A Study of Siblings of Individuals with ASD: Comparison of Pragmatic Language Ability

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Background

- Previous studies have found impairment in pragmatic language across individuals with Autism Spectrum Disorder (ASD) (Tager-Flusberg et al., 2005; Baron-Cohen, 1988; Bishop et al., 2006). Impairment in pragmatic language includes overtalkativeness, talking in a stereotypical manner, or being unable to consider others' viewpoints (Bishop et al., 2006).

- Deficits in pragmatic language are also observed in siblings of individuals with ASD, thus it has been hypothesized that pragmatic language may be part of the broader autism phenotype (BAP) (Bishop, 1997; Baron-Cohen, 1988).

- This study compared the pragmatic language ability between three groups: (1) Typically developing (TD) children whose twin has a diagnosis of ASD (TD twin of ASD), (2) TD children whose twin is also TD (TD twin of TD) and (3) Children with a diagnosis of ASD whose twin also has an ASD diagnosis (ASD twin of ASD). This study also looked at whether children's pragmatic language ability can be predicted by other social communication measures of their twin.

- We hypothesize that TD children from ASD disconcordant twin pairs will perform better than children with ASD from ASD concordant twin pairs, but not as well as TD children from concordant TD twin pairs. We also hypothesize that the social skills of a twin will significantly predict the pragmatic language ability of his or her other twin.

Methods

Participants: Three groups of individuals participated in this study along with their twin: (1) Typically developing children whose twin has a diagnosis of ASD (TD twin of ASD), (2) Typically developing children whose twin is also typically developing (TD twin of TD) and (3) Children with a diagnosis of ASD whose twin also has an ASD diagnosis (ASD twin of ASD). All groups matched on age and Nonverbal IQ.

	TD Twin of ASD	ASD Twin of ASD	TD Twin of TD
Gender	N = 13 (M = 5, F = 8)	N = 13 (M = 10, F = 3)	N = 13 (M = 7, F = 6)
MZ/DZ	MZ = 4, DZ =9	MZ = 10, DZ =3	MZ = 6, DZ =7
Verbal IQ	M = 116.31, SD = 13.94	M = 101.00, SD = 10.01	M = 117.46, SD = 9.13
Age (in years)	M = 10.02, SD = 2.93	M = 10.50, SD = 3.89	M = 10.40, SD = 2.31

Table 1 Participant profile

Procedure:
Subjects completed the Wechsler Abbreviated Scale of Intelligence (WASI) and a 15-20 minute interview from the Autism Diagnostic Observation Schedule (ADOS). The interview from the ADOS was video-recorded, and the videos were later rated by coders blind to diagnosis. Coders assessed subjects' pragmatic language using the Pragmatic Rating Scale-Modified (PRS-M) (Ruser, 2007). Table 2 shows three of the four subdomains in the PRS-M.


Image 1 Participant during ADOS interview

| Emotional expressiveness and awareness of the other	Communicative performance	Language
Direct emotional verbal expression	Intonation	Grammatical errors
Indirect emotional verbal expression	Descriptive gestures	Confusing accounts
Failure to reference	Emphatic gestures	Reformulation
Facial expressions	Eye contact	Mispronunciation
Empathy		

Table 2 Items and subscales of Pragmatic Rating Scale – Modified (PRS-M) (Ruser, 2007)

Results

Comparison of Pragmatic Language Across Different Diagnostic Groups
Univariate Analysis of Covariance was used to test if the three groups significantly differ on their pragmatic language. Verbal IQ was considered as the Covariate.
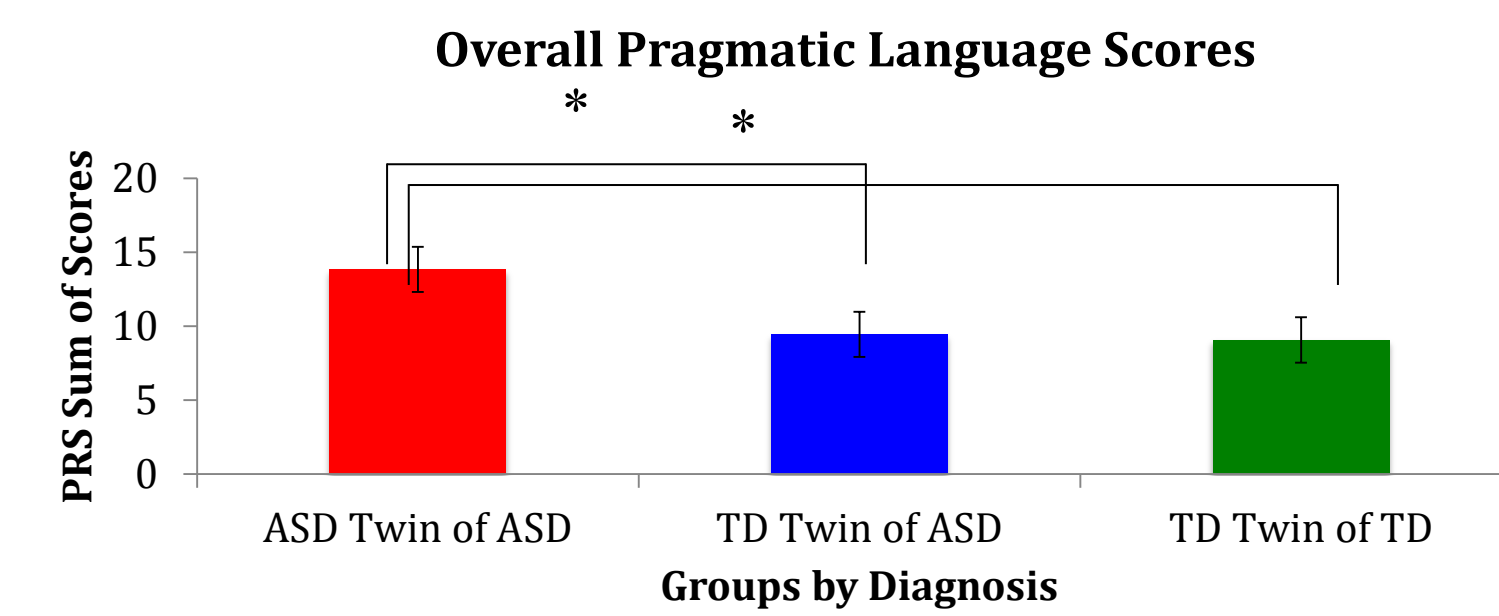

TD twin of ASD group scored significantly **lower (better)** than ASD twin of ASD group, p = .02, and did not differ from TD twin of TD group. ASD twin of ASD group scored significantly **higher (worse)** than TD twin of TD, p = .013.
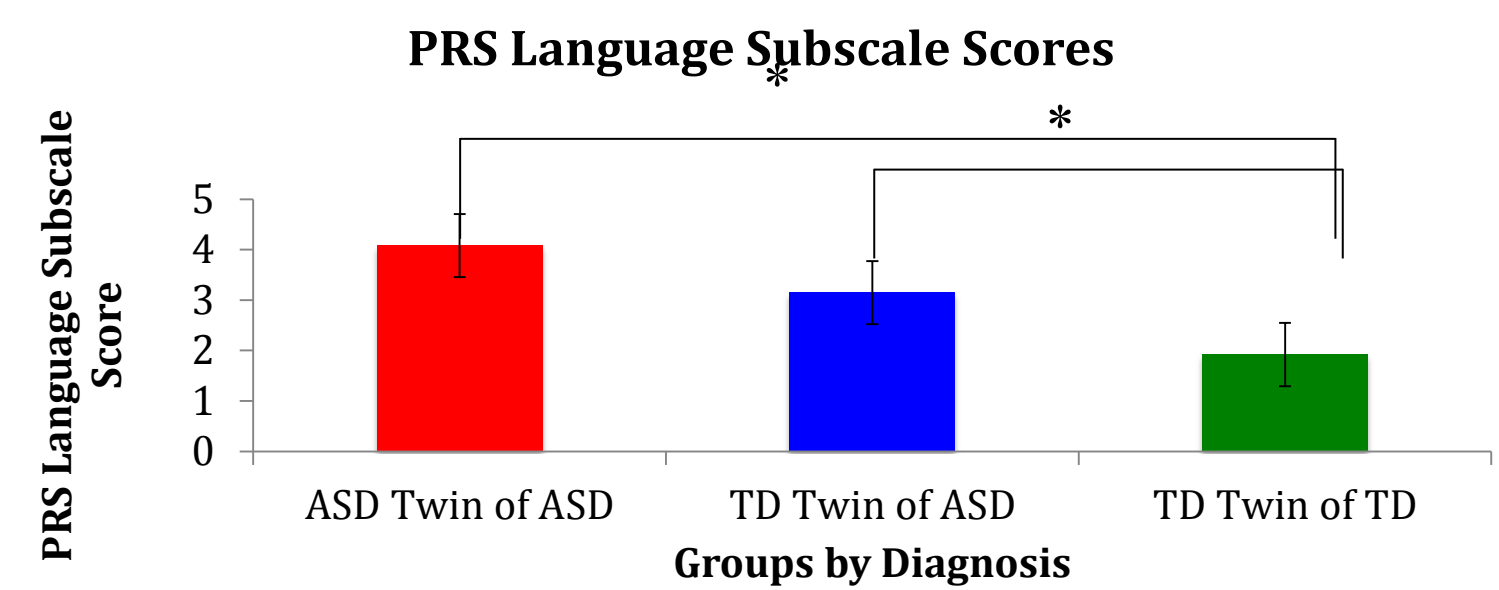

TD twin of ASD group scored significantly **higher (worse)** than TD twin of TD group, p = .05, and did not differ from ASD twin of ASD group. TD twin of TD group scored significantly **lower (better)** than ASD twin of ASD group, p = .022.

Do the social communication measures of one twin predict the pragmatic language abilities of the other?

Multiple regression analysis was used to test if three different social communication measures of one twin significantly predicted the PRS scores of the other.
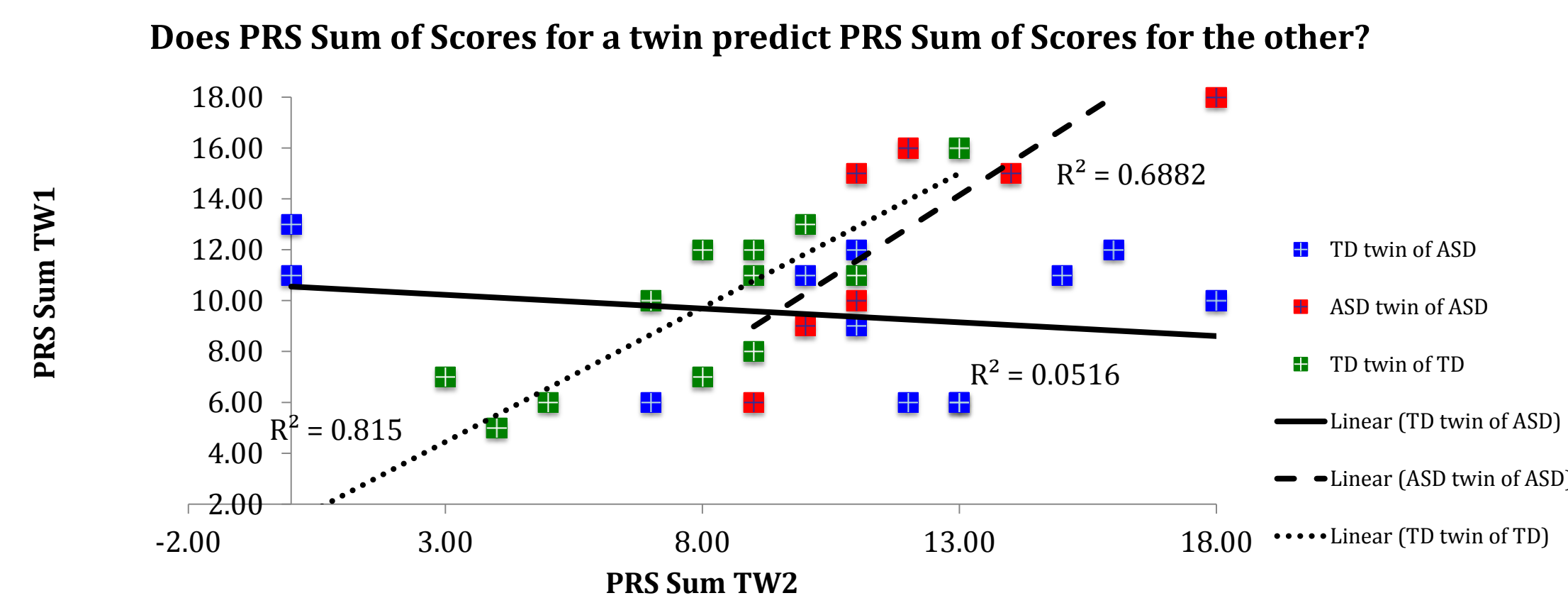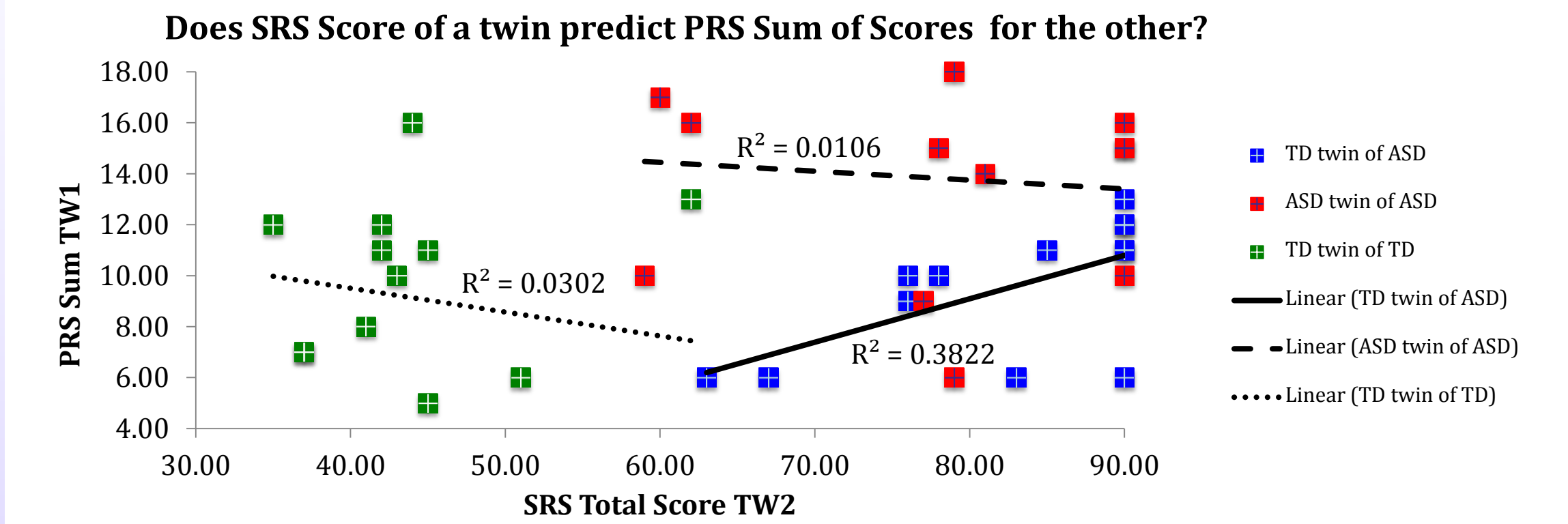

High (poor) score on PRS Sum of a twin significantly predicted a high (poor) score on PRS Sum for his or her twin in ASD concordant twin pairs, p = .011 and in TD concordant twin pairs, p = .00, but not in the disconcordant pairs.
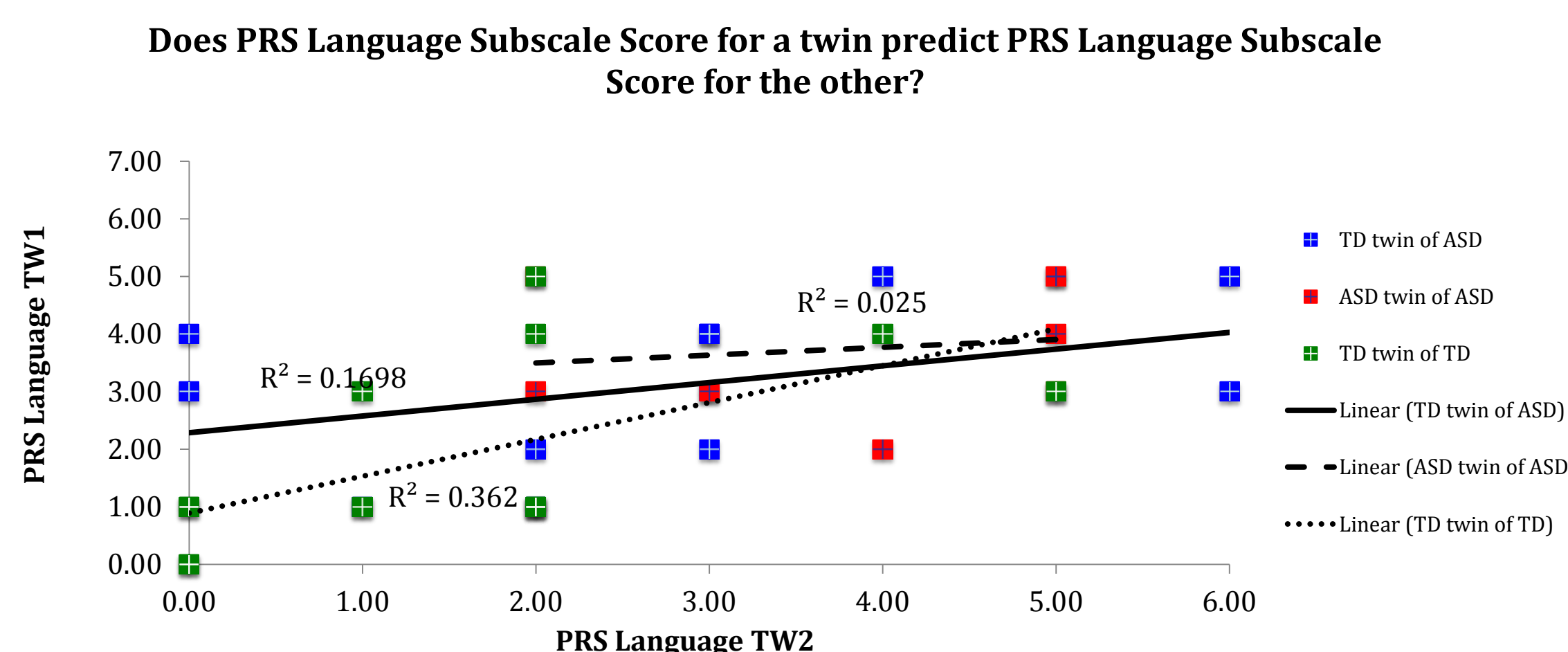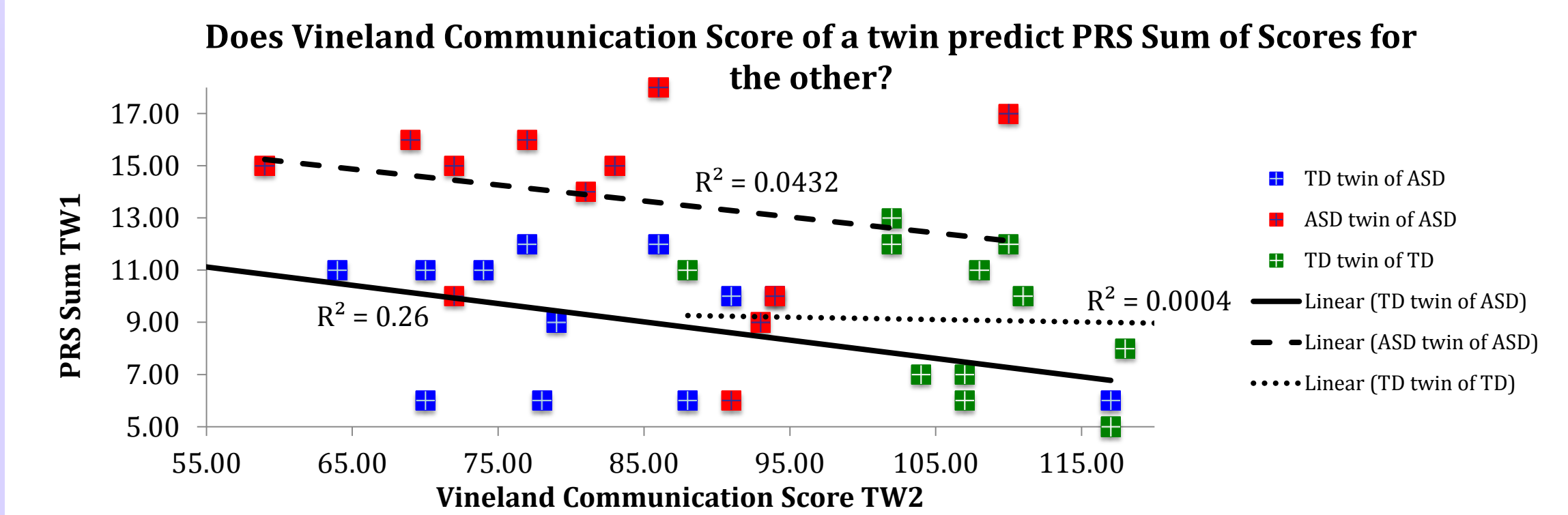

High (poor) score on PRS Language Subscale of a twin significantly predicted a high (poor) score on PRS Language Subscale for his or her twin in TD concordant twin pairs, p = .030, but not in other pairs.

Results Cont.

High (poor) score on SRS Total of a twin with ASD significantly predicted a high (poor) score on PRS Sum for his or her TD twin in disconcordant twin pairs, p = .014, but not in the the TD concordant and ASD concordant pairs.

Low (poor) score on Vineland Communication Subscale of a twin with ASD marginally significantly predicted a high (poor) score on PRS Sum for his or her TD twin in disconcordant twin pairs, p = .075, but not in the TD concordant and ASD concordant pairs.

Summary and Conclusions

Summary
- TD twins of children with ASD performed more similarly to TD twins of TD children in all areas of pragmatic language except for the language subscale, which includes grammar, reformulation, pronunciation and content clarity (GRPC). In the language subscale, TD twins of children with ASD performed more similarly to children with ASD. This could suggest that individual diagnosis matters in the development of pragmatic language ability, except for the language subscale, where level of GRPC in a TD child is influenced by the diagnosis of his or her twin with ASD. This could suggest a potential presence of broader autism phenotype (BAP) in the development of GRPC in TD twins of children with ASD.
- To learn more how the social communication ability of TD children are related to the social communication ability of their twins with ASD, a correlational analysis was done between the social communication measure of the children with ASD and the pragmatic language ability of their TD twins. Poor overall pragmatic language ability of TD twin was predicted by the poor SRS Sum of Scores and Vineland Communication Score of his or her twin with ASD, despite the disconcordant diagnosis. This suggests that the development of pragmatic language ability in TD twins of children with ASD could be predicted by some measures of social communication ability of their twins with ASD.
- When looking at the relationship between the pragmatic language ability of a TD child and of his or her twin with ASD, there was no significant correlation. However, for the concordant twin pairs (ASD-ASD and TD-TD), the pragmatic language ability of a twin predicted his or her other twin's pragmatic language ability.

Limitations and future directions
- Participants were not matched on twin pair gender or zygosity. Future studies should investigate if these trends differ between male, female, and discordant sex twins.
- Considering that fraternal twins share greater amount of environmental factors than non-twin siblings, future studies should include an additional sibling group to help in teasing apart the roles of genetics from the environment.

References

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