Associations of Sleep Disturbance and Autism Symptomatology in Children and Adolescents with ASD

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Background
- Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that is characterized by social and communication deficits and restricted, repetitive behaviors
- There is a high co-occurrence of sleep problems in ASD: 40-80% of children with ASD report sleep difficulties as compared to just 20% of their neurotypical peers (Brown, 2016)
  - Sleep problems present heterogeneously in this population, but an extended sleep onset latency (SOL) is a common marker of sleep disturbance and a characteristic of pediatric insomnia
  - Sleep disturbance is a predictor for more severe aberrant behaviors in children with ASD
  - Poor sleep has been associated with greater reported social deficits, inattention, and oppositional behaviors in ASD children
  - It is unclear whether the sleep problems are the result or the cause of the behavioral problems
  - This retrospective analysis aimed to determine the relationship between sleep disturbance and behavioral issues

Participants & Method
- Participants: Children who were evaluated by the Yale Child Study Center Developmental Disabilities clinic between 2000 and March 2017
  - Inclusion criteria
    - A confirmed diagnosis of ASD, as indicated in their history
    - A completed parent-reported sleep history questionnaire
    - A completed parent-reported 5 item behavioral screening
  - Exclusion criteria:
    - medication to assist with sleep: melatonin, Risperdal, Clonidine, Inderal
    - N=100 children and adolescents met criteria
    - Children were stratified into good (n=60) and poor (n=40) sleepers, as defined by a sleep onset latency (SOL) ≥ 30 minutes (Montgomery, 2006; Brown, 2016)

Tools
- The sleep history questionnaire is a parent-reported measure on their child’s sleep, which provides information about the child’s sleep over the past month, including bed time, wake time, and SOL
- The behavioral checklist consists of 5 aberrant behaviors for parents to endorse
  - Screaming
  - Hitting
  - Biting
  - Self-injurious behavior (SIB)
- Vineland-II subdomains (available for n=62 participants)
  - V-scale scores are indicators of functioning in varying life domains, that are scaled relative to children of the same age
  - V-scale score mean is 15, with a standard deviation of 3

Statistical Analysis
- The presence of behavioral problems and V-scores of Vineland adaptive behavior subscales were analyzed using repeated measures analysis of variance (ANOVA), with post-hoc independent sample T-tests
- Correlations were used to examine relationships with Vineland scores and SOL
- Participants with outlier SOLs were excluded (SOL>180 minutes)

Results

<table>
<thead>
<tr>
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<th>Mean (SD)</th>
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<tbody>
<tr>
<td>N</td>
<td>Age (years)</td>
</tr>
<tr>
<td>Poor Sleepers</td>
<td>73 (3.7)</td>
</tr>
<tr>
<td>Good Sleepers</td>
<td>7.5 (3.7)</td>
</tr>
</tbody>
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Table 1: All participants were stratified into two groups according to their SOL. No significant differences were found in their mean age or score on the autism screening questionnaire

Figure 1: Frequency of parent-endorsed behavioral problems, between cohorts. Parents of children with impaired sleep were more likely to endorse that their child engaged in the following aberrant behaviors: screaming, hitting, and tantrums

Figure 2: A greater sleep onset latency is associated with lower V-scale subdomain scores on the Vineland-II Adaptive Behavior Scales (VABS) (n=62). There was a significant correlation in 4 subdomains: Expressive Communication (p<0.05), Coping Skills (p<0.05), Interpersonal (p<0.01), and Play and Leisure Time (p<0.01)

Conclusions
- 40% of the population of children with ASD met the criteria for poor sleep, a proportion consistent with the literature
- Children who experience difficulty sleeping are more likely to exhibit behavioral problems such as screaming, hitting and tantrums
- A greater SOL is associated with worse adaptive functioning, as measured by the VABS subdomain V-scale scores
  - The subdomains for which there was a significant association with sleep include those related to appropriate expression of emotion and interaction with others
  - However, it remains unclear the impact in which factor, sleep or adaptive behavior, fuels the other. It is likely a bidirectional relationship
- Future analyses of sleep disturbances in ASD should control for factors such as age, sex and autism severity, and use more powerful measures of sleep disturbance
- Future studies comparing the severity of behavioral problems before and after intervention for poor sleep will further clarify the relationship between sleep and behavioral disturbances

References

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