Developmental Academic Profiles in Siblings of Individuals with ASD

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Background

- The Broad Autism Phenotype (BAP) refers to a set of subclinical personality traits and language abilities observed in unaffected relatives of individuals with ASD that mirror the defining features of ASD, and are believed to reflect genetic liability to ASD.[1]

- Prior work identified childhood patterns of academic performance in parents of individuals with ASD, showing lower performance in language but not reading or math in archival, academic testing records, and that predicted BAP features in adulthood and ASD symptom severity in their child.[2]

- These findings suggest that academic language performance may serve as a potential childhood marker of genetic liability to ASD.

- Parallel archival developmental data in siblings holds potential for revealing developmental phenotypic markers of ASD genetic risk.

Objective

- To characterize childhood developmental academic profiles in siblings of individuals with ASD compared to controls.

- To examine correlates of developmental academic profiles within individuals, and families, as potential markers of ASD genetic risk.

Methods

- Academic performance: Assessed using the Iowa Test of Basic Skills (ITBS)[3], a standardized measure of academic performance administered annually from K-12 in the state of Iowa.

- ASD symptoms: The ADOS-2[4] assessed symptom severity in individuals with ASD.

- Social cognition: Reading the Mind in the Eyes[5] assessed social cognition in unaffected siblings.

- *Analyses:* Hierarchical linear models characterized childhood performance and rate of development in language, reading, and math over time. Correlations explored relationships between academic performance and social cognition in unaffected siblings and ASD symptom severity in their siblings with ASD.
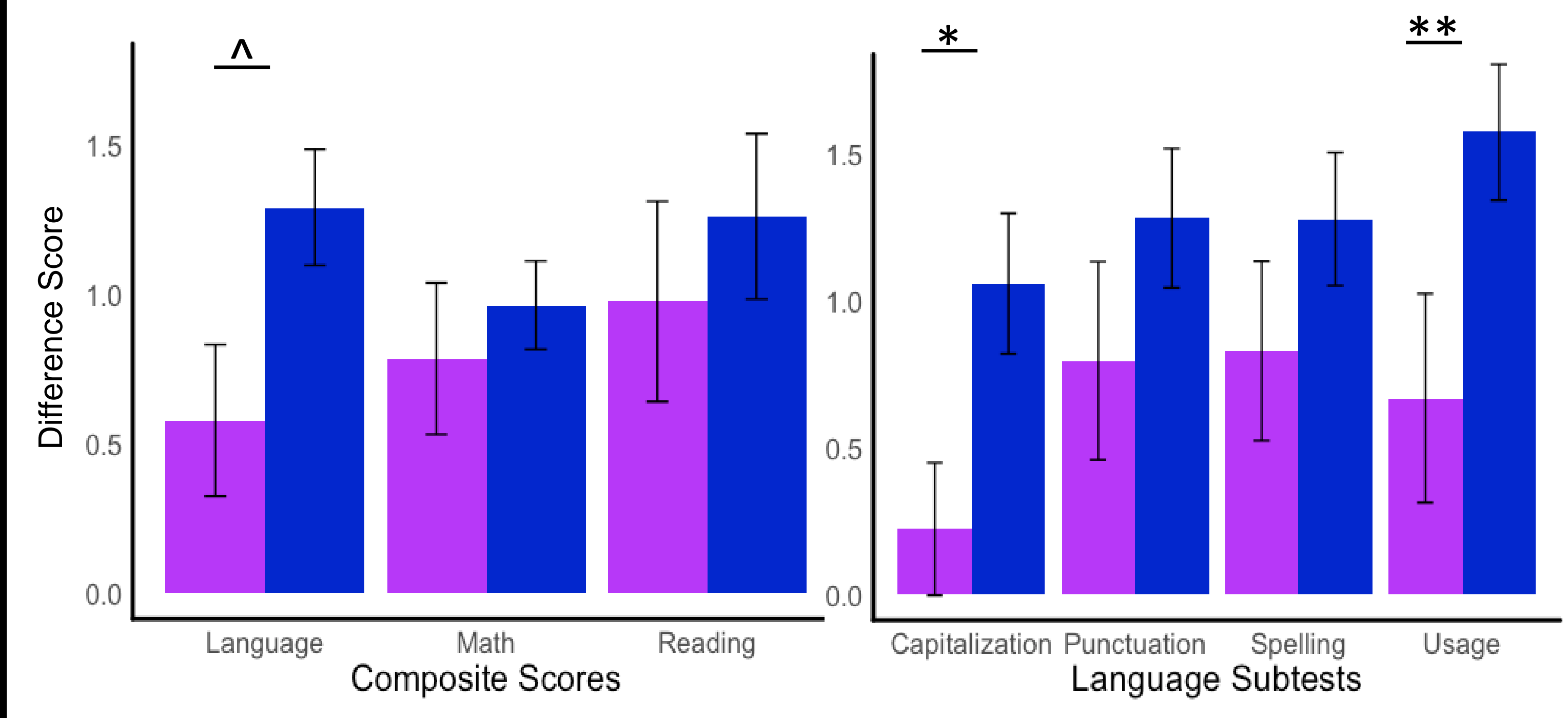
Participants

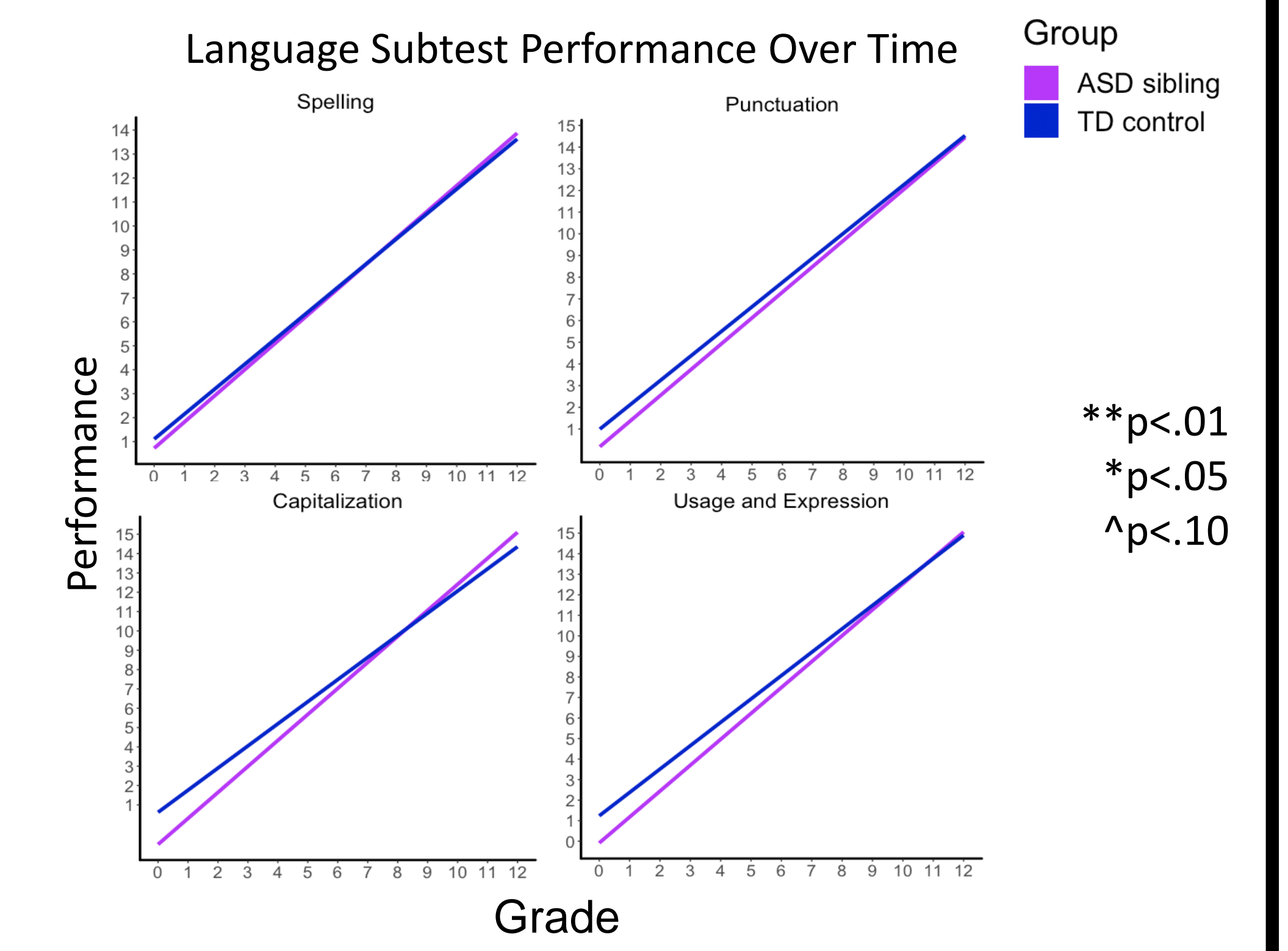| Group	N	Sex (M:F)	FSIQ (SD)	VIQ (SD)	PIQ (SD)
Controls	88	22:13	113.2(12.6)	110.6(14.1)	112.44(14.8)
ASD sibling	33	16:13	118.7(11.6)	121.3(13.3)*	113.6(12.8)
ASD**	25	20:5	99.1(17.9)	95.3(22.8)	103.1(19.6)

*p < .05; **ASD group included in correlation analysis only.
Note: IQ assessed using Wechsler Abbreviated Scale of Intelligence or Wechsler Intelligence Scale for Children[5-6].

Childhood academic performance

- Siblings of individuals with ASD showed poorer performance than controls in the <u>Language</u> composite; specifically in <u>Capitalization</u> (p = .03) and <u>Usage and Expression</u> language subtests (p = .009)

- No group differences in Reading or Math.
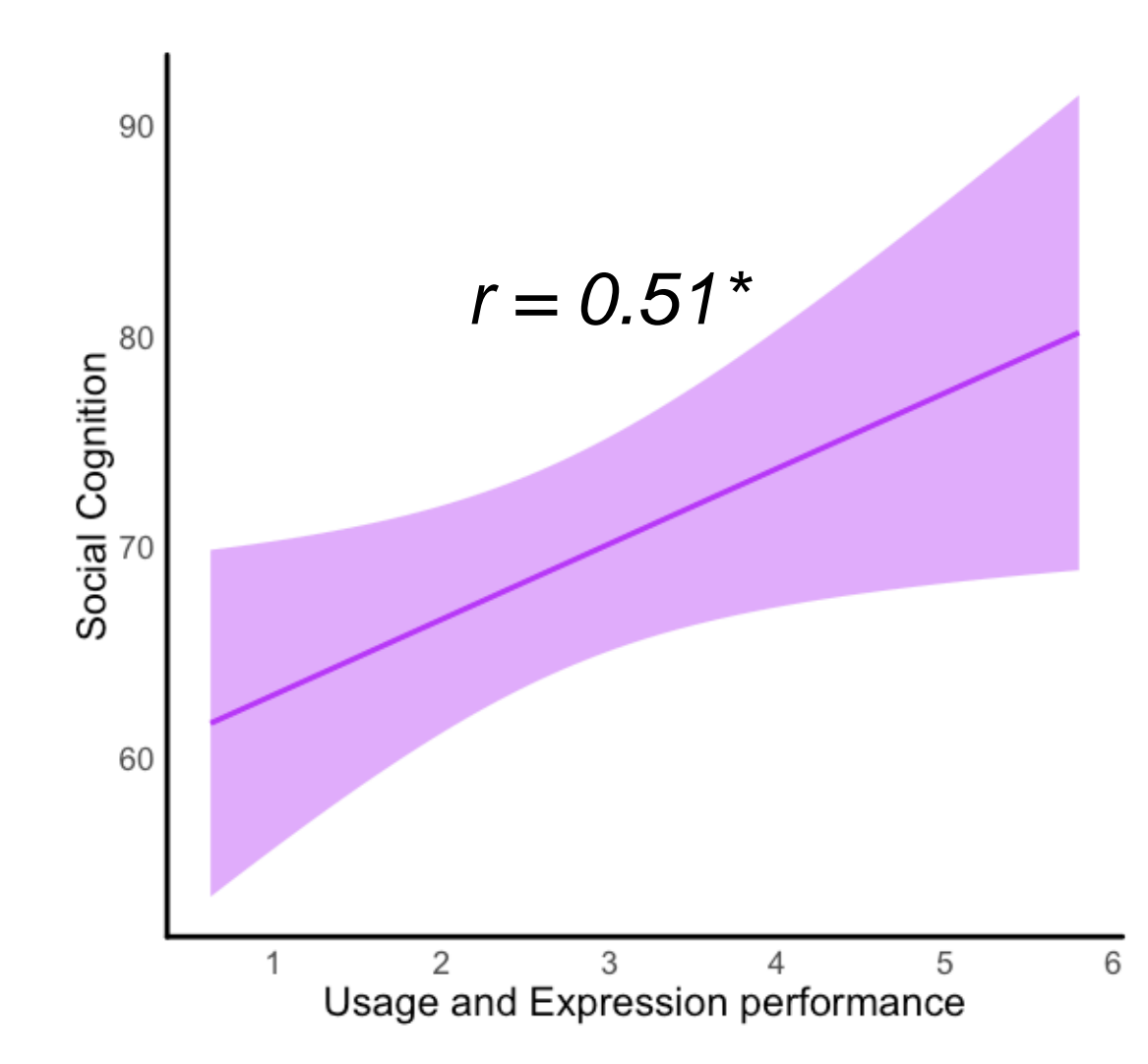

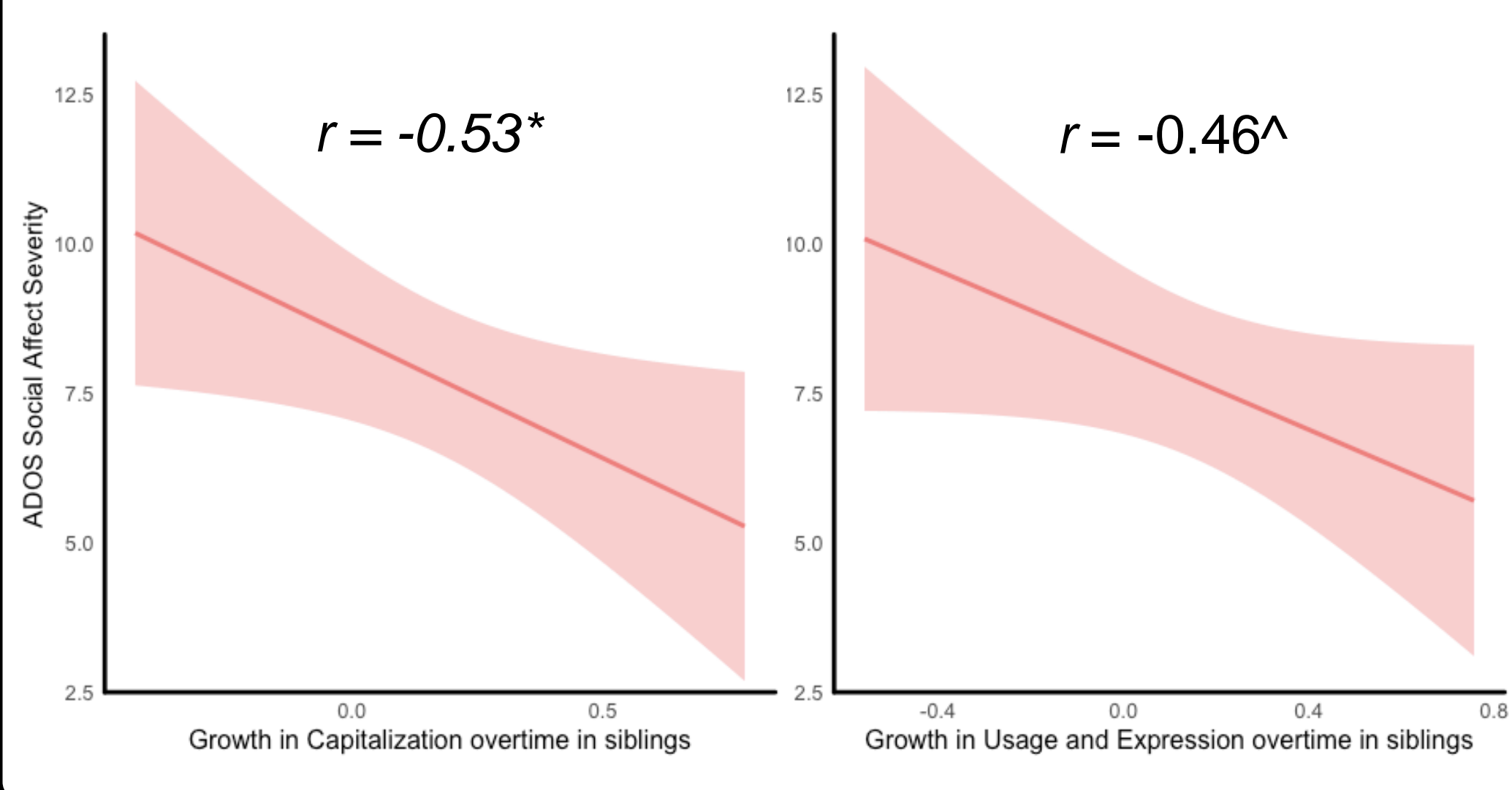Note: Difference Scores represent the difference from grade expectation

Language Subtest Performance Over Time

**p<.01
*p<.05
^p<.10

- *Capitalization differences: grades 3*, 5**
- *Usage/Expression differences: grades 3*, 4*, 5^*

Correlations

- *Lower performance in Usage/Expression was associated with poorer performance on a task of social cognition.*

r = 0.51*

- *Slower rates of siblings' development in language subtests (Capitalization, Usage/Expression) associated with increased ASD severity in the affected sibling.*

r = -0.53*   r = -0.46^

Summary & Conclusions

- Patterns of performance in siblings mirrored those previously reported in parents, with lower performance in language tests but no differences in reading or math.[2]

- Consistent with profiles in parents, siblings with lower language performance in childhood demonstrated lower social cognitive abilities, and also had siblings with more severe clinical symptoms.

- Findings suggest that academic-related language abilities might serve as a developmental marker of genetic liability to ASD, evident in clinically unaffected first degree relatives of individuals with ASD.

- These results further point to the language domain as particularly relevant for understanding of subclinical expression of ASD genetic liability within families.

References

1. Piven et al., (1997). *American J of Psychiatry.*
2. Losh et al., (2017). *J of autism and developmental disorders.*
3. Hoover(2001). *Iowa Tests of Basic Skills, Riverside Publishing Company.*
4. Lord et al., (2015). ADOS-2. *Manual (Part I): Modules*, 1-4.
5. Baron-Cohen et al., 2001. J Child Psychol Psychiatry
6. Wechsler, 1999, *Pearson Assessment*
7. Wechsler, 2003, *Psychological Corporation*

Acknowledgments