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Introduction

Infants rely largely on their parents for their emotional needs

Attachment theory

- Children exposed to suboptimal parenting are likely to develop disorganized attachment relationships

Examples of disorganized attachment behaviors

odd (trancelike expression), inexplicable (freezing), contradictory (rise and then fall prone on the floor), disoriented, and/or fearful infant behaviors during a stressful situation (maternal separation and reunion)

- Levels of disorganized attachment behaviors → socio-emotional functioning¹
- Attachment experiences may shape brain development in socio-emotional regions during childhood

Attachment and brain morphometry

- High-risk samples: attachment disorganization or insecurity in infancy → larger amygdalar volume in adulthood^{2,3}
- Higher levels of attachment security in infancy → larger grey matter volume in frontal and temporal regions in late childhood⁴

- No study has investigated the prospective link between disorganized attachment and brain morphometry in childhood

Study aim

To examine the links between infants' disorganized attachment behaviors and whole-brain regional grey matter volume and cortical thickness in late childhood, in a low-risk community sample.

Method

Participants

33 children (13 boys) and their families seen at 18 months (T1; M = 18.1; SD = 0.8) and 10 years (T2; M = 10.6; SD = 0.5)

Measures

Levels of disorganized attachment behaviors (T1)

- The Strange Situation Procedure⁵ includes episodes of separation and reunion between mother and infant
- Continuous scores of disorganized attachment behaviors (range 1 to 9; ICC = .80)

Brain imaging (T2)

- Magnetic resonance imaging (MRI) with standard 3D T1-weighted whole-brain protocol

Statistical analyses

- Preprocessing and analyses: CAT12, SPM12, MATLAB
- Multiple regressions analyses to predict regional (1) grey matter volume and (2) cortical thickness from disorganized attachment
- Covariates: child age, sex, and maternal education

Results

Grey matter volume

- No significant association was found

Cortical thickness

- Infants who exhibited more disorganized attachment behaviors had greater cortical thickness in some regions (see Table 1 and Figure 1)
- Negative contrast was non-significant

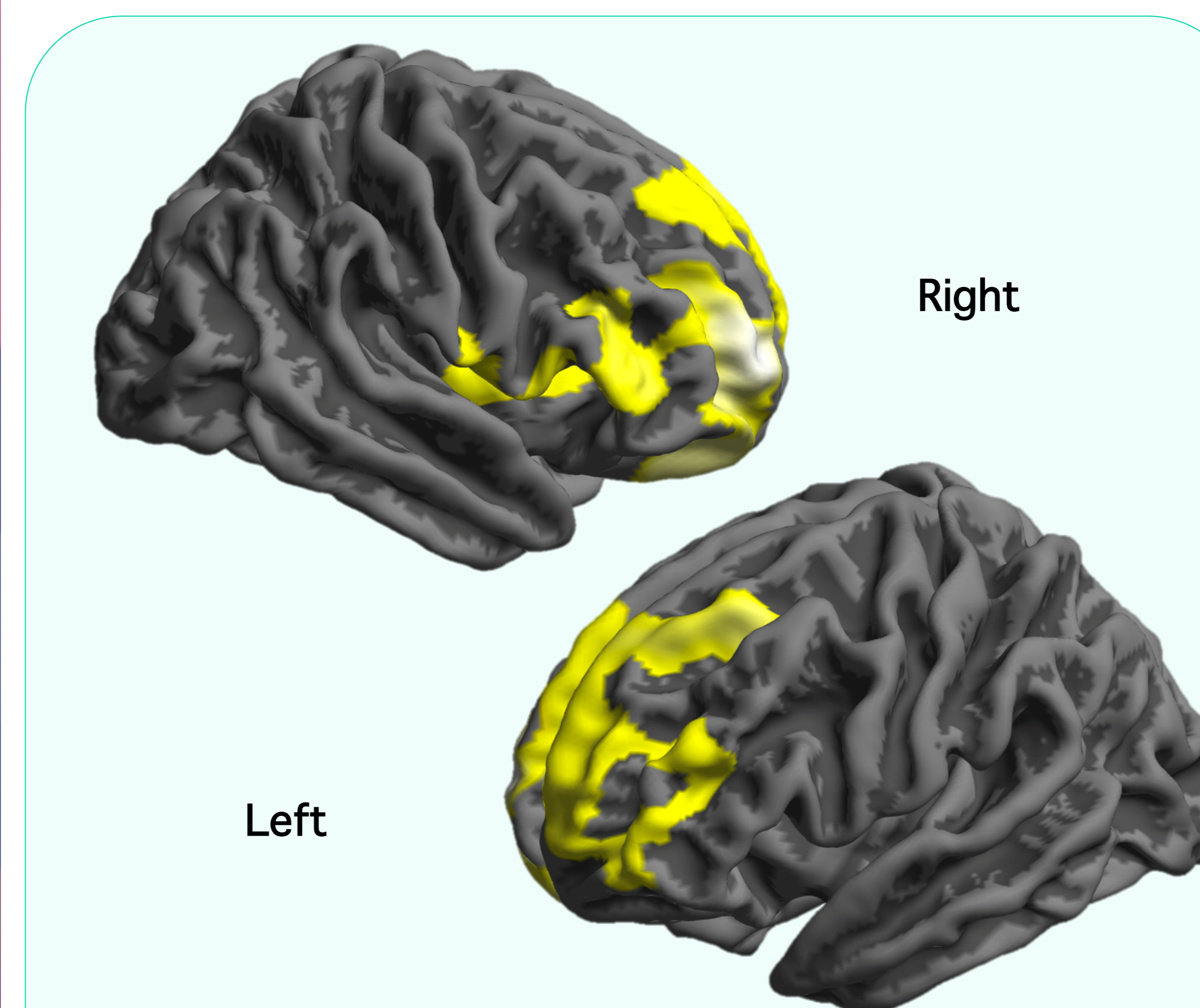


Figure 1. Association between levels of disorganized attachment behaviors in infancy and cortical thickness in late childhood

Table 1. Regional cortical thickness significantly associated with levels of disorganized attachment behaviors (positive contrast)

	Regions	k (voxels)	MNI coordinates (x, y, z)	TFCE	p _{FWE-corr}
Right	Superior frontal gyrus		20, 62, 7	19,138	.025
	Middle frontal gyrus, orbital part	2283	31, 53, -4	17,202	.032
	Inferior frontal gyrus, pars triangularis		45, 35, 7	16,269	.036
Left	Middle frontal gyrus		-25, 18, 50	16,705	.035
	Superior frontal gyrus	1144	-31, 52, 0	15,511	.041
	Superior frontal gyrus		-21, 62, 9	15,429	.041

Conclusion

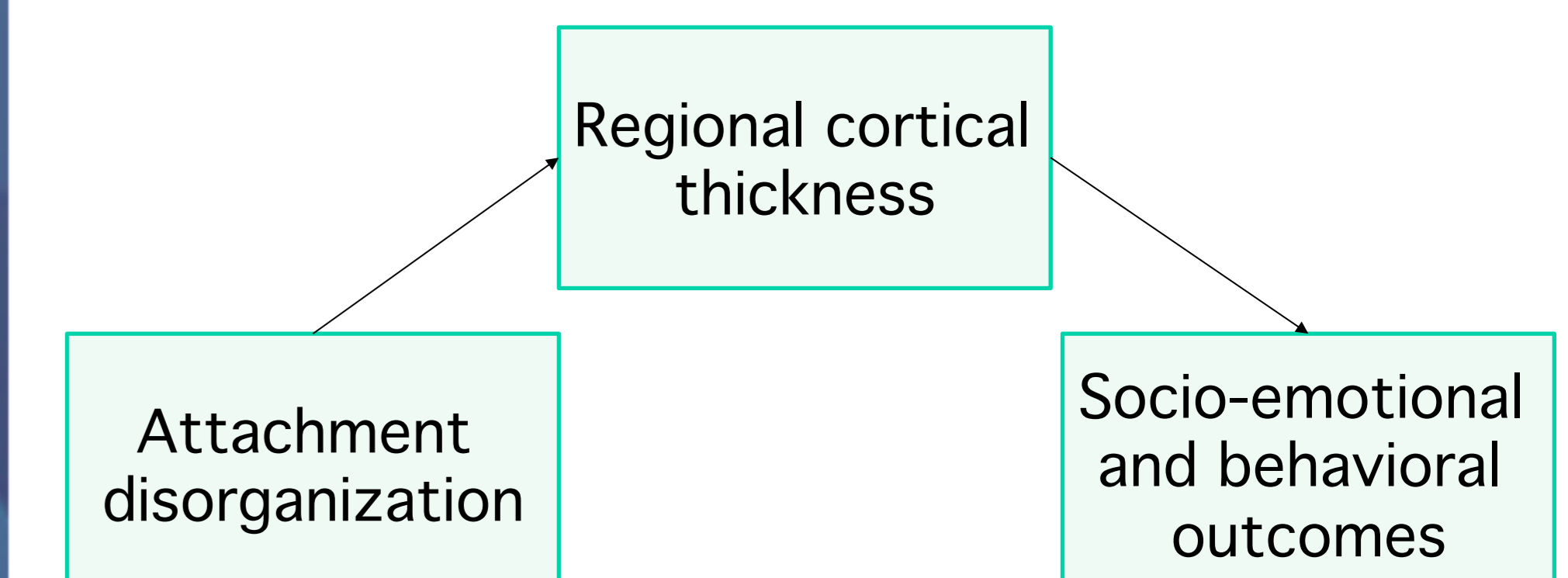
- Normative variations in infant behavior toward their mothers in a stressful situation → relevant to structural brain development in childhood

- Brain regions : socio-emotional and executive functioning

Study contribution

- First study to examine the link between attachment disorganization and cortical grey matter volume or thickness
- Attachment disorganization and security : distinct morphometric correlates

Future research



References

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