



Investigating Early Brain Development and Executive Function in Young Children

DiPiero M.^{1,2}, Pletcher C.², Heinrich L.², Alexander A.^{2,3,4}, Kecskemeti S.², Planalp E.^{2,5}, Dean D.^{2,4,6}

University of Wisconsin-Madison, Departments of: ¹ Neuroscience Training Program;
²Waisman Center, ³Psychiatry, ⁴Medical Physics, ⁵Psychology, ⁶Department of Pediatrics

BACKGROUND

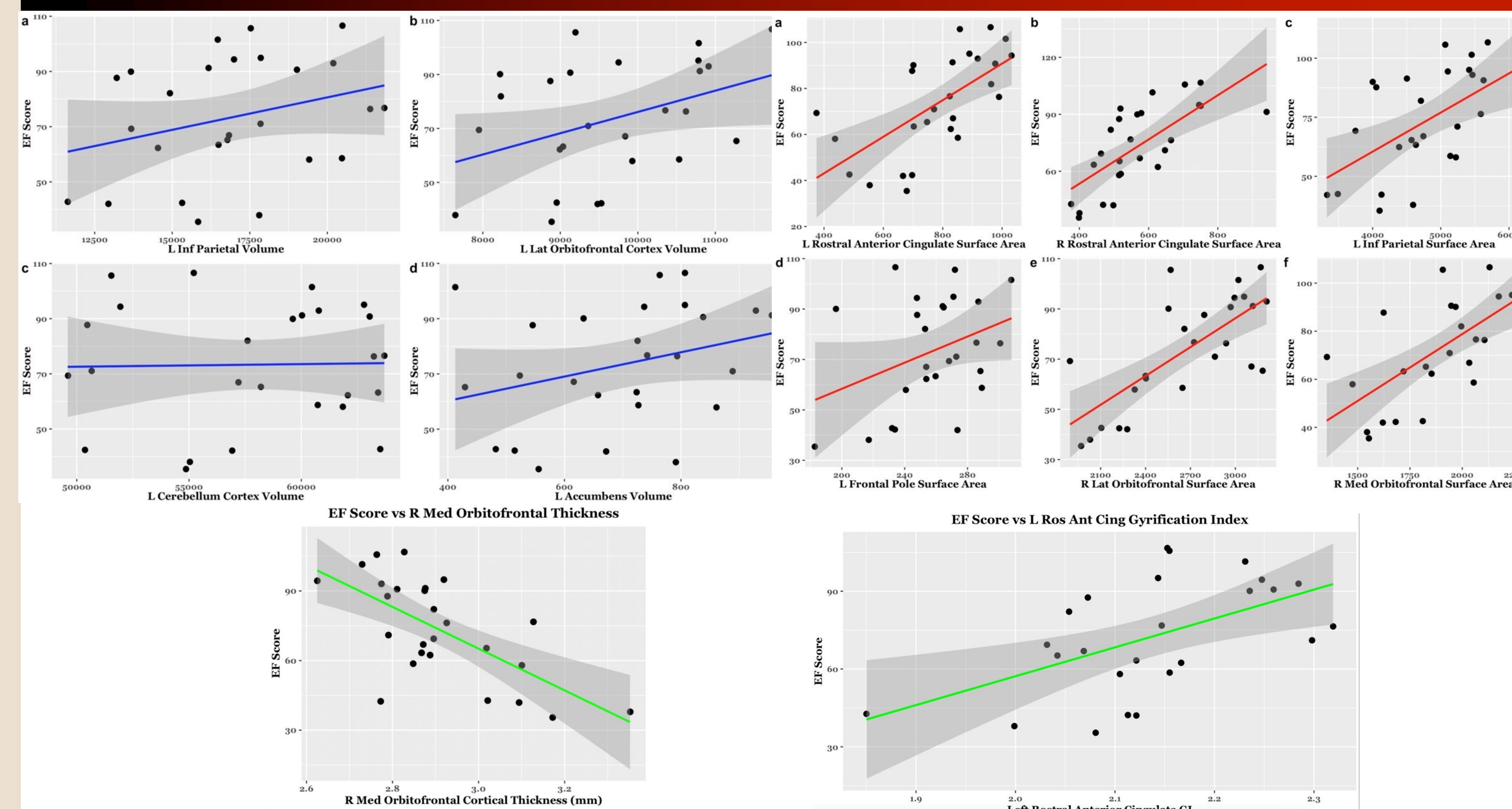
- Executive Function (EF) is a set of higher-order processes involved in the conscious control of thoughts and actions, particularly goal-directed behavior.
- The emergence of EF in children is an important developmental process that impacts later cognitive and behavioral outcomes; however, much remains unknown about the neural processes underlying the development of EF.
- In this study, we quantified volumetric measures from structural MRI to investigate associations between EF and brain structure in children aged 3 to 10 years old.

METHODS

- 26 children (15 males) between the ages of 3-and-10 years old completed an MRI scan and the NIH Toolbox-Cognition Battery (NIHTB).
- We examined associations between EF and brain measures of brain volume, cortical thickness, and surface area from regions in the frontal lobes, parietal lobes, and subcortical structures.
- Within our linear model framework, we corrected for age and sex when examining surface area and cortical thickness, while corrections for age, sex, and estimated total intracranial volume were used for cortical and subcortical volumes.

Childhood executive functioning is related to various structural brain measurements of cortical and subcortical volume, surface area, cortical thickness, and local gyrification index.

RESULTS



CONCLUSIONS

- Neural architecture is implicated in variability in children's EF. Identifying brain regions associated with the emergence and development of EF during early childhood is important to understanding the neurodevelopmental processes related EF development.
- Clarifying the neural mechanisms underpinning the development of EF in typically-developing children could advance our understanding of the sensitive period for EF development, and thus provide a framework for studying EF in atypically-developing populations.

ADDITIONAL KEY INFORMATION

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Contact info: dipiero@wisc.edu

