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38 Fine Motor Skills in Pediatric Frontal Lobe Epilepsy are Associated with Executive Dysfunction and ADHD Symptomatology

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Objective: Pediatric patients with frontal lobe epilepsy (FLE) have higher rates of attention deficit hyperactivity disorder (ADHD), as well as executive functioning (EF) and fine motor (FM) challenges. Relations between these constructs

have been established in youth with ADHD and are supported by FM and EF skill involvement in frontal-subcortical systems. Still, they are not well understood in pediatric FLE. We hypothesized that poorer FM performance would be related to greater executive dysfunction and ADHD symptomatology in this group.

Participants and Methods: 47 children and adolescents with FLE (AgeM=12.47, SD=5.18; IQM=84.07; SD=17.56; Age of Seizure OnsetM=6.85, SD=4.64; right-handed: n=34; left-handed: n=10; Unclear: n=3) were enrolled in the Pediatric Epilepsy Research Consortium dataset as part of their phase I epilepsy surgical evaluation. Participants were selected if they had unifocal FLE and completed the Lafayette Grooved Pegboard (GP). Seizure lateralization (left-sided: n=19; right-sided: n=26; bilateral: n=2) and localization were established via data (e.g., EEG, MRI) presented at a multidisciplinary team case conference. Patients completed neuropsychological measures of FM, attention, and EF. Parents also completed questionnaires inquiring about their child's everyday EF and ADHD symptomatology. Correlational analyses were conducted to examine FM, EF, and ADHD relations.

Results: Dominant hand (DH) manual dexterity (GP) was related to parent-reported EF (Behavior Rating Inventory of Executive Function, Second Edition [BRIEF-2]–Global Executive Composite [GEC]: $r(15) = -.70, p < .01, d = 1.96$). While not statistically significant, medium to large effect sizes were found for GP DH and parent-reported inattention (Behavior Assessment System for Children, Third Edition [BASC-3]–Attention Problems: $r(12) = -.39, p = .17, d = .85$) and hyperactivity/impulsivity (BASC-3–Hyperactivity: $r(11) = -.44, p = .13, d = .98$), as well as performance-based attention (Conners Continuous Performance Test, Third Edition – Omission Errors: $r(12) = -.35, p = .22, d = .41$), working memory (Wechsler Intelligence Scale for Children – Fifth Edition [WISC-V]–Digit Span [DS]: $r(19) = .38, p = .09, d = .82$) and cognitive flexibility (Delis-Kaplan Executive Function System (D-KEFS) Verbal Fluency Category Switching: $r(13) = .46, p = .08, d = 1.04$); this suggests that these relations may exist but that our study was underpowered to detect them. Non-dominant hand (NDH) manual dexterity was related to performance-based working memory (WISC-V–DS: $r(19) = .50, p < .01, d = 1.12$) and cognitive flexibility (D-KEFS–Trails Making Test Number-Letter Switching: $r(17) = .64, p < .01, d = 1.67$). Again, while underpowered, medium to

large effect sizes were found for GP NDH and parent-reported EF (BRIEF-2 GEC: $r(15) = -.45$, $p = .07$, $d = 1.01$) and performance-based phonemic fluency (D-KEFS–Letter Fluency: $r(13) = .31$, $p = .20$, $d = .65$).

Conclusions: Our findings suggest that FM, EF, and ADHD are related in youth with FLE; however, these relations appear to vary by skill and hand. We posit that our findings are due in part to the frontal-cerebellar networks given their anatomic proximity between frontal motor areas and the dorsolateral prefrontal cortex – as well as their shared functional involvement in these networks. Future studies should evaluate the predictive validity of initial FM skills for later executive dysfunction and ADHD symptomatology in FLE. If such relations emerge, contributions of early FM interventions on EF development should be examined. Further replication of these findings with a larger sample is warranted.

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39 Neurodevelopmental Complexity of a Patient with Perinatal Right Middle Cerebral Artery Stroke and Infantile Spasms

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Objective: A rich literature exists on cognitive changes related to focal injury in the adult brain. In contrast, the developing brains of children are less understood. In contrast to adult cases, 20% to 25% of perinatal strokes result in language disorder regardless of lesion lateralization.

Existing literature suggests children with perinatal stroke may present with a range of executive functioning and visuospatial processing difficulties. Gross and fine motor challenges are also likely to occur. Furthermore, these children have an increased prevalence of autism spectrum disorder (ASD) and carry the highest risk for epilepsy. Despite growing research on neurodevelopmental profiles in patients with perinatal stroke, published literature is limited.

Participants and Methods: Our study examines neurodevelopment of a 2-year-old, right-handed male with a history of perinatal ischemic right middle cerebral artery (MCA) stroke, infantile spasms, and left hemiparesis following right hemispherectomy for seizure management who underwent two neurodevelopmental evaluations at our medical center over approximately 3 years.

Results: Findings from the patient's evaluation with the Mullen Scales of Early Learning revealed overall cognitive ability in the low average range (SS = 89, 23rd percentile); however, notable variability was seen in his performance. His receptive language was average (SS = 98, 45th %tile) and consistent with previous evaluation results, and he has made gains in visual reception (from SS = 75, 5th %tile to SS = 91, 27th %tile) and expressive language (from SS = 55, 0.1st %tile to SS = 70, 2nd %tile). In addition, his gross motor was exceptionally low (SS = 55, 0.1st %tile) and consistent with previous evaluation results. Fine motor was low average (SS = 84, 14th %tile).

Conclusions: Our patient showed cognitive gains in language and visual reception since his prior evaluation despite history of right MCA stroke and right hemispherectomy. Improvements are likely due to a combination of early brain plasticity and intensive therapies he has received. Consistent with published findings in this population, he experienced seizures associated with his stroke. Our results add to the limited literature on neurodevelopmental challenges associated with perinatal stroke and progress that can be made when appropriate supports are provided early and consistently.

Categories: Epilepsy/Seizures

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