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Introduction

It is increasingly believed that early caregiving experiences may have an impact on children's brain development

- Particularly in brain regions underpinning emotional functioning
- Amygdala development is closely related to the creation of the attachment bond between children and their caregivers¹

High-risk samples²⁻⁶

Low SES, Maternal depression, Harsh corporal punishment, Parental verbal abuse, Institutional rearing

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Reduced WM/GM volumes (particularly in frontal areas) and abnormal amygdala volumes

Low-risk samples^{7, 8}

Two longitudinal studies:

Higher maternal support, Higher parental sensitivity

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Enlarged hippocampal volume and increased total GM

Aim of research

This study aimed to investigate the longitudinal association between early attachment quality and later amygdala volume in a community sample

Method

Participants

28 children (11 boys) and their mothers participated in three assessments at the ages of 15 months (T1), 2 years (T2), and 10 years (T3).

Measures

Mother-child attachment at T1 and T2

- Attachment Q-Sort⁹: An observational measure that assesses the quality of the child's attachment behaviors toward his/her mother
- Average score used in analyses

Brain imaging at T3

- Children underwent a 30-min magnetic resonance imaging protocol
- Standard 3D T1-weighted whole-brain
- 3D RF-spoiled gradient recalled echo acquisition (TR/TE/α = 22 ms/10 ms/30°)
- 1 mm isotropic resolution (256 x 256 x 160-170 matrix)

Statistical analyses

- Statistical Parametric Mapping (SPM12) software
- Voxel-based morphometry analyses (VBM).
- Multiple regression
- Covariates: total intracranial volume, child age, and maternal education

Results

After adjusting for age, total intracranial volume, and maternal education, left and right amygdala grey matter volumes were significantly related to attachment security

Table 1. Small volume correction (SVC) over amygdala

	MNI coordinates	Volume (voxels)	T	p
Left amygdala	-21, -10, -23	149	4.25	< .05
Right amygdala	18, -10, -26	171	3.79	< .05

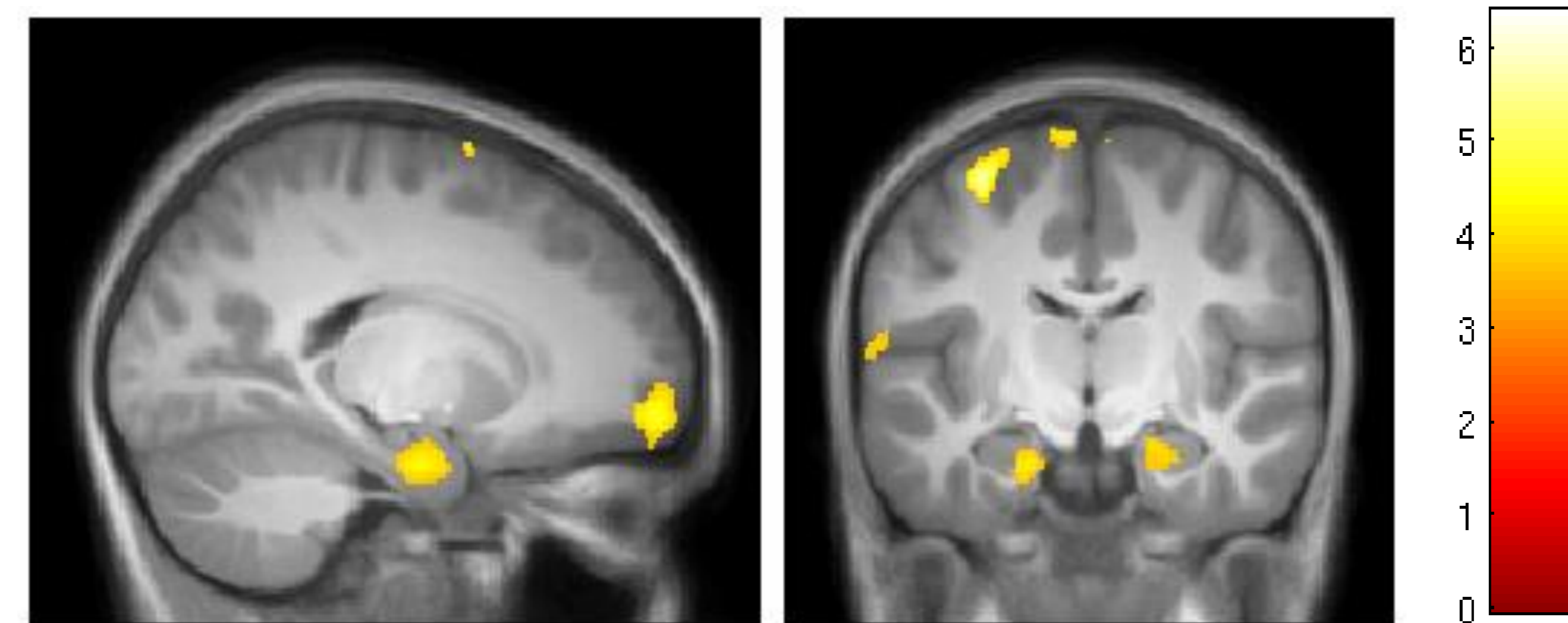


Figure 1. Statistical results ($p < .001$ uncorrected) overlaid over the mean structural image of all participants.

Discussion

Amygdala

Consistent with past literature indicating that adolescents who are exposed to higher levels of positive maternal behavior have a larger left amygdala¹⁰

Significance

- First study to establish a longitudinal link between caregiving and subcortical volumes in a community sample
- First study to use attachment security to assess the quality of the caregiving relationship
- Children who are more securely attached to their mother have larger amygdalae, a subcortical structure involved in the acquisition of affective and social skills¹¹

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