Early adversity and brain response to faces in young adulthood

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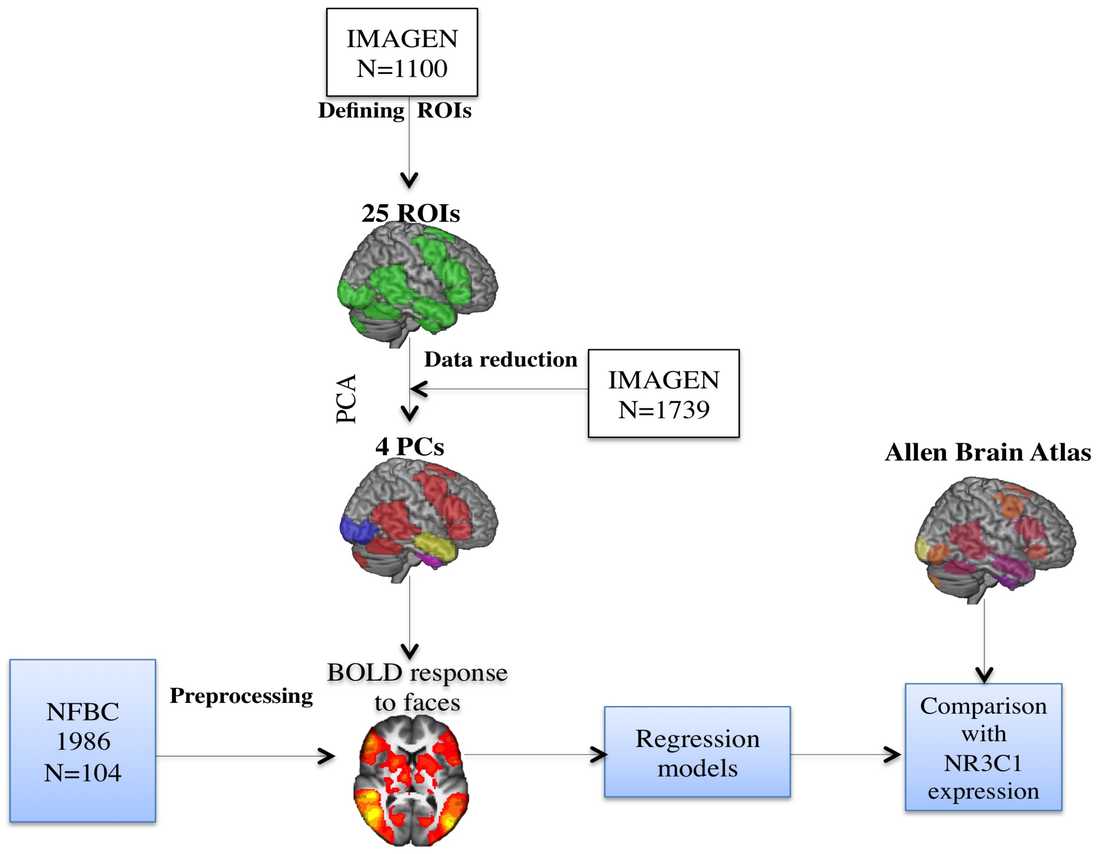
EARLY ADVERSITY AND BRAIN RESPONSE TO FACES IN YOUNG ADULTHOOD

Introduction

Early stressors play a key role in shaping inter-individual differences in vulnerability to various psychopathologies, which might relate to elevated glucocorticoid secretion and impaired responsiveness to stress. Furthermore, previous studies have shown that individuals exposed to early adversity have deficits in emotion processing from faces (1,2). The present study aims to explore whether early adversities associate with brain response to faces and whether this association might relate to the regional variations in mRNA expression of the glucocorticoid receptor gene (*NR3C1*).

Methods



104 individuals drawn drawn from the Northern Finland Birth Cohort 1986 participated in face-task fMRI. Early adversities were mapped using TADS questionnaire (3). BOLD response to dynamic happy and fearful faces were extracted from 25 regions of interests (4), which were reduced using principal components derived from the IMAGEN dataset. MANCOVA followed by post-hoc regressions were conducted to explore relationships between adversities and brain response to faces.

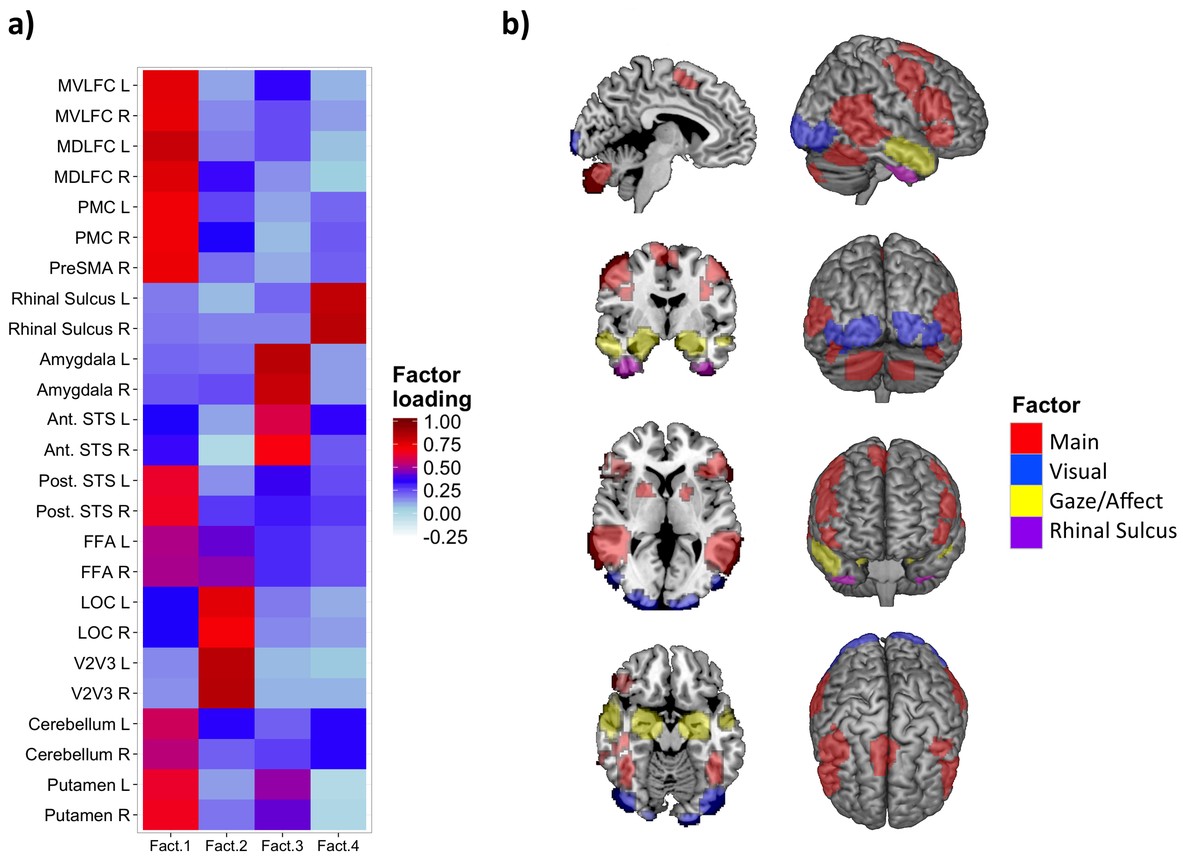


Figure 2 a) Factor loadings across the 25 ROIs in the IMAGEN dataset. Abbreviations: Mid-ventrolateral frontal cortex (MVLFC), Mid-dorsolateral frontal cortex (MDLFC), premotor cortex (PMC), pre supplementary motor area (PreSMA), superior temporal sulcus (STS), fusiform face area (FFA), lateral occipital cortex (LOC), anterior (Ant), posterior (Post). b) Spatial representation of each factor (loadings > 0.5).

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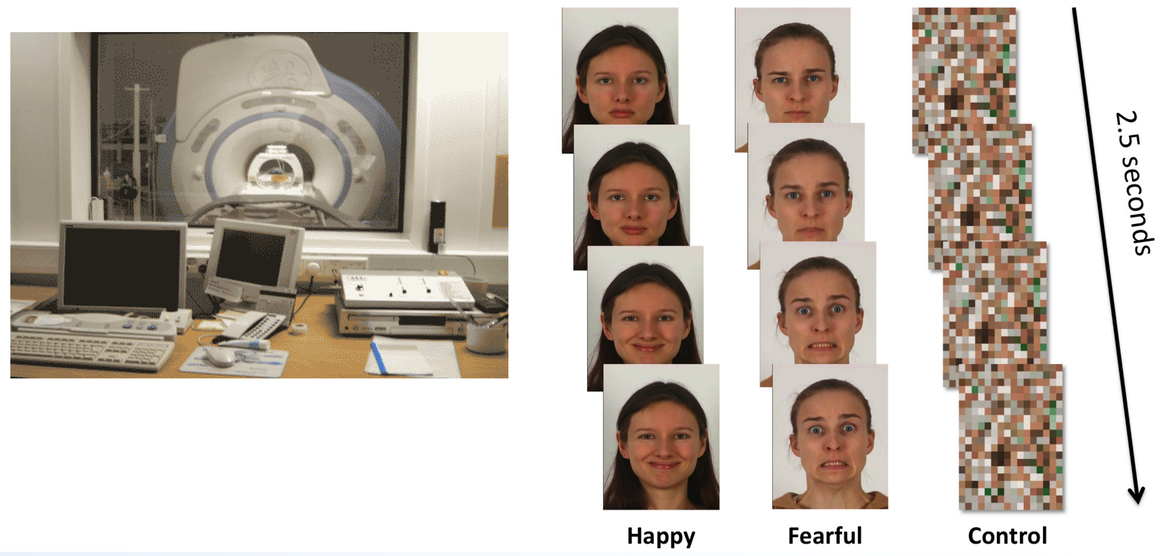

Results

MANCOVA revealed an association between adversities and factors representing brain response to fearful faces and ($p = 0.006$). Post-hoc regressions revealed a number of brain-behavior relationships, which are presented in Figure 3.

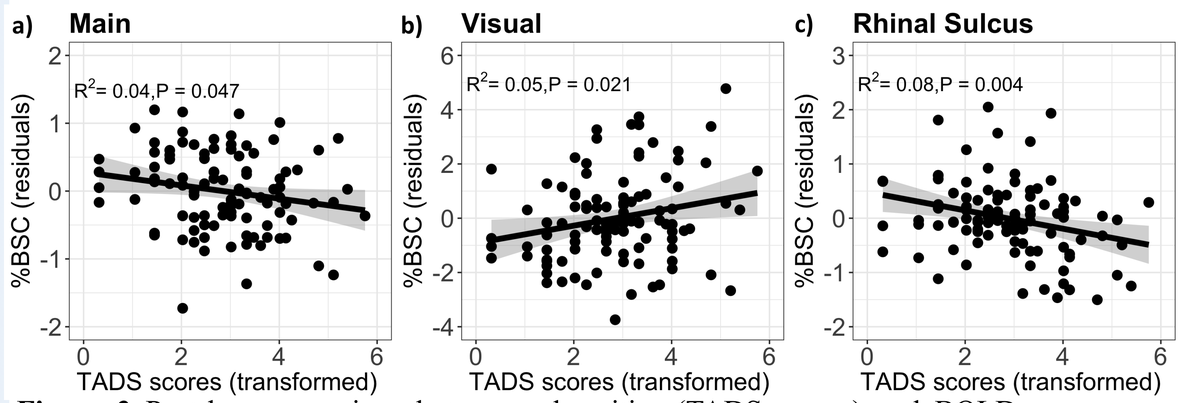

Figure 3 Post-hoc regressions between adversities (TADS scores) and BOLD response to fearful faces. Plots are shown in standardized residuals (covariating for sex).

NR3C1 expression (data from Allen Human Brain Atlas) correlated across the 25 ROIs with the magnitude of associations between adversity and BOLD response to fearful faces. This relationship is depicted in Figure 4.

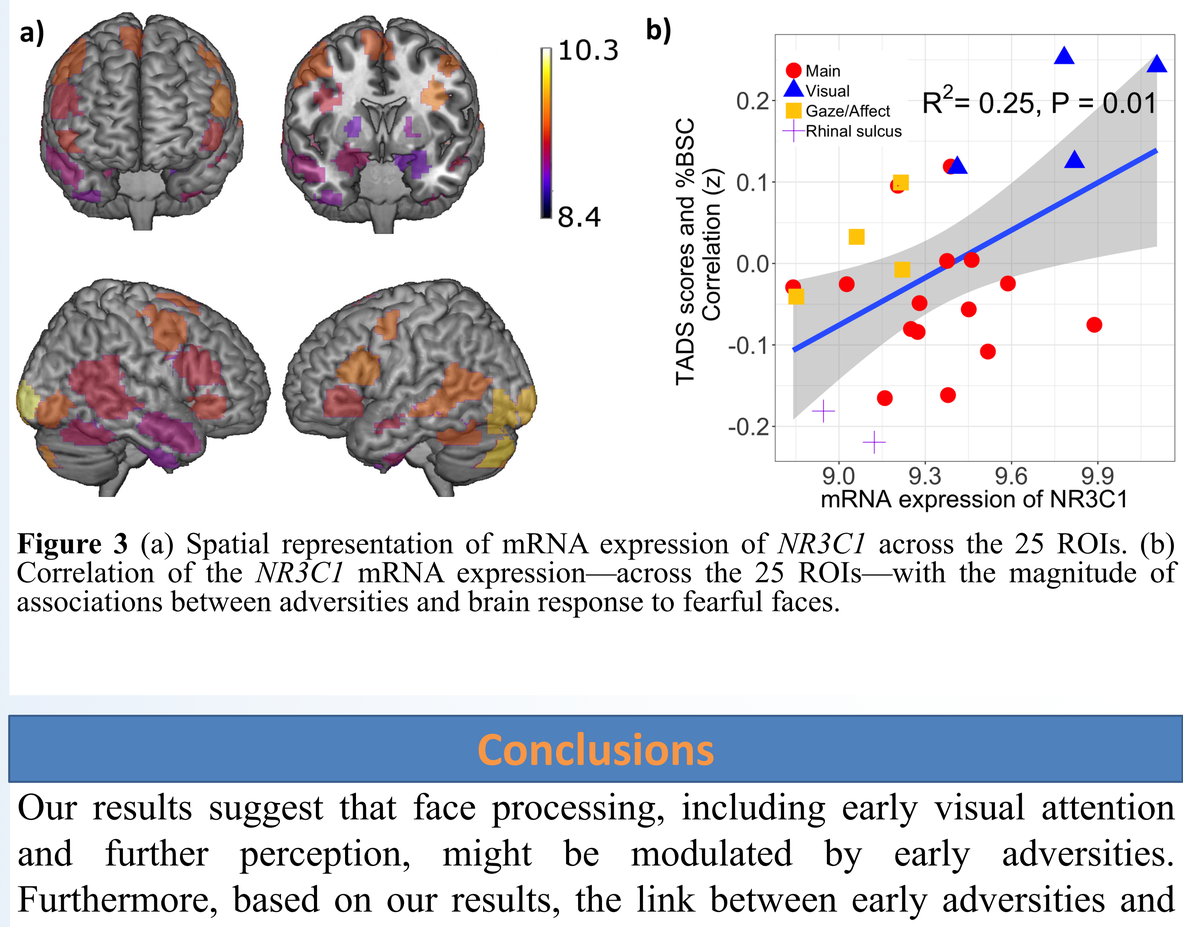

Figure 3 (a) Spatial representation of mRNA expression of *NR3C1* across the 25 ROIs. (b) Correlation of the *NR3C1* mRNA expression—across the 25 ROIs—with the magnitude of associations between adversities and brain response to fearful faces.

Conclusions

Our results suggest that face processing, including early visual attention and further perception, might be modulated by early adversities. Furthermore, based on our results, the link between early adversities and brain response to fearful faces might be mediated by the glucocorticoid system. Altogether, our results support the conceptualizations of higher hypothalamus–pituitary–adrenal (HPA) axis activation leading to the dysfunction of the brain function, which may, in part, lead to individual differences in mental health disorders in later life.

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