

# Moderation by Race and Ethnicity on the Relationship Between Aggression and Symptom Severity in Children with Autism Spectrum Disorder



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## Background

- Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by deficits in social communication, restricted interests, and repetitive behaviors
- ~23% of ASD children show clinical levels of **aggression** [Farmer, 2014]
- Race/ethnicity** is another a factor of interest in ASD research, including on disparities in diagnosis rates and severity [Liptak, 2008]
- Previous research found ASD symptom severity to be a significant predictor of physical aggression (this study did not investigate race as a moderator) [Mazurek, 2013]
- We aimed to look at the relationship between aggression and symptom severity, and the moderating effect of race/ethnicity on that relationship
- We predicted that:
  - Children with greater ASD symptom severity display more aggressive behaviors [Jang, 2011]
  - There is a moderating effect of race, with this relationship stronger in white, non-Hispanic adolescents than non-white adolescents

## Methods

160 participants (M= 90), ages 8-17 years from the four-site NIH funded ACE GENDAAR study were included in the analysis. Participants met ASD criteria via standardized tests and had an IQ > 70.

Measures:

1. **Autism Diagnosis Observation Schedule-2 (ADOS-2)**: ASD diagnosis was confirmed via the ADOS-2 measure and symptom severity was determined based on clinician observation of and interaction with the participant using the **ADOS Calibrated Severity Score (ADOS CSS)**. Scores range from 1-10 with higher number indicating higher severity.

2. **Child Behavior Checklist (CBCL)**: Parents of the participants completed the (CBCL), and rated their child's level of emotional/behavioral problems. Questions were grouped together to yield scores in different "syndrome scale" categories, including aggressive behaviors and a more broad externalizing behavior category, which includes aggression and rule-breaking. Scores are normalized with respect to an average of 50 controlling for sex and age, with higher number indicating greater problems.

Due to limited racial diversity within our sample, race was grouped as "White Non-Hispanic" or "Non-white". Symptom severity was collapsed into "Moderate" (scores 4-5) and "Severe" (scores 6-10) for some analyses.

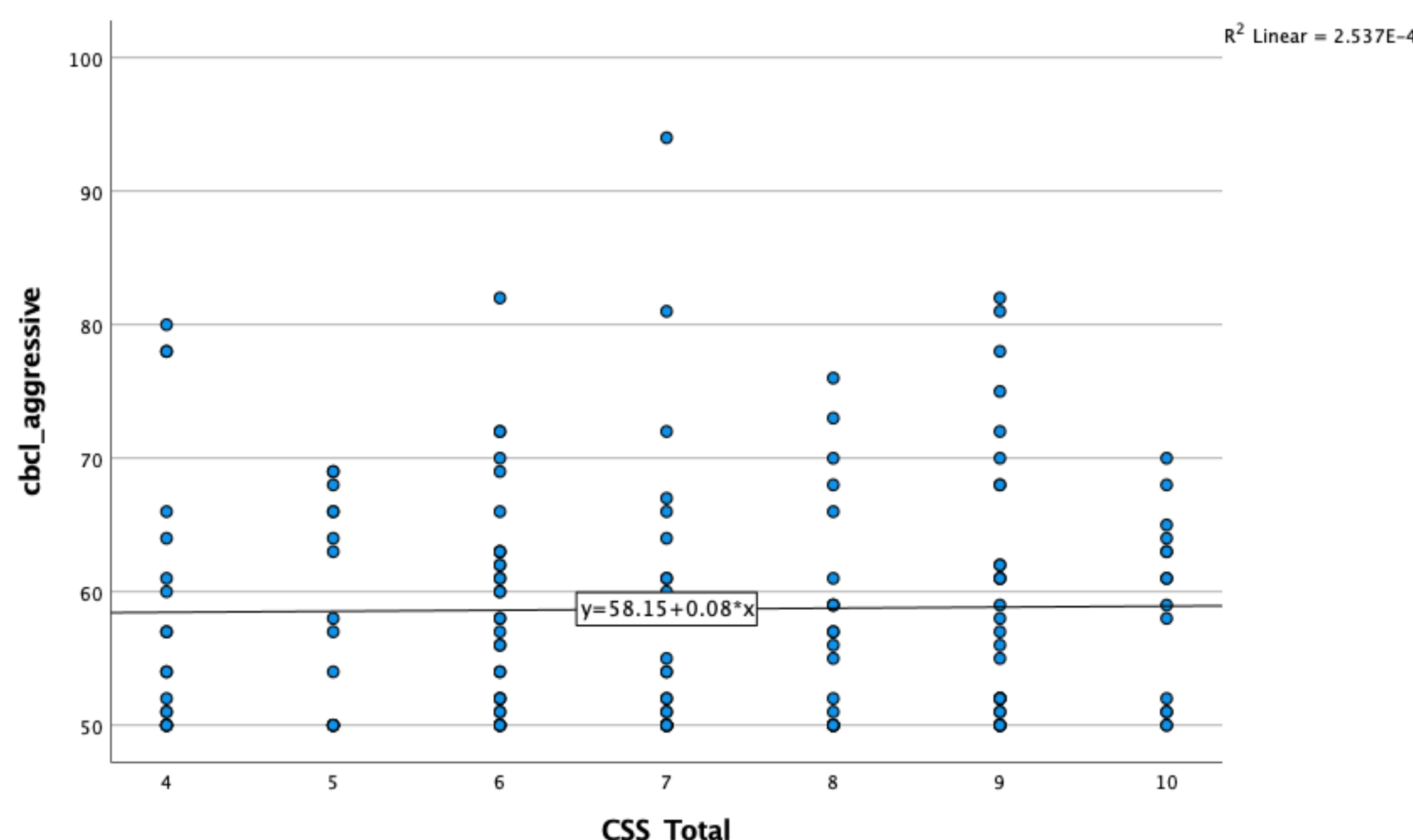
Table 1. Demographics of Groups

	N	Percent	Mean CSS	Std Dev CSS	Mean Aggression	Std Dev Aggression	Mean External	Std Dev External
ASD F	70	43.8	6.6	1.853	59.64	9.688	56.41	10.837
ASD M	90	56.3	7.42	1.774	57.96	8.376	54.41	10.763
White Non-Hisp	106	66.3	7.21	1.901	59.02	9.041	55.72	10.682
Non-white	54	33.8	6.78	1.723	58.06	8.92	54.52	11.101

## Results

**Question 1:** Are there correlations between aggression and autism symptom severity?

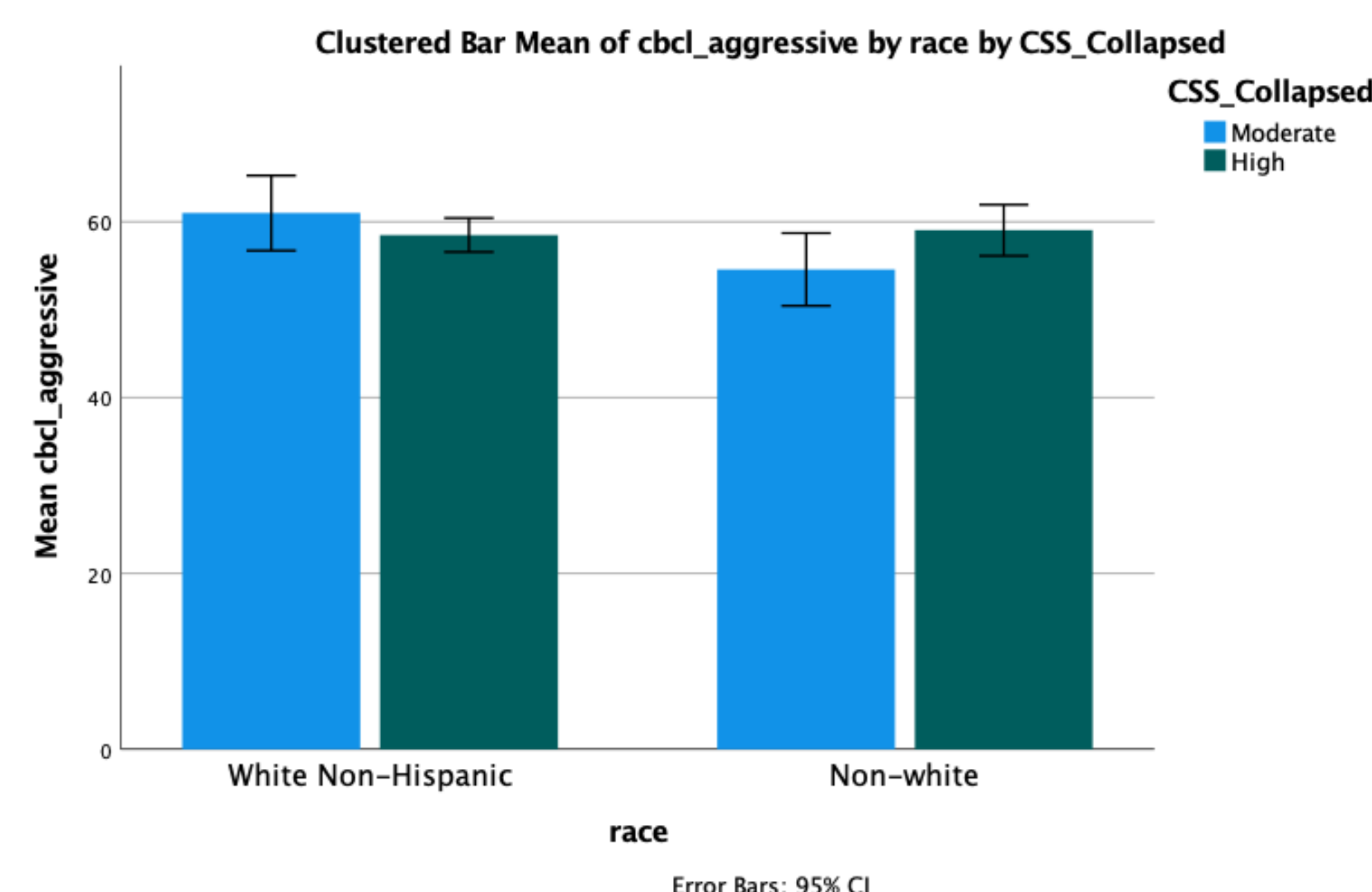
Correlations were implemented between ADOS CSS scores and CBCL Aggressive scores for the entire sample



The correlation between aggression and autism symptom severity (R= 0.026, p= 0.842) was very weak and not statistically significant at the level  $\alpha = 0.05$  (2-tailed). The linear regression line gave a small slope (0.08) and a near-zero R<sup>2</sup> value (R<sup>2</sup>= 2.537E-4).

**Question 2:** Is there a difference in aggression by level of autism symptom severity? When separated by race?

The data were split by race, and independent sample t-tests were implemented between collapsed ADOS CSS score (moderate vs. high) and CBCL Aggressive scores



No significant differences were found between symptom severity and aggression scores for the whole sample (t= 0.030, p= 0.976), for White non-Hispanic participants (t= 1.156, p= 0.250), or for non-white participants (t= -1.549, p= 0.127).

**Question 3:** Is there a moderating effect of race on the relationship between aggression and autism symptom severity?

Moderator analysis was performed between ADOSS CSS scores and CBCL Aggressive scores with race as a dichotomous moderator

Model Summary <sup>c</sup>									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			
						F Change	df1	df2	Sig. F Change
1	.052 <sup>a</sup>	.003	-.010	9.028	.003	.212	2	157	.809
2	.095 <sup>b</sup>	.009	-.010	9.028	.006	1.010	1	156	.316

a. Predictors: (Constant), race, CSS\_Total  
 b. Predictors: (Constant), race, CSS\_Total, CSS\_x\_race  
 c. Dependent Variable: cbcl\_aggressive

Including race as a moderator generated an R<sup>2</sup> increase of 0.006, or 0.6%. This R<sup>2</sup> change was not statistically significant at the level  $\alpha = 0.05$ , as the significance value of the F change was 0.316.

## Discussion

- Contrary to our hypothesis, our results did not show any significant relationships between autism symptom severity and aggressive behaviors in adolescents with ASD
- We also did not find a statistically significant moderating effect by race on this relationship
- Noteworthy result:** in our T-tests, we observed a noticeable, though not statistically significant decrease in the p-values comparing the mean aggression scores for the "moderate" vs "severe" symptom severity groups after dividing the participants by race compared to all together (p= 0.976 for all participants to p= 0.250 for white non-Hispanics and p= 0.127 for non-whites)
- Limitations:**
  - Relatively small sample size (N = 160)
  - Limited diversity of racial makeup, symptom severity, and IQ
- Future research:**
  - Repeat study with a greater range of IQs and non-white races in the sample population, and/or include TD adolescents as well as ASD adolescents
  - Explore the moderating effect of gender, or gender and race together
  - Investigate whether there is a relationship between symptom severity and internalizing (anxious, withdrawn, depressed) behaviors instead of externalizing behaviors

## Acknowledgements & References

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