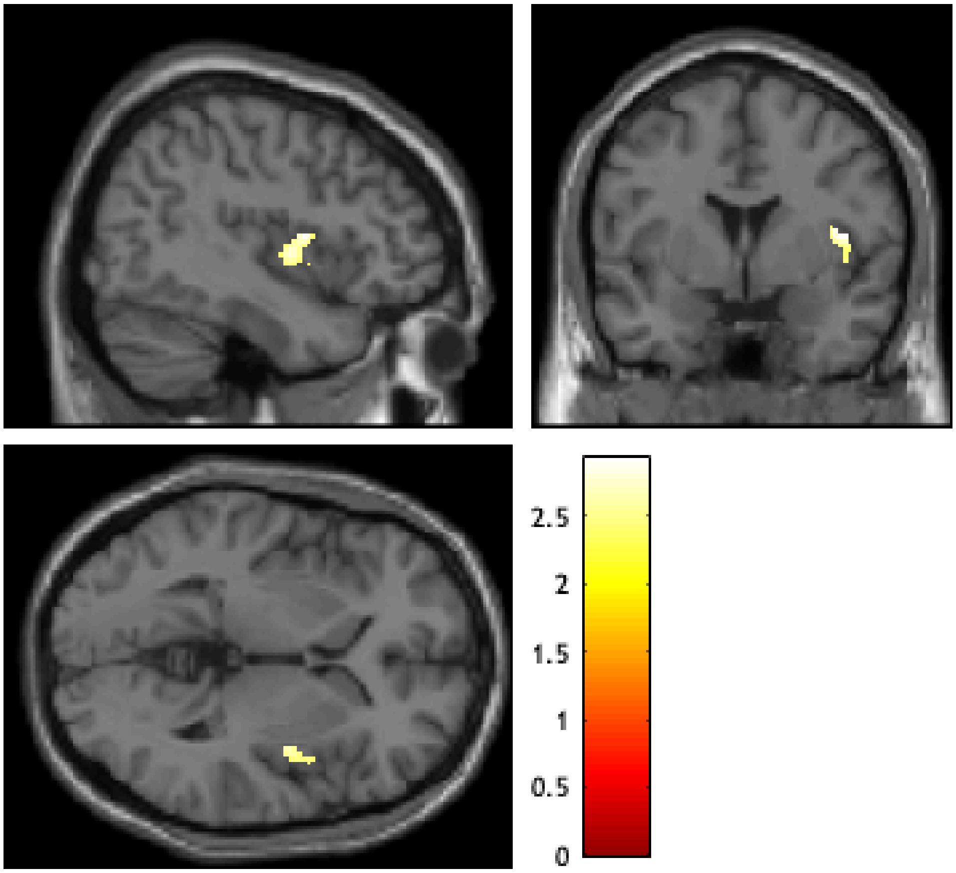


Figure S5. Group-level PPI effects of left and right amygdala connectivity associated with callous-unemotional traits during distress processing. *N* = 165. A. Group-level PPI effects of left and right amygdala connectivity associated with callous-unemotional traits while viewing fearful versus neutral facial expressions. N = 165. Stronger positive connectivity group-level PPI effects of the amygdala are shown in red. Weaker positive connectivity group-level PPI effects of the amygdala are shown in blue. Details about the significant clusters (e.g., MNI coordinates, cluster size and extent) are reported in Supplemental Table S10. B. Group-level PPI effects of left and right amygdala connectivity associated with callous-unemotional traits while viewing sad versus neutral facial expressions.



Supplemental Figure 4. Callous-unemotional traits were associated with stronger positive connectivity between the left amygdala and insula while viewing happy versus neutral facial expressions. *N* = 165. The voxel-wise threshold is set at $p < .01$, which resulted in a cluster threshold of $k = 97$ contiguous voxels for small volume correction in the anterior cingulate cortex ROI. The color bar is showing T-values. Details about the significant clusters (e.g., MNI coordinates, cluster size and extent) are reported in Supplemental Table S10.

Interaction Models MPlus Syntax Set 1: 4 models examining interactions between AB and CU traits in predicting amygdala activation to different emotional faces.

Model 1:
TITLE: AB x CU traits interaction model for contrast fearful > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 ABCU;

DEFINE:
ABCU = AB_C * CU_C;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_17 on Gender pubc_mean income White AA AB_C CU_C ABCU; RAmy_17 on Gender pubc_mean income White AA AB_C CU_C ABCU; Output: sampstat standardized residual tech1 tech3;

Model 2:
TITLE: AB x CU traits interaction model for contrast happy > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_23 RAmy_23 ABCU;

DEFINE:
ABCU = AB_C * CU_C;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_23 on Gender pubc_mean income White AA AB_C CU_C ABCU; RAmy_23 on Gender pubc_mean income White AA AB_C CU_C ABCU;

Output: sampstat standardized residual tech1 tech3;

Model 3:
TITLE: AB x CU traits interaction model for contrast sadness > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_27 RAmy_27 ABCU;

DEFINE:
ABCU = AB_C * CU_C;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_27 on Gender pubc_mean income White AA AB_C CU_C ABCU; RAmy_27 on Gender pubc_mean income White AA AB_C CU_C ABCU;

Output: sampstat standardized residual tech1 tech3;

Model 4:
TITLE: AB x CU traits interaction model for contrast angry > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_32 RAmy_32 ABCU;

DEFINE:
ABCU = AB_C * CU_C;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_32 on Gender pubc_mean income White AA AB_C CU_C ABCU; RAmy_32 on Gender pubc_mean income White AA AB_C CU_C ABCU;

Output: sampstat standardized residual tech1 tech3;

Interaction Models MPlus Syntax Set 2: 4 models examining three-way interactions between AB, CU traits, and gender in predicting amygdala activation to different emotional faces.

Model 1:
TITLE: AB x CU traits x gender interaction model for contrast fearful > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 ABCU AB_G CU_G AB_CU_G;

DEFINE:
ABCU = AB_C * CU_C; AB_G = AB_C * Gender; CU_G = CU_C * Gender; AB_CU_G = AB_C * CU_C * Gender;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_17 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_G CU_G AB_CU_G;
RAmy_17 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_G CU_G AB_CU_G;

Output: sampstat standardized residual tech1 tech3;

Model 2:
TITLE: AB x CU traits x gender interaction model for contrast happiness > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_23 RAmy_23 ABCU AB_G CU_G AB_CU_G;

DEFINE:
ABCU = AB_C * CU_C; AB_G = AB_C * Gender; CU_G = CU_C * Gender; AB_CU_G = AB_C * CU_C * Gender;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_23 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_G CU_G AB_CU_G;
RAmy_23 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_G CU_G AB_CU_G;

Output: sampstat standardized residual tech1 tech3;

Model 3:
TITLE: AB x CU traits x gender interaction model for contrast sadness > neutral

VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_27 RAmy_27 ABCU AB_G CU_G AB_CU_G;

DEFINE:
ABCU = AB_C * CU_C; AB_G = AB_C * Gender; CU_G = CU_C * Gender; AB_CU_G = AB_C * CU_C * Gender;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_27 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_G CU_G AB_CU_G;
RAmy_27 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_G CU_G AB_CU_G;

Output: sampstat standardized residual tech1 tech3;

Model 4:
TITLE: AB x CU traits x gender interaction model for contrast angry > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_32 RAmy_32 ABCU AB_G CU_G AB_CU_G;

DEFINE:
ABCU = AB_C * CU_C; AB_G = AB_C * Gender; CU_G = CU_C * Gender; AB_CU_G = AB_C * CU_C * Gender;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL:
LAmy_32 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_G CU_G AB_CU_G;
RAmy_32 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_G CU_G AB_CU_G;

Output: sampstat standardized residual tech1 tech3;

Interaction Models MPlus Syntax Set 3: 4 models examining three-way interactions between AB, CU traits, and African American race in predicting amygdala activation to different emotional faces.

Model 1:
TITLE: AB x CU traits x African American race interaction model for contrast fearful > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 ABCU AB_B CU_B AB_CU_B;

DEFINE: ABCU = AB_C * CU_C; AB_B = AB_C * AA; CU_B = CU_C * AA; AB_CU_B = AB_C * CU_C * AA;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_17 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_B CU_B AB_CU_B;
RAmy_17 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_B CU_B AB_CU_B;

Output: sampstat standardized residual tech1 tech3;

Model 2:
TITLE: AB x CU traits x African American race interaction model for contrast happiness > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_23 RAmy_23 ABCU AB_B CU_B AB_CU_B;

DEFINE:
ABCU = AB_C * CU_C; AB_B = AB_C * AA; CU_B = CU_C * AA; AB_CU_B = AB_C * CU_C * AA;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_23 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_B CU_B AB_CU_B;
RAmy_23 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_B CU_B AB_CU_B;

Output: sampstat standardized residual tech1 tech3;

Model 3:
TITLE: AB x CU traits x African American race interaction model for contrast sadness > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_27 RAmy_27 ABCU AB_B CU_B AB_CU_B;

DEFINE:
ABCU = AB_C * CU_C; AB_B = AB_C * AA; CU_B = CU_C * AA; AB_CU_B = AB_C * CU_C * AA;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_27 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_B CU_B AB_CU_B;
RAmy_27 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_B CU_B AB_CU_B;

Output: sampstat standardized residual tech1 tech3;

Model 4:
TITLE: AB x CU traits x African American race interaction model for contrast angry > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_32 RAmy_32 ABCU AB_B CU_B AB_CU_B;

DEFINE:
ABCU = AB_C * CU_C; AB_B = AB_C * AA; CU_B = CU_C * AA; AB_CU_B = AB_C * CU_C * AA;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_32 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_B CU_B AB_CU_B;
RAmy_32 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_B CU_B AB_CU_B;

Output: sampstat standardized residual tech1 tech3;

Interaction Models MPlus Syntax Set 4: 4 models examining three-way interactions between AB, CU traits, and Caucasian race in predicting amygdala activation to different emotional faces.

Model 1:
TITLE: AB x CU traits x Caucasian race interaction model for contrast fearful > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 ABCU AB_w CU_W AB_CU_w;

DEFINE:
ABCU = AB_C * CU_C; AB_w = AB_C * White; CU_w = CU_C * White; AB_CU_w = AB_C * CU_C * White;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_17 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_w CU_w AB_CU_w;
RAmy_17 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_w CU_w AB_CU_w;

Output: sampstat standardized residual tech1 tech3;

Model 2:
TITLE: AB x CU traits x Caucasian race interaction model for contrast happiness > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_23 RAmy_23 ABCU AB_w CU_W AB_CU_w;

DEFINE:
ABCU = AB_C * CU_C; AB_w = AB_C * White; CU_w = CU_C * White; AB_CU_w = AB_C * CU_C * White;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_23 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_w CU_w AB_CU_w;
RAmy_23 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_w CU_wAB_CU_w;

Output: sampstat standardized residual tech1 tech3;

Model 3:
TITLE: AB x CU traits x Caucasian race interaction model for contrast sadness > neutral

VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_27 RAmy_27 ABCU AB_w CU_W AB_CU_w;

DEFINE:
ABCU = AB_C * CU_C; AB_w = AB_C * White; CU_w = CU_C * White; AB_CU_w = AB_C * CU_C * White;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_27 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_w CU_w AB_CU_w;
RAmy_27 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_w CU_w AB_CU_w;

Output: sampstat standardized residual tech1 tech3;

Model 4:
TITLE: AB x CU traits x Caucasian race interaction model for contrast angry > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_32 RAmy_32 ABCU AB_w CU_W AB_CU_w;

DEFINE:
ABCU = AB_C * CU_C; AB_w = AB_C * White; CU_w = CU_C * White; AB_CU_w = AB_C * CU_C * White;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_32 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_w CU_w AB_CU_w;
RAmy_32 on Gender pubc_mean income White AA AB_C CU_C ABCU AB_w CU_w AB_CU_w;

Output: sampstat standardized residual tech1 tech3;

Interaction Models MPlus Syntax Set 5: Models using 'GROUPING' to compare boys versus girls based on previous significant three-way interactions between AB, CU traits, and gender in predicting amygdala activation to different emotional faces.

Model 1:
TITLE: Comparing boys versus girls for contrast fearful > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are
AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 ABCU;

grouping is Gender (0= Girls 1= Boys);

DEFINE:
ABCU = AB_C * CU_C;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_17 on White pubc_mean income AA AB_C CU_C ABCU; RAmy_17 on White pubc_mean income AA AB_C CU_C ABCU;

Model Girls: LAmy_17 on White pubc_mean income AA AB_C CU_C ABCU; RAmy_17 on White pubc_mean income AA AB_C CU_C ABCU;

Model Boys: LAmy_17 on White pubc_mean income AA AB_C CU_C ABCU; RAmy_17 on White pubc_mean income AA AB_C CU_C ABCU;

Output: sampstat standardized residual tech1 tech3;

Model 2:
TITLE: Comparing boys versus girls for contrast sadness > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_27 RAmy_27 ABCU;

grouping is Gender (0= Girls 1= Boys);

DEFINE:
ABCU = AB_C * CU_C;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_27 on White pubc_mean income AA AB_C CU_C ABCU; RAmy_27 on White pubc_mean income AA AB_C CU_C ABCU;

Model Girls: LAmy_27 on White pubc_mean income AA AB_C CU_C ABCU; RAmy_27 on White pubc_mean income AA AB_C CU_C ABCU;

Model Boys: LAmy_27 on White pubc_mean income AA AB_C CU_C ABCU; RAmy_27 on White pubc_mean income AA AB_C CU_C ABCU;

Output: sampstat standardized residual tech1 tech3;

Model 3:
TITLE: Comparing boys versus girls for contrast angry > neutral
VARIABLE: NAMES ARE Id AB_C CU_C Gender pubc_mean income White AA LAmy_17 RAmy_17 LAmy_23 RAmy_23 LAmy_27 RAmy_27 LAmy_32 RAmy_32;

missing are all (-9999);

usevariables are AB_C CU_C Gender pubc_mean income White AA LAmy_32 RAmy_32 ABCU;

grouping is Gender (0= Girls 1= Boys);

DEFINE:
ABCU = AB_C * CU_C;

Analysis:
Type is general; estimator is mlr; iterations = 25000; convergence = 0.00005;

MODEL: LAmy_32 on White pubc_mean income AA AB_C CU_C ABCU; RAmy_32 on White pubc_mean income AA AB_C CU_C ABCU;

Model Girls: LAmy_32 on White pubc_mean income AA AB_C CU_C ABCU; RAmy_32 on White pubc_mean income AA AB_C CU_C ABCU;

Model Boys: LAmy_32 on White pubc_mean income AA AB_C CU_C ABCU; RAmy_32 on White pubc_mean income AA AB_C CU_C ABCU;

Output: sampstat standardized residual tech1 tech3;

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