Executive functions and the heterogeneity in emergent academic literacy and mathematics in kindergarten

Reut Balhinez, PhD Student. Supervisor: Dr. Shelley Shaul

Research topic: This study explores the connection between emergent academic abilities (in literacy and mathematics) and the core executive functions (EFs): working memory (WM), inhibition, and cognitive flexibility. A central aim of this study is to clarify whether and which EF skills account for the heterogeneity in emergent academic attainment among kindergarteners. Specifically, we examine different profiles of EF skills among the following academic subgroups: typical achievers (TA), peers with low performance in single academic domains; literacy (LL) or mathematics (LM) and cross-domain low achievers (LL+LM). The contribution of EFs to reading and mathematical abilities after children begin school (1^{st} and 2^{nd} grades) will also be examined.

Why is my study unique? The existing literature comparing EF skills in young children with different academic profiles of school readiness (i.e., in literacy and math) is still limited and inconclusive. The present research potentially provides a comprehensive framework for the cognitive foundation of emergent academic heterogeneity prior to school entry. In order to delineate a broader picture of the differences between typical and low achievers, we are undertaking a systematic comparison of a representative kindergarten sample from a cross-domain perspective, using multiple measures of early academic skills and multiple EF components.

Preliminary analyses and findings: Across the full sample, preschool literacy and math knowledge were both found to be correlated with WM and cognitive flexibility but not with inhibitory control. Consistent with these outcomes, comparison of the four different profiles above using one-way analysis of variance (ANOVA) followed by Bonferroni post-hoc comparisons yielded overall significant group differences in WM and cognitive flexibility but not in inhibitory control.

Why is my study important for education and/or clinical practice? Understanding the factors that might account for the differences in the academic profiles of young children is essential for effective identification, instructional practices, and individualized intervention for a variety of academic difficulties.