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# Executive Functioning in Children and Adolescents with Disabilities

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Recent research has demonstrated the importance of executive functioning – a set of cognitive abilities necessary for regulation and control of goal-directed behavior – to academic skills in typically developing children. Executive functioning may be of particular consequence for students with disabilities who may already be at risk for academic and learning problems. One domain of executive functioning, working memory, may be especially crucial for academic performance. This symposium will present research that takes knowledge of cognitive science to the realm of educating children with disabilities. The projects include both the exploration of executive functioning skills and the development of strategies aimed at improving executive functioning in children with disabilities. They bring together researchers with various backgrounds (e.g., cognitive psychology, educational psychology, special

education, neuroscience) and cut across different types of psychological and cognitive disabilities with impairments in executive functioning skills. Amy Sussman, Program Officer for the Cognition and Student Learning in Special Education program at the Institute of Education Sciences, will moderate this panel and facilitate discussion throughout the symposium.

## **Working Memory Training in Typically Developing Children and Children with Attention Deficit Hyperactivity Disorder: Evidence for Plasticity in Executive Control Processes**

The overarching goal of this research is to evaluate the extent to which working memory can be trained in a manner transferable to tasks that tap working memory. We (*Shah, Buschkuehl, Jaeggi, & Jonides*) trained typically developing children as well as children with Attention Deficit

Hyperactivity Disorder (ADHD) on a motivating working memory (WM) game that incorporated a spatial n-back for 4 weeks. Before and after training, the children were tested for transfer on a non-trained WM task and on an executive control task that is a common marker for ADHD, the continuous performance task. We compared the WM training groups' improvements on those transfer tasks to improvements of control groups who practiced a general knowledge and vocabulary game for the same duration as the experimental groups. Our results show that for both the healthy and the ADHD children, working memory training is more effective than the control training in improving the transfer measures of working memory and executive control. The improvements are primarily based on reductions in errors of commission, a result that is of particular relevance for the children with ADHD. The improved impulse control might be an underlying mechanism for generalized transfer effects, such as fluid intelligence and scholastic achievement tests. The ongoing data collection and follow-up assessments will establish whether and how long the transfer effects last.

### **Preliminary Evidence for a Specific Executive Functioning Profile in Children with Down Syndrome**

Different neurodevelopmental disabilities may have distinct "executive fingerprints" with unique strengths and challenges. We (*Daunhauer & Fidler*) will discuss preliminary evidence indicating that some aspects of executive functioning (EF) may be more impaired than other areas in students with Down Syndrome (DS). We will begin by reviewing the literature on EF component skills in DS that suggests that working memory and planning skills may be more severely impaired than cognitive flexibility or inhibitory control.

In addition, we will discuss empirical support for this EF profile from our recent study using caregiver report. Caregivers of children with DS (chronological ages 4-10 years; mental ages 2-4 years) completed the Behavior Rating Inventory of Executive Function – Preschool (BRIEF-P), a caregiver report measure of everyday/functional EF skills in multiple domains. On the BRIEF-P, deficits were noted on a global EF measure as well as the Working Memory and Plan/Organize scales in particular (relative to norms developed for typically developing children of a similar mental age). These results suggest a specific pattern of EF weaknesses in young children with DS, consistent with the extant literature that has focused primarily on older individuals utilizing laboratory EF tasks. We conclude by discussing how these results inform the design of our upcoming research project that will compare the EF profile of children with DS to comparison groups and examine how these EF skills relate to academic skills concurrently and over time.

### **Addressing Social Competence Deficits for Adolescents with Autism in the Schools (SCI-S)**

For this presentation, we (*Stichter, Herzog, O'Connor, Lierheimer, Kerpash, & Benigno*) present data on two years of a three year grant for the implementation of the Social Competence Intervention (SCI). SCI-S is a school-based implementation of SCI designed to impact social competence performance for adolescents with Autism, with a specific social-deficit subtype characterized by a diagnosis of an ASD, an IQ of 70+, and specific social characteristics consistent with high functioning Autism (HFA) or Asperger Syndrome. The curriculum utilizes primarily cognitive-behavioral intervention supported by applied behavior analysis to target social cognition deficits as characterized by a theory of mind deficit, executive function (EF) impairment, and an inability to recognize emotions. Results from several measures, with an emphasis on EF, will be presented. Specifically, on the Behavior Rating Inventory of Executive Function (BRIEF), parents reported significant pre to post improvements in students' EF; teachers' reports of improvement were more modest. Across measures of student performance, results indicated significant improvement in cognitive flexibility, inhibition, and attention/inhibition. Discussion will provide implications for future work, including potential EF predictor variables for response to intervention.

### **Discussant**

*Dr. Frances Connors* investigates developmental cognition in typical and atypical populations, particularly intellectual disability. Her research focuses on working memory, reading, and implicit processes.

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