

EARLY MOTHER-CHILD ATTACHMENT AS A PREDICTOR OF CHILD WHITE MATTER MICROSTRUCTURE: A 9-YEAR LONGITUDINAL STUDY

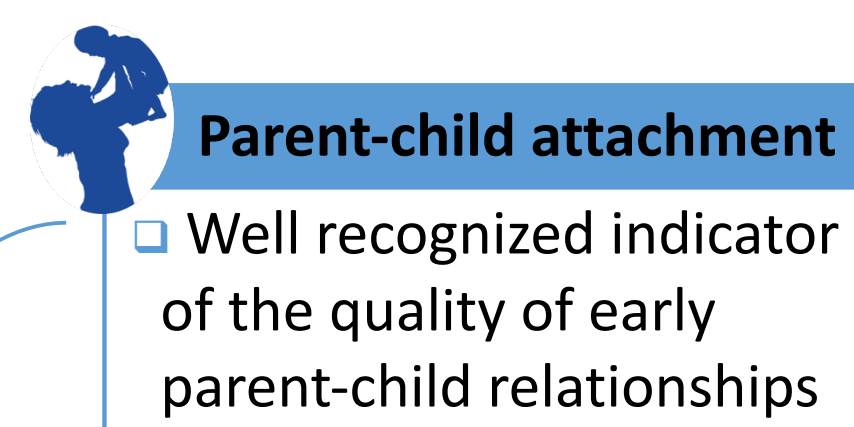
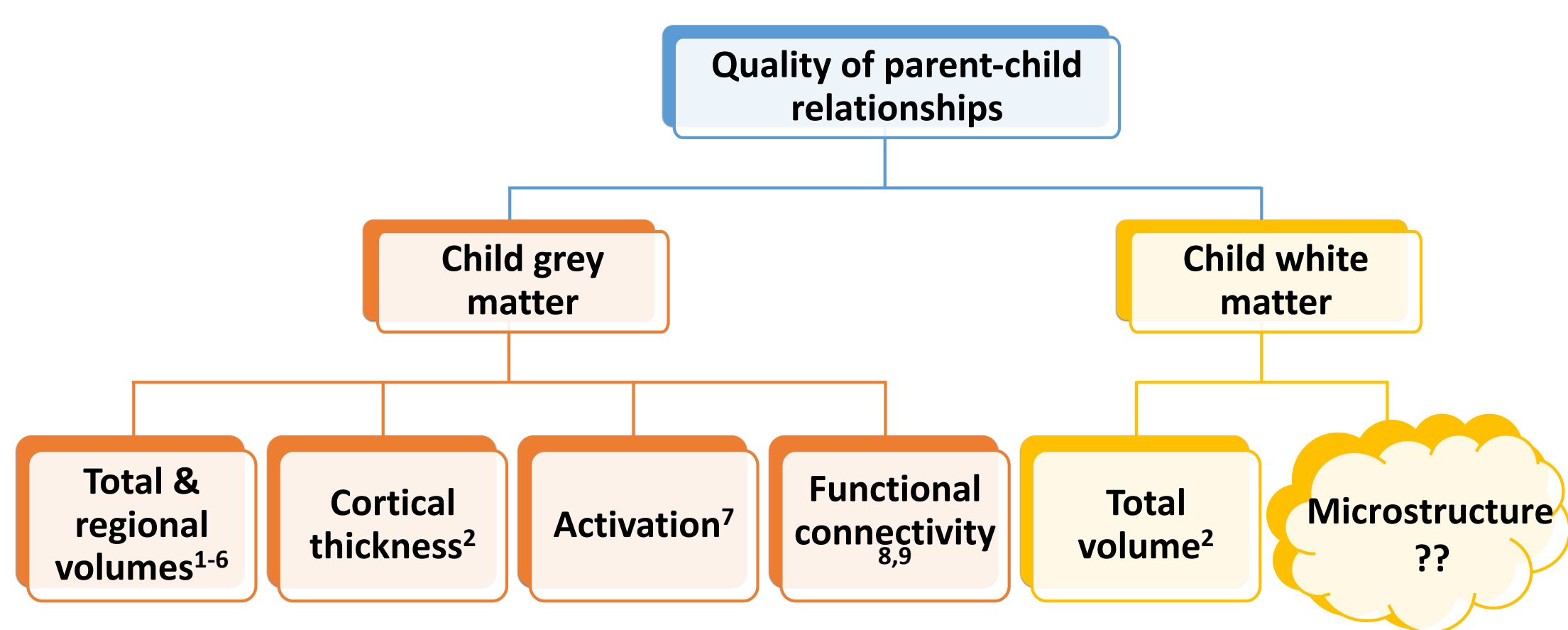
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INTRODUCTION

- Early childhood experiences
 - Strength and effectiveness of neural connections
 - Fine tune the development of brain networks
- Parent-child relationships
 - Among the most pervasive and potent early experiences



Child grey matter (GM)

- Adults: GM volume in the amygdalae^{11,12}
- Current sample: GM volume in frontal and temporal regions³

Child white matter (WM)

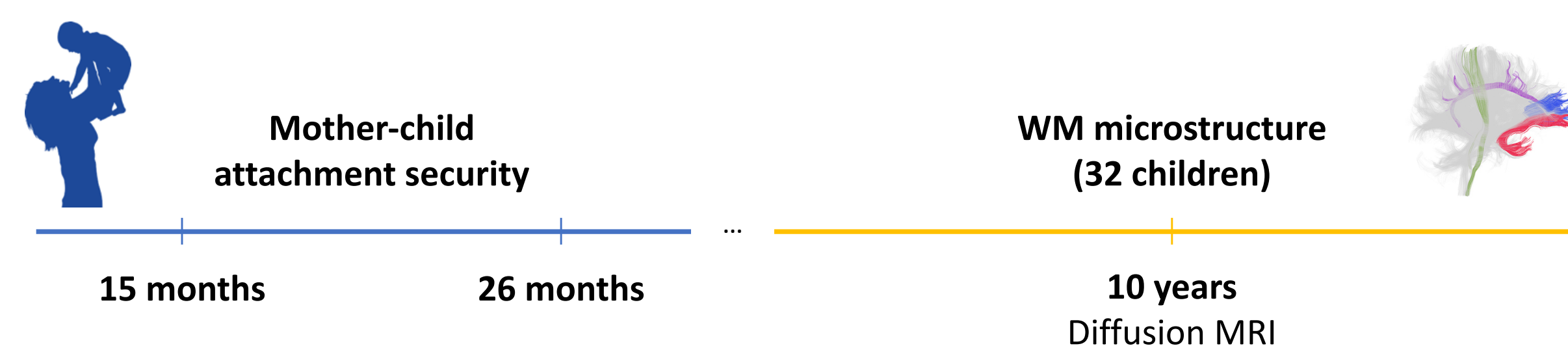
- Neglected children (foster care): caregiver-child attachment intervention promotes normative WM development¹³

No empirical evidence in the general population

OBJECTIVE



METHOD



Mother-child attachment security

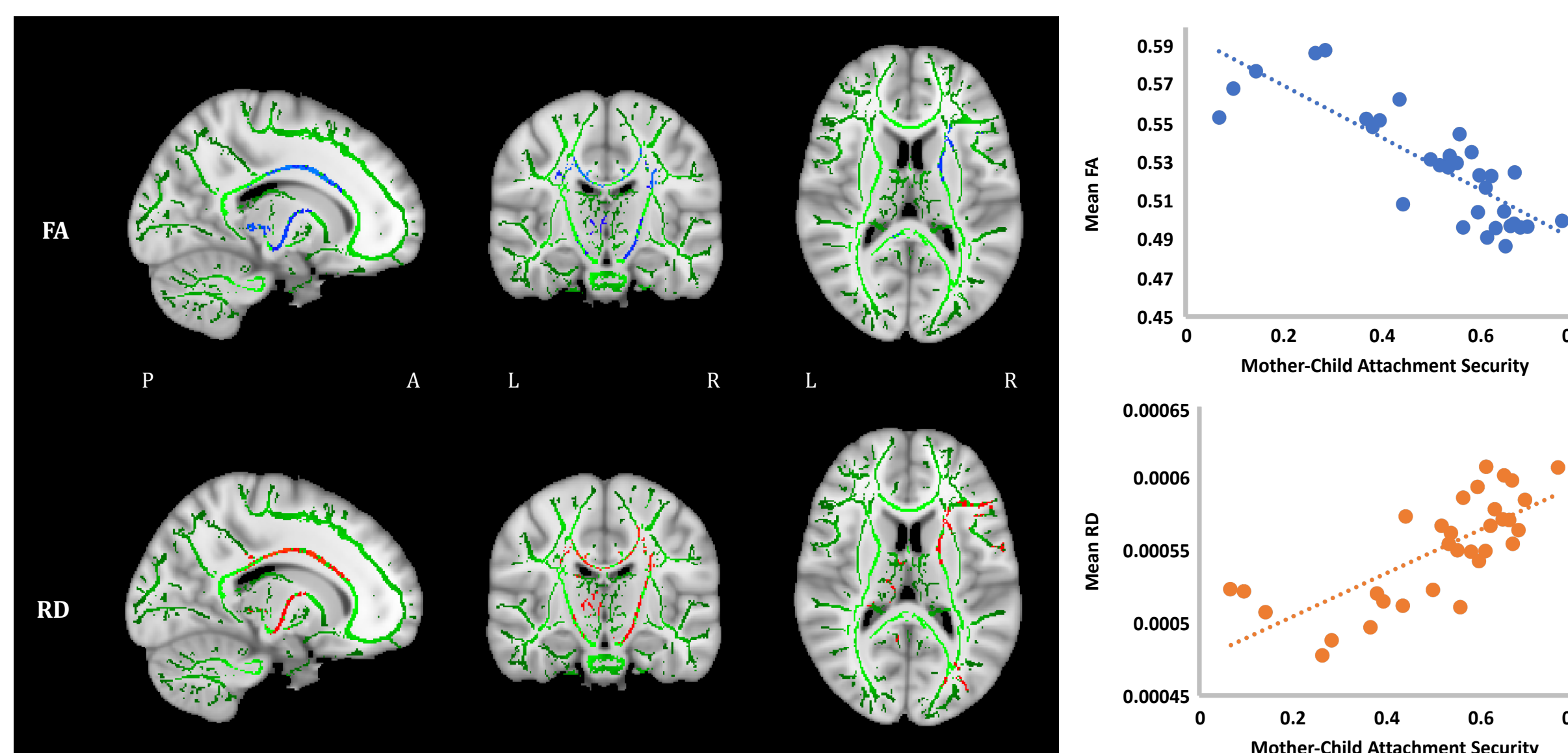
- 70- to 90-minute home visits
 - Maternal attention solicited by both child demands and research-related tasks
- Attachment Behavior Q-Sort (AQS)¹⁴
 - 90 items
- Score used in subsequent analyses
 - Average of scores at 15 and 26 months
 - $M = 0.51$; $SD = 0.18$; Range = 0.07 – 0.77

WM microstructure

- Diffusion MRI acquisition (Siemens 3T, 32-channel)
 - $b=0$ s/mm²: 2 volumes
 - $b=1000$ s/mm²: 30 volumes
- Voxel-wise general linear model analyses (FSL)
 - Metrics: FA, AD, RD, & MD
 - Covariates: age, sex, & maternal education
 - Randomise permutations: 5,000
 - Threshold-free cluster enhancement (TFCE)

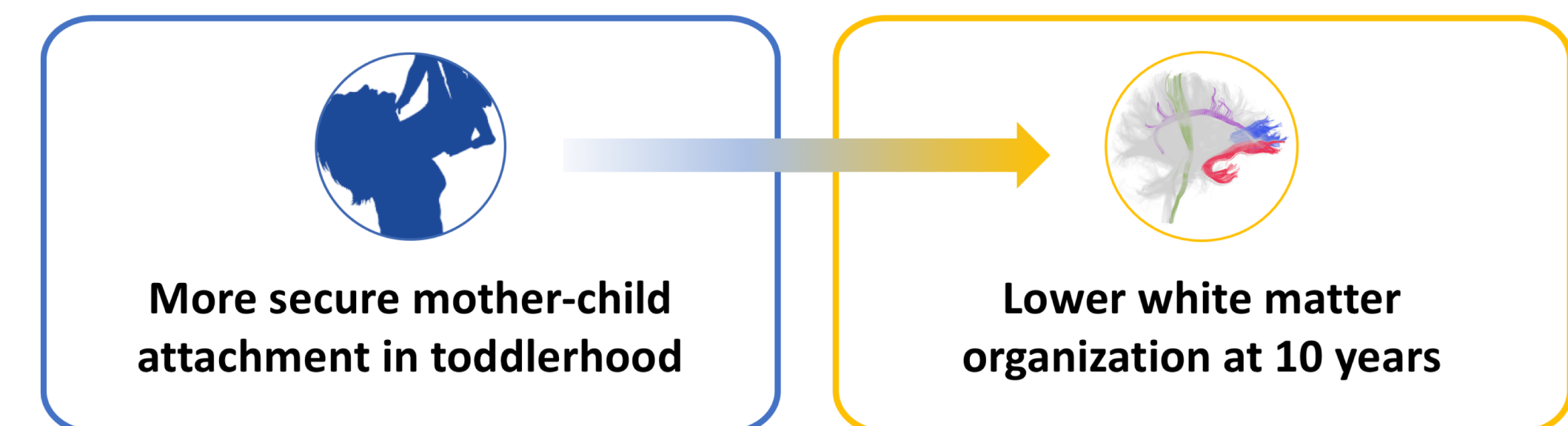
RESULTS

- ↑ Mother-child attachment security ⇔ ↓ FA & ↑ RD
 - WM tracts: corpus callosum, cingulum, corticospinal tract, superior longitudinal fasciculus, inferior fronto-occipital fasciculus, right cerebral peduncle

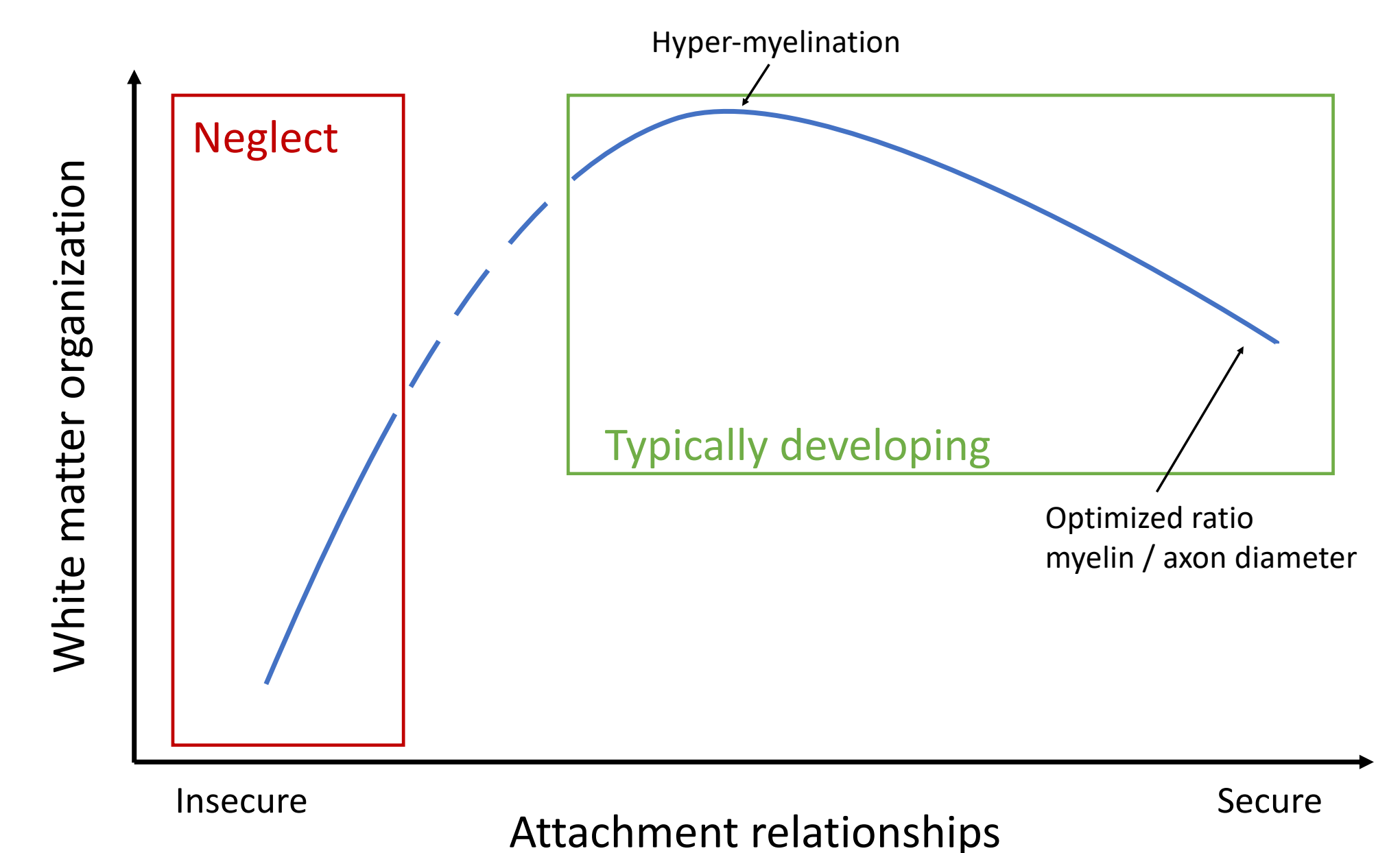


Threshold: FWE-corrected $p < .05$; $k > 50$ voxels

DISCUSSION



- In some tracts, WM development ⇔ ↓ organization, rather than ↑ organization¹⁵
- ↑ FA along with ↓ RD ⇔ ↑ myelination¹⁵
- Optimization theory ⇔ hyper-myelination and large axon diameter are non-optimal¹⁶
 - ⇒ Lower WM organization observed in children more securely attached to their mother may reflect an “optimized” level of myelination that allows for better child functioning



REFERENCES

¹Bernier et al., 2018; ²Kok et al., 2015; ³Leblanc et al., 2017; ⁴Luby et al., 2016; ⁵Luby et al., 2012; ⁶Rao et al., 2010; ⁷Bernier et al., 2016; ⁸Dégeilh et al., 2018; ⁹Thijssen et al., 2017; ¹⁰Kopala-Sibley et al., 2018; ¹¹Lyons-Ruth et al., 2016; ¹²Moutsiana et al., 2015; ¹³Bick et al., 2015; ¹⁴Waters and Deane, 1985; ¹⁵Krogsrud et al. 2016; ¹⁶Chomiak and Hu, 2009



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QR Code linked to the Grandir Ensemble laboratory website:

