Title: Profile of Executive Function Deficits in Individuals With and Without Autism Spectrum Disorder and Intellectual Disability

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Introduction: The Behavior Rating Inventory of Executive Function (BRIEF, Gioia et al., 2000) is a parent report measure of executive function challenges (assessed across eight scales/domains) for children ages 5-18 years. Children with autism spectrum disorder (ASD) have shown clinically significant elevations on the Shift scale (Blijd-Hooogewys & Bezemer, 2014), with elevations on all scales when compared to neurotypical peers (Granader, Wallace, Hardy, Yerys, Lawson, Rosenthal, Wills, Dixon, Pandey, Penna, Schultz, & Kenworthy, 2014). Memisevic and Sinanovic (2014) studied children with intellectual disability (ID), grouped by unknown etiology, Down syndrome, and other genetic causes of ID or brain injury, and found elevations on the Shift, Initiate, and Working Memory scales on the BRIEF. ASD and ID each impact real-world executive functioning in youth. However, to date, their distinct and overlapping influence upon this profile has not been examined in a single sample. This information is critically important for guiding intervention development.

Methods: 290 participants (108 female) ages 6-18.92 years (M=11.52, SD=3.38) were selected from databases of children’s hospital clients. Participant full scale IQ scores and adaptive scores range from 32 to 142 and 32 to 128, respectively.

Participants were divided into groups of those with and without ASD (N=138 and N=152, respectively), based on DSM-5 clinical diagnosis, for analysis of executive functioning profiles using the BRIEF. The BRIEF measures executive function on eight scales (Inhibit, Shift, Emotional Control, Initiate, Working Memory, Plan Organize, Organization of Materials, and Monitor). There was no significant difference in age between these groups, but the groups did significantly differ in gender ratio, as ASD is more commonly diagnosed in boys. Participants were then divided according to whether or not they had ID (N=145 and N=145, respectively), based on full scale IQ and adaptive behavior scores of 75 and below for the ID group. These groups did not differ significantly in age or gender ratio. The profile of parent-reported BRIEF scales for each group pairing was analyzed with mixed-model ANOVAs. The Organization of Materials scale was not included in these analyses because of limited variability across individuals. Removing this scale did not change the results.

Results: For the ASD/non-ASD groups, there was a significant interaction between group and BRIEF scale, F(5.03, 1432.26) = 6.92, p<.001. The ASD group was rated significantly higher (i.e., more executive function difficulties) on the Inhibit (p<.001), Shift (p<.001), Emotional Control (p<.001), Initiate (p<.05) and Monitor scales (p<.05) than the non-ASD group. For the ID/non-ID groups, there was a significant interaction between group and BRIEF scale as well, F(4.79, 1366.07) = 6.66, p<.001. The ID group was rated as having more challenges in the domains of Inhibit (p<.001), Shift (p<.001), Initiate (p<.001), Working Memory (p<.001), Planning and Organization (p<.001), and Monitor (p<.001).

Discussion: The current study demonstrates distinct and overlapping effects of ASD alone and ID alone upon the profile of everyday executive function challenges in the same large sample of children. Particularly striking were the difficulties encountered by youth with ASD in the domains assessed by the Behavioral Regulation Index (Inhibit, Shift, and Emotional Control), while youth with ID exhibited more prominent challenges in domains assessed by the Metacognition Index (Initiate, Working Memory, Planning and Organization, and Monitor). Consistent with the extant literature (Blijd-Hooogewys & Bezemer, 2014; Granader et al., 2014), the ASD group demonstrated a peak deficit on the Shift scale, while the ID group exhibited a peak deficit on the Working Memory scale (Memisevic & Sinanovic, 2014; Loveall, Conners, Tungate, Hahn, & Osso, 2017). These selective and relative executive deficits should help to guide approaches to intervention and accommodation for youth with ASD and/or ID.

References/Citations:
