Functional brain correlates of cognitive-behavioural manifestations in Autism Spectrum Disorder

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Abstract

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder affecting multiple cognitive domains, thereby resulting in aberrant cognition. The resulting atypical behaviour manifests as varying degrees of clinical severity. This study explores the functional brain correlates of ASD independently plus its interaction with the severity of overall symptomatology and comorbid depression.

Preface

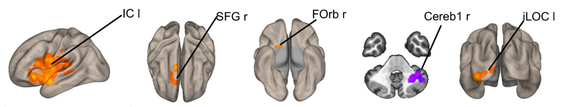
- Individuals diagnosed with ASD face challenges in their daily lives, especially when it comes to social interactions.
- Individuals with ASD may also experience comorbidities such as attention deficits, hyperactivity, anxiety, psychosis, and **depression** (Pehlivanidis et al., 2020) which suggests neuroanatomical and functional overlaps of ASD with other psychiatric disorders (Kim & Lord, 2013)
- Delineating the resting state functional connectivity (rsfc) of brain networks is thus, of merit in better understanding and managing ASD.
- Functional connectivity differences in young adults with ASD (18-35 years) are often overlooked, despite ample reports of the prevalence of **depression** in this population (Mazefsky et al., 2008).
- **Here, in young adult samples, we explore** …

1) Brain rsfc differences between ASD and typical controls (TD).
2) Brain rsfc association with Clinical severity (ADOS) of ASD.
3) Brain rsfc association with interaction between ADOS X Depression (BDI) of ASD.

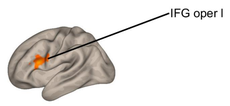
Differences between ASD and TD

[1]

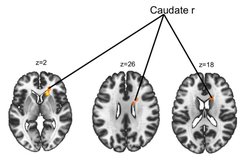
Caudate r seed



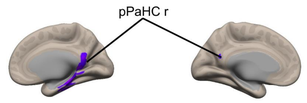
Caudate l seed



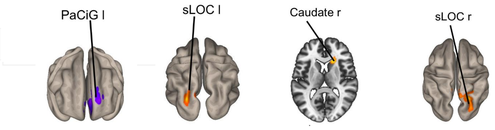
Amygdala l seed



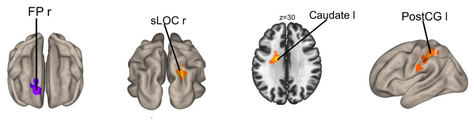
Precuneus seed



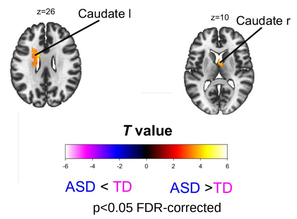
Anterior Insula l seed



Anterior Insula r seed



Anterior Cingulate Cortex seed

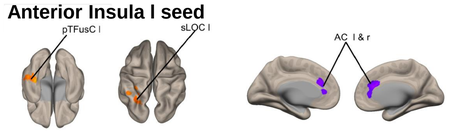


False Discovery Rate (FDR)
IC l Insular Cortex left; SFG r Superior Frontal Gyrus right; FOrb r Frontal Orbital Cortex right; Cereb1 r Cerebellum Crus1 right; iLOC l Lateral Occipital Cortex inferior division left; IFG oper l Inferior Frontal Gyrus pars opercularis left; Caudate r Caudate right; pPaHC r Parahippocampal Gyrus posterior division right; PaCiG l Paracingulate Gyrus left; sLOC l & sLOC r Lateral Occipital Cortex superior division left and right; FP r Frontal Pole right; PostCG l Posterior Cingulate Gyrus left; Caudate l Caudate left

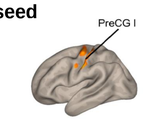
Effect of ADOS in ASD

[2]

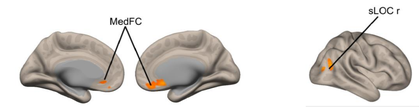
Anterior Insula l seed



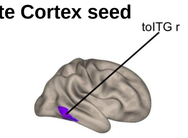
Anterior Insula r seed



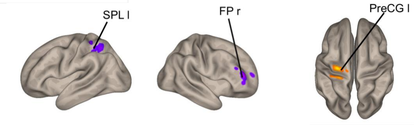
Frontal Pole r seed



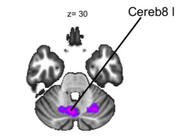
Posterior Cingulate Cortex seed

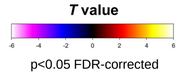


Caudate r seed



Anterior Cingulate Cortex seed



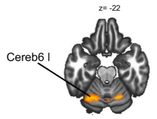


False Discovery Rate (FDR)
pTFusC l Temporal Fusiform Cortex, posterior division left; sLOC l Lateral Occipital Cortex superior division left; AC l & r Cingulate Gyrus anterior division left & right; PreCG l Precentral Gyrus; MedFC Medial Frontal Cortex; sLOC r Lateral Occipital Cortex superior division right; toITG r Inferior Temporal Gyrus, temporo-occipital part right, SPL l Superior Parietal Lobule left; FP r Frontal Pole right; PreCG l Precentral Gyrus left; Cereb l Cerebellum8 left

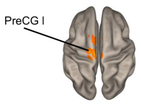
Interaction between ADOS and BDI in ASD

[3]

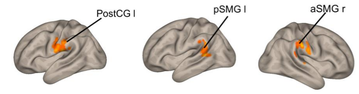
Medial Prefrontal Cortex seed

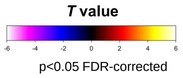


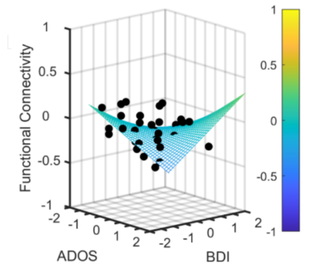
Lateral Prefrontal Cortex l seed

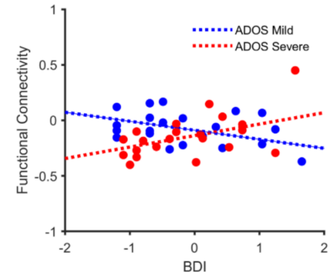


Lateral Prefrontal Cortex r seed









False Discovery Rate (FDR)
Cereb6 l Cerebellum6 left; PreCG l Precentral Gyrus left; PostCG l Postcentral Gyrus left; pSMG l Supramarginal Gyrus posterior division left; aSMG r Supramarginal Gyrus anterior dvision right; LPFC l & r Lateral Prefrontal Cortex left & right; MPFC Medial Prefrontal Cortex

Conclusion

- The findings illuminate the **brain rsfc architecture** of ASD and its difference from TD.
- The findings **disentangle the role of depression** in modulating rsfc in the brain differentially for high and low symptomatic severity in ASD.
- The above insights have the potential for streamlining **timely diagnosis and management** of ASD with comorbid depression in young adults.

References:

Kim, S. H., & Lord, C. (2013). The behavioral manifestations of autism spectrum disorders. *The neuroscience of autism spectrum disorders*, 25–37.

Mazefsky, C. A. et al.,(2008). Overrepresentation of mood and anxiety disorders in adults with autism and their first-degree relatives: What does it mean? *Autism Research*, *1*(3), 193–197.

Pehlivanidis, A. et al.,(2020). Lifetime co-occurring psychiatric disorders in newly diagnosed adults with attention deficit hyperactivity disorder (ADHD) or/and autism spectrum disorder (ASD). *BMC Psychiatry*, *20*(1), 1–12.

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