

When the significance level was 0.01, meta-attention only correlated with 80% of EEFs indicators and can't predict any CEFs and EEFs among the typical group.

**Conclusions:** Meta-attention at 6 can predict CEFs and EEFs among VLBW preterm children at 8, while the effect didn't be found among typically developing children. Thus, meta-attention can be served as a clinical cut-point for VLBW preterm children to find the deficits and intervene early.

**Categories:** Prenatal/Perinatal

Factors/Prematurity

**Keyword 1:** attention

**Keyword 2:** executive functions

**Keyword 3:** child development (normal)

**Correspondence:** 1. Wen-Hao Chang 2. Institute of Behavior Medicine, College of Medicine, National Cheng Kung University 3. michael7799602301611@gmail.com

## 11 Using the Chinese Version of Computerized Tower Test and Teacher-Filled BRIEF-2 to Assess the Executive Functions of Children With Autism Spectrum Disorder in Taiwan

TZU-CHING LIN<sup>1</sup>, HSUEH-CHIH CHEN<sup>1</sup>, Meng-Ting Chen<sup>1</sup>, Jao-Shwann Liang<sup>2</sup>

<sup>1</sup>National Taiwan Normal University, Taipei, Taiwan. <sup>2</sup>Far Eastern Memorial Hospital, Taipei, Taiwan

**Objective:** Many studies supported that children with autism spectrum disorder (ASD) have worse executive functions (EFs) when compared to typically developmental (TD) children in many domains, such as planning, flexibility, inhibition, and self-monitoring. The current study aims to use an adapted version of the computerized tower test to investigate the EFs of children with ASD. Furthermore, the researcher also assessed children's EFs-related behaviors in their schools using a teacher-filled behavior rating inventory of executive function, 2nd edition (BRIEF-2).

**Participants and Methods:** 61 Children aged 7 to 12 years old ( $M = 9.23$ ) were included in the current study. 29 of them were in the ASD group, and 31 of them were in the TD group. All participants conducted an adapted computerized

tower test. All participants' teachers completed BRIEF-2 to investigate their EFs-related behaviors in their schools.

**Results:** The results indicated that there were no significant differences in the tower test between the ASD group and TD group in all indexes. Therefore, it implied that the current indexes might not be sensitive enough to distinguish whether a child has ASD or not. In addition, we further investigate the correlations between the tower test and the teacher-filled BRIEF-2. We found the different patterns in the two groups. In the ASD group, we found that the task-monitor index was positively correlated with total-number-of-rule-violations, total-complete-time, and total-rule-violations-per-item-ratio. The task-monitor index was negatively correlated with total-achievement-score, implying that poorer ability to monitor tasks leads to a longer completion time, more rule violations, and a lower total achievement score. Moreover, we also found a high correlation between the organization-of-materials in BRIEF-2 and total-complete-time in the tower test, suggesting the long problem-solving time in ASD groups is highly related to the disability of keeping working space ordered. In addition, we found that the shift index is positively correlated with total-complete-time and total-rule-violations-per-item-ratio. Hence, it indicates that those with poor flexibility in solving problems tend to need more time to complete tasks and violate more rules in ASD groups. In the TD group, we only found the correlation effects were significant between inhibition and self-monitor in the BRIEF-2 and the total-rule-violations-per-item-ratio in the tower test. It suggested that individuals with behavioral regulation problems, such as impulse control and monitoring problems are more likely to make rule violations. The result indicated that behavioral regulations play a more significant role in the TD group. In contrast, cognitive and emotional regulations are more critical in ASD children.

**Conclusions:** Our findings found no significant difference in the computerized tower test between children with and without ASD, suggesting that the current indexed might not be sensitive enough to differentiate children with or without ASD. However, the results of the correlation between the tower test and teacher-filled BRIEF-2 showed that different patterns might be the cause of the EF performances between the two groups, indicating that there might be a different domain of EFs the children used in the tower test between two groups.

Therefore, further research could focus on developing new indexes in the Tower test and finding the EF mechanism of ASD children with different approaches.

**Categories:** Autism Spectrum

Disorders/Developmental Disorders/Intellectual Disability

**Keyword 1:** assessment

**Keyword 2:** child development disorders

**Keyword 3:** inhibitory control

**Correspondence:** TZU-CHING LIN National Taiwan Normal University, Taipei, Taiwan  
a93197@gmail.com

## 12 Does Executive Functioning Predict Diagnostic Timing of Autism?

Alexis Khuu, Lauren Kenworthy, Allison Ratto  
Center for Autism Spectrum Disorders,  
Children's National Hospital, Washington, DC,  
USA

**Objective:** Executive functioning (EF) is impaired in autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD), and EF challenges are exacerbated in youth with ASD and ADHD (ASD+ADHD), which may impact diagnostic timing. We hypothesized youth with ASD+ADHD would be more impaired in EF (as opposed to other functional domains) compared to autistic youth without ADHD (ASD-only), with particular deficits in metacognition and inhibition. We also predicted youth with ASD+ADHD would be at significant risk for delayed ASD diagnosis and that greater EF challenges would predict earlier age of ASD diagnosis across groups.

**Participants and Methods:** Data from a clinical database was extracted for 400 youth who received a new diagnosis of ASD after age 5, either with a co-occurring diagnosis of ADHD (ASD+ADHD group:  $n=297$ ; Mage of ASD diagnosis=10.49; 25.9% female; 48.1% white) or without a co-occurring ADHD diagnosis (ASD-only group:  $n=100$ ; Mage of ASD diagnosis=12.02; 34.0% female; 44.7% white). EF was measured with the BRIEF-2 parent-report, and ASD symptom strength was measured with the SRS-2 School Age form. Independent samples t-tests investigated whether a) the ASD+ADHD group was uniquely impaired in EF compared to the ASD-only group,

b) parents of ASD+ADHD report elevated EF problems, and c) the ASD+ADHD group was at significant risk for delayed ASD diagnosis.

Pearson correlations examined the association between age of ASD diagnosis and EF for each diagnostic group. Hierarchical linear regressions further analyzed whether specific EF domains concurrently predicted age of ASD diagnosis, after controlling for the known predictors of assigned sex at birth, FSIQ, and ASD symptom strength.

**Results:** The ASD+ADHD group had greater challenges in overall EF ( $t=-6.42$ ,  $p<.001$ ), metacognitive skills ( $t=-6.47$ ,  $p<.001$ ), and inhibition skills ( $t=-7.06$ ,  $p<.001$ ). There was no significant difference in parent-reported autism symptoms between the ASD and ASD+ADHD groups ( $t=0.973$ ,  $p=.331$ ). The ASD+ADHD group received ASD diagnoses earlier than the ASD-only group ( $t=4.194$ ,  $p<.001$ ). In the ASD-only group, age of ASD diagnosis was not significantly correlated to overall EF, metacognitive skills, nor inhibition skills ( $ps>.05$ ). In the ASD+ADHD group, ASD diagnosis was significantly related to overall EF ( $r(297)=.128$ ,  $p=.027$ ) and metacognitive skills ( $r(297)=.329$ ,  $p<.001$ ) but not inhibition skills ( $r(297)=.078$ ,  $p=.180$ ). Hierarchical linear regressions controlling for assigned sex at birth, FSIQ, and SRS-2 T-scores were used to determine whether these EF components significantly predicted age of ASD diagnosis. Overall EF did not predict age of ASD diagnosis in the ASD+ADHD group ( $\beta=.034$ ,  $t=1.417$ ,  $p=.157$ ), but metacognitive skills did ( $\beta=.123$ ,  $t=5.582$ ,  $p<.001$ ).

**Conclusions:** Our findings suggest youth with ASD+ADHD have greater impairment in overall EF, metacognition, and inhibition compared to ASD-only youth, despite similar levels of ASD traits, consistent with hypotheses. Contrary to our hypothesis, youth with ASD+ADHD in this sample were diagnosed with ASD earlier. However, results also suggest EF problems, specifically metacognitive deficits, predict later age of ASD diagnosis. Future research is needed to replicate findings and better understand how EF and other functional domains predict ASD diagnostic timing.

**Categories:** Autism Spectrum

Disorders/Developmental Disorders/Intellectual Disability

**Keyword 1:** executive functions

**Keyword 2:** autism spectrum disorder