Heritability of Pragmatic Language in Twins with Autism Spectrum Disorders

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INTRODUCTION

Autism is characterized by having abnormal or impaired development in social interaction, language and communication, and restricted or repetitive behaviors (APA, 2000). Evidence that Autism Spectrum Disorder (ASD) has strong genetic contributions has emerged from studies researching heritability of ASD in twins. These studies have found that concordance rates of ASD among monozygotic twins (MZ) are higher than among dizygotic twins (DZ) (Bailey et al., 1995).

Pragmatic language is the component of language most seriously impaired in autism (Baltaxe, 1977; Tager-Flusberg, & Lord, 2005). The current study asked the following questions:

1. Is pragmatic language ability poorer in individuals with ASD than Typically Developing (TD) individuals?
2. Is verbal IQ (VIQ) related to pragmatic language ability?
3. Is pragmatic language ability correlated within twin pairs?

METHODS

Participants

• All TD participants in the study were MZ twins.
• ASD participants were accepted if they were either MZ or DZ twins concordant for ASD due to recruitment challenges.
• All individuals in ASD group had to have a prior diagnosis of Autistic Disorder, Asperger’s Disorder, or (PDD-NOS) to participate.
• TD twins with immediate family members with an ASD were excluded.

Participant Characteristics: Means (SD), Ranges

<table>
<thead>
<tr>
<th>N (M)</th>
<th>Age</th>
<th>FSIQ&lt;sup&gt;1&lt;/sup&gt;</th>
<th>VIQ&lt;sup&gt;2&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical</td>
<td>15 (6)</td>
<td>11.6 (5.1)</td>
<td>5.2-21.8</td>
</tr>
<tr>
<td>ASD</td>
<td>13 (10)</td>
<td>13.3 (5.7)</td>
<td>6.6-22.0</td>
</tr>
</tbody>
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Measures

Verbal and Nonverbal Intelligence. The Wechsler Abbreviated Scale of Intelligence (WASI) was administered to provide a standard measure of intellectual ability (Wechsler, 1999).

Autism Diagnostic Assessments. The Autism Diagnostic Interview-Revised (ADI-R) and the Autism Diagnostic Observation Schedule (ADOS) was administered to ASD participants to confirm prior diagnosis (Rutter et al., 2003; Lord et al., 2002).

RESULTS

Group Differences

Statistical analysis showed that group differences in overall PRS-M scores were based on diagnostic status, t(26) = -4.39, p < .001. Group differences were also found for the Communicative Performance, t(26) = -2.86, p < .01 and Language, t(26) = -3.87, p = .001 subscales.

Given that groups also significantly differed on Verbal IQ, ANCOVA was conducted with VIQ entered as a covariate. Group differences remained for Overall PRS-M scores, F(1,25) = 5.92, p < .05, as well as the Language subscale, F(1,25) = 6.32, p < .05. The effect of group on Communicative Performance was no longer significant when controlling for VIQ.

Because groups differed on PRS-M and VIQ, the relation between these variables was also examined within groups.

• For the TD group, there were no significant correlations between VIQ and PRS-M or its subscales. This suggests that among typically developing individuals the PRS-M is measuring an independent aspect of communication functioning from VIQ.

• For the ASD group, Communicative Performance ability significantly related to VIQ. Higher VIQ scores related to better performance on PRS-M. Total PRS-M and its other subscales did not relate to VIQ (r(13) = .57, p < .05).

Together, these results suggest that the relations found with groups combined may have been due to overall group differences on these scales.

Pragmatic Language Ability within Twin Pairs

Total PRS-M scores within twin pairs were significantly related r(14) = -.59, p < .05. In addition, a significant relationship also existed for Communicative Performance, r(14) = .69, p < .01, and Language r (14) = .81, p < .05. Correlations within TD twin pairs were not significant. In addition, there was only a significant correlation for Communicative Performance within ASD twin pairs r(6) = .81, p < .05. The non-significant correlations between groups could be due to small sample size.

DISCUSSION

• This study replicated previous findings that pragmatic language ability is poorer in individuals with autism than typically developing individuals.

• The study also determined that significant differences remained between TD and ASD individuals when controlling for VIQ, this finding supports the idea that the PRS-M and VIQ measure different aspects of language.

• Correlations between VIQ and the PRS-M did exist. It should be of note that in order for an ASD candidate to be scored on pragmatic language ability they needed to have verbal fluency.

• We are in the process of collecting a larger sample to validate these findings.