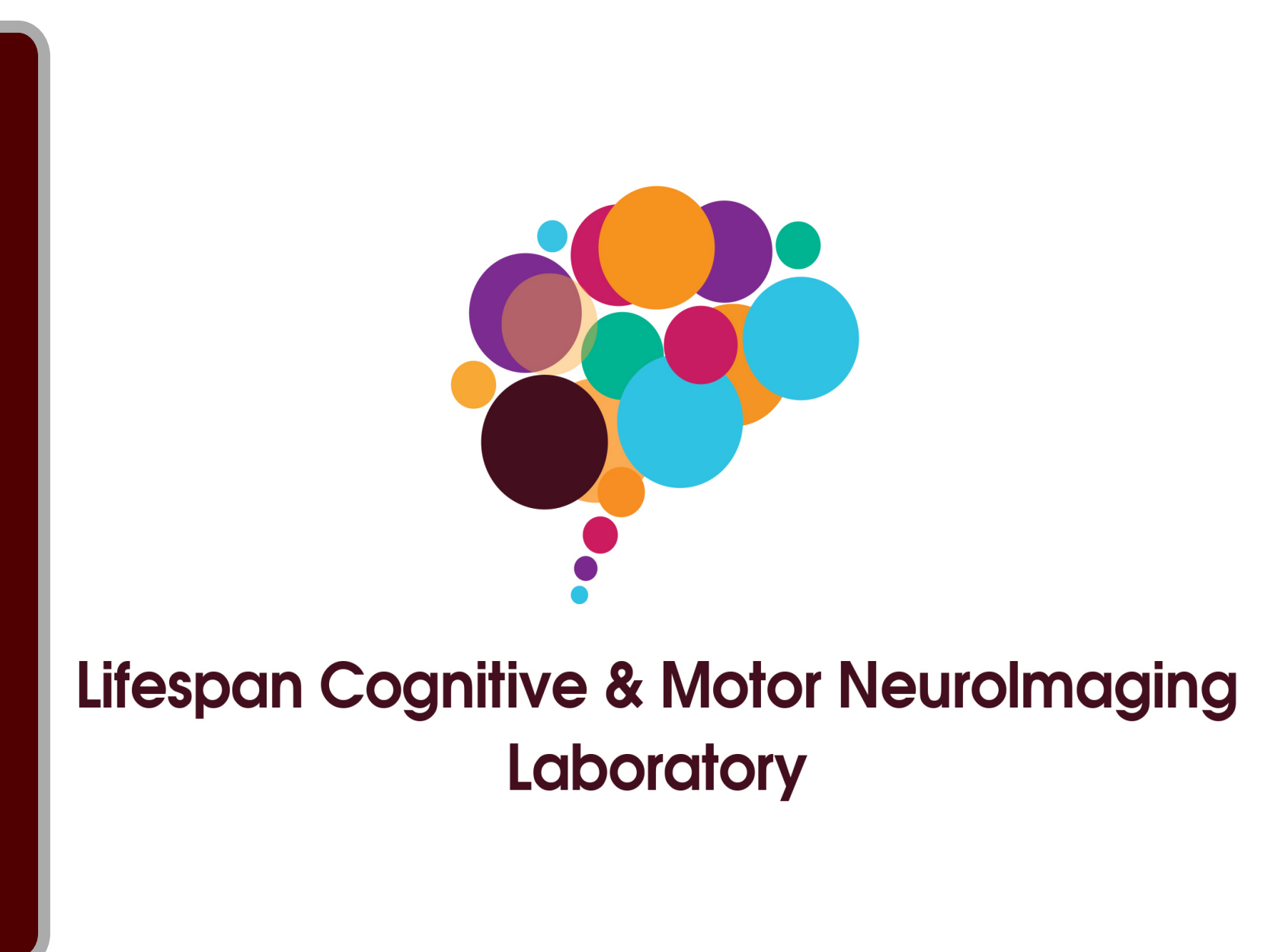




Cerebellar-Motor Connectivity in Patients with Schizophrenia: Insight Into Negative Symptom Severity

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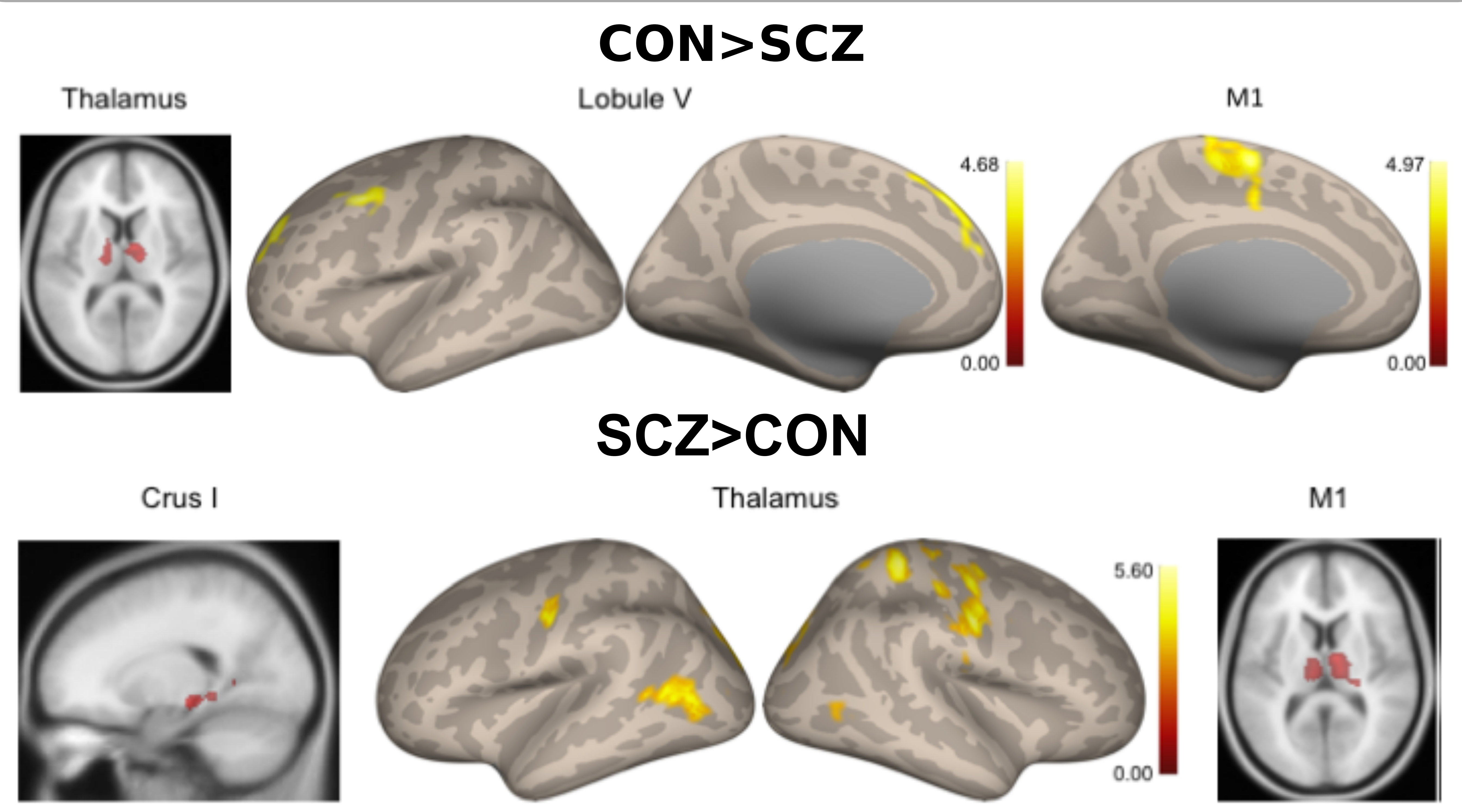
Introduction

- Though schizophrenia (SCZ) is defined by positive symptoms, motor deficits are also present, and motor networks may relate to the pathophysiology of the disease.
- Cerebellar circuits have been implicated in models of SCZ¹, and our own recent work has implicated cerebello-motor connectivity in symptom progression in high-risk youth².
- To investigate the notion that motor network dysfunction is related to the disease state in SCZ, we conducted an fcMRI analysis in SCZ, and in healthy controls (CON).

Methods

- All data are publically available and were identified and downloaded from www.schizconnect.org
- Sample was limited to patients and controls having resting state functional connectivity MRI, structural MRI (collected at 3T), and clinical data
- The final sample was exclusively from the COBRE dataset.
- All analyses were completed using the CONN Toolbox, controlling for medication using CPZ equivalents. Seeds were placed in Lobule V, Crus I, M1, and the thalamus

Group Differences in Connectivity



Top: Controls showed higher connectivity within the thalamus. Lobule V showed stronger connectivity with an extended motor network and PFC. Lateral M1 was more strongly correlated with medial M1. This is consistent with literature suggesting hypoconnectivity in SCZ.
Bottom: Patients with SCZ did however show some areas of greater connectivity. This included between Crus I and medial temporal lobe, and most notably between the thalamus and motor cortex.

Positive Symptoms

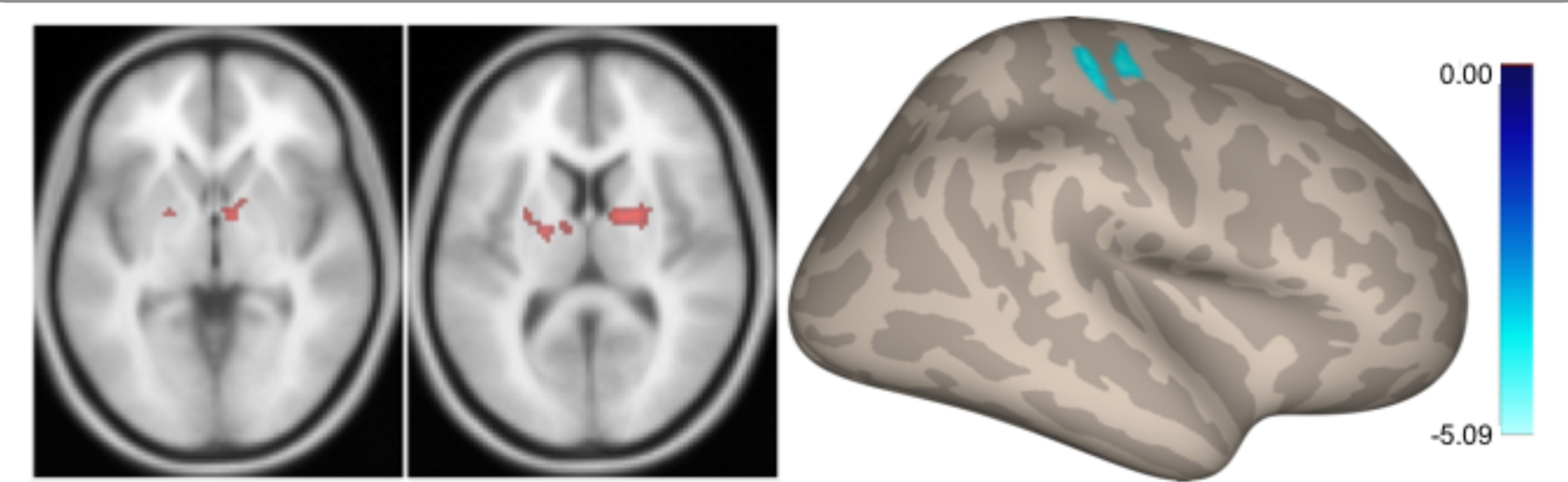


Above: Correlations between connectivity and symptoms were also present for the positive domain. Higher connectivity between the thalamus and visual cortical regions is associated with more severe positive symptoms. Interestingly however, this was outside of the motor networks and was limited to sensory regions.

Summary

- Patients with SCZ show aberrant patterns of motor network connectivity. This includes hypoconnectivity and thalamo-motor hyperconnectivity, consistent with recent work linking this circuit to transition in at-risk groups³.
- Thalamic connectivity with visual regions is consistent with recent fMRI work looking at patients with these symptoms⁴.

Connectivity & Negative Symptom Severity



Left: Greater connectivity between lateral M1 and basal ganglia regions is associated with more severe negative symptoms.
Right: Greater connectivity within the motor cortex is associated with fewer negative symptoms. Together, this implicates motor network connectivity in negative symptoms, suggesting motor networks may play a key role in SCZ. **Hot colors:** positive correlations. **Cool colors:** negative correlations.

Table 1. Participant demographics.

	Patients	Controls
N	82	88
Age	38.36 (13.78)	38.78 (11.76)
Sex	67M, 15F	63M, 25F
Participant Education**	3.83 (1.49)	4.57 (1.28)
Parent Education*	3.82 (2.15)	4.35 (1.83)
Current Alcohol Usage*	1.04 (.19)	.98 (.15)
Lifetime Alcohol Usage**	1.46 (.76)	1.18 (.54)
Current Marijuana Usage**	1.02 (.22)	.98 (.15)
Lifetime Marijuana Usage	1.46 (.74)	1.02 (.30)
Symptoms		
Positive	15.30 (4.78)	--
Negative	15.24 (5.32)	--

1. Andreasen et al. (1996), *PNAS*; 2. Bernard et al. (2017), *NeuroImage: Clinical*; 3. Anticevic et al. (2015), *JAMA Psychiat*; 4. Oertel et al. (2007), *Psychiat Res Neuroimage*

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