The effect of comorbidity on cognitive efficiency in autism spectrum disorder

Brianna Lewis, Kathryn McNaughton, Adam Naples, James McPartland

Child Study Center, Yale University School of Medicine, New Haven, CT, USA

Background

- Psychiatric co-morbidities in autism spectrum disorder (ASD) are common, occurring in as many as 72% of children with ASD1.
- Children with ASD often have deficits in aspects of cognitive efficiency, specifically working memory, processing speed, and/or executive functioning, though findings are mixed2.
- Psychiatric comorbidity has negative consequences on cognitive functioning, including executive functioning.
- Understanding whether secondary conditions or comorbidities have unique or shared impact on ASD compared to other diagnostic groups has important implications for assessment and treatment.

Objective: To study the effect of comorbidity on cognitive efficiency in individuals with ASD compared to individuals with other childhood psychiatric conditions.

Methods

Procedures:

- Use of archival clinic database from an academic medical center clinic specializing in developmental disability evaluations.
- Cognitive assessments were conducted by licensed psychologists, and final consensus diagnosis was determined by a multidisciplinary team consisting of psychology, psychiatry, and speech/language specialists following comprehensive evaluation.

Measures:

- Wechsler Adult Intelligence Scale, 3rd Edition (WAIS-III)
- Behavior Rating Inventory of Executive Function (BRIEF)

Inclusion/Exclusion Criteria:

- Primary diagnosis of ASD (ASD) or other psychiatric disorder (Non-ASD).
- Excluded: Children diagnosed with a primary or comorbid Intellectual Disability, cerebral palsy, or children with no clinical diagnosis.

Participant Demographics:

<table>
<thead>
<tr>
<th>N</th>
<th>Sex (M, F)</th>
<th>Age (SD)</th>
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</thead>
<tbody>
<tr>
<td>ASD</td>
<td>307</td>
<td>225, 46</td>
</tr>
<tr>
<td>Non-ASD</td>
<td>108</td>
<td>79, 14</td>
</tr>
</tbody>
</table>

Non-ASD Group Diagnoses

- ADHD
- Anxiety Disorders
- Conduct Disorder
- Global Developmental Delay
- Major Depressive Disorder
- Mood Disorders
- Language Disorders

- There was a significant difference in age between the ASD and Non-ASD group, t(399)=-2.66, p<.01.
- There was no significant difference in sex [χ²(4, 415)=3.61, p=.73].

Statistical Analyses:

- Comparison of group differences were analyzed using factorial ANCOVAs with the independent variables of either diagnostic group (ASD and non-ASD) and/or comorbidity group (presence or absence of a comorbid or secondary diagnosis) controlling for age.

Results

Diagnostic Group Comparison

- The ASD group had significantly lower Full Scale IQ (FSIQ) than the Non-ASD group [F(1,381)=8.50, p<.01].
- Of the Verbal, Nonverbal, Working Memory and Processing Speed composite scores, there was only a significant difference in Verbal Standard Scores between the ASD and Non-ASD group [F(1,340)=9.59, p<.01].

Comorbid or Secondary Diagnosis Group Comparisons

- Comorbid conditions were diagnosed in 7% (n=22) of individuals with ASD and 20% (n=22) of individuals in the non-ASD group (x²=14.70, p<.01).

<table>
<thead>
<tr>
<th>Comorbid or Secondary Diagnosis</th>
<th>ASD (n %)</th>
<th>Non-ASD (n %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHD 5 (2%)</td>
<td>4 (4%)</td>
<td></td>
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<tr>
<td>Learning Disorder 9 (3%)</td>
<td>6 (6%)</td>
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</tr>
<tr>
<td>Tourette’s Syndrome 4 (1%)</td>
<td>1 (1%)</td>
<td></td>
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<tr>
<td>Childhood Schizophrenia 1 (&lt;1%)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
| Other developmental conditions 2 (<1%) | 0 | 0
| Mood or Anxiety Disorder 0                  | 11 (10%) |

- FSQ: There was no significant interaction between diagnostic group and comorbidity status on FSIQ [F(1,379)=0.20, p=.66]. There was a main effect of diagnostic group [F(1,379)=5.06, p=.03].
- Verbal: There was no main effect of comorbidity [F(1,338)=0.13, p=.72], but there was a main effect of diagnostic group [F(1,338)=5.04, p=.03] on Verbal Standard Scores. There was no significant interaction between comorbidity and diagnostic group [F(1,338)=0.01, p=.91].
- Nonverbal: There was no main effect of comorbidity status [F(1,338)=0.34, p=.56] or diagnostic group [F(1,338)=2.66, p=.10].
- Working Memory and Processing Speed: There was no main effect of comorbidity status or diagnostic group on WMI [F(1,283)=2.30, p=.13], [F(1,283)=1.25, p=.26] or PSI [F(1,277)=0.48, p=.49], [F(1,277)=0.82, p=.37].

Discussion

- Comorbidity did not differentially impact core cognitive abilities or cognitive efficiency in children with ASD or another psychiatric condition.
- Comorbidity increased impairment in one domain of EF in both ASD and Non-ASD groups, specifically planning and organizing work or activities. Analysis with a larger sample with comorbidity is needed.
- A limitation was the small sub-samples on the BRIEF, as well as within each comorbidity condition that did not allow for more nuanced analysis of specific disorder(s) differential impact on cognitive processes.

References

3. doi:10.1016/j.tics.2003.11.003

McPartland Lab
Email: mcp.lab@yale.edu
Website: http://medicine.yale.edu/lab/mcpartland/