

Introduction

- Disturbances of emotional processing [1,2] are a hallmark of schizophrenia (SZ).
- Emotional changes are linked to different aspects of the symptomatology, especially negative symptoms like blunted affect, but also positive symptoms, such as the affective content of auditory hallucinations [3] or paranoia [4].
- While a lot of neuroimaging research focuses on emotion processing in the visual domain, fewer is known about how neural correlates of auditory affective processing relate to schizophrenia symptomatology.

AIM: Investigation of relationships between brain structure and psychopathology in schizophrenia within a meta-analytical derived affective auditory network.

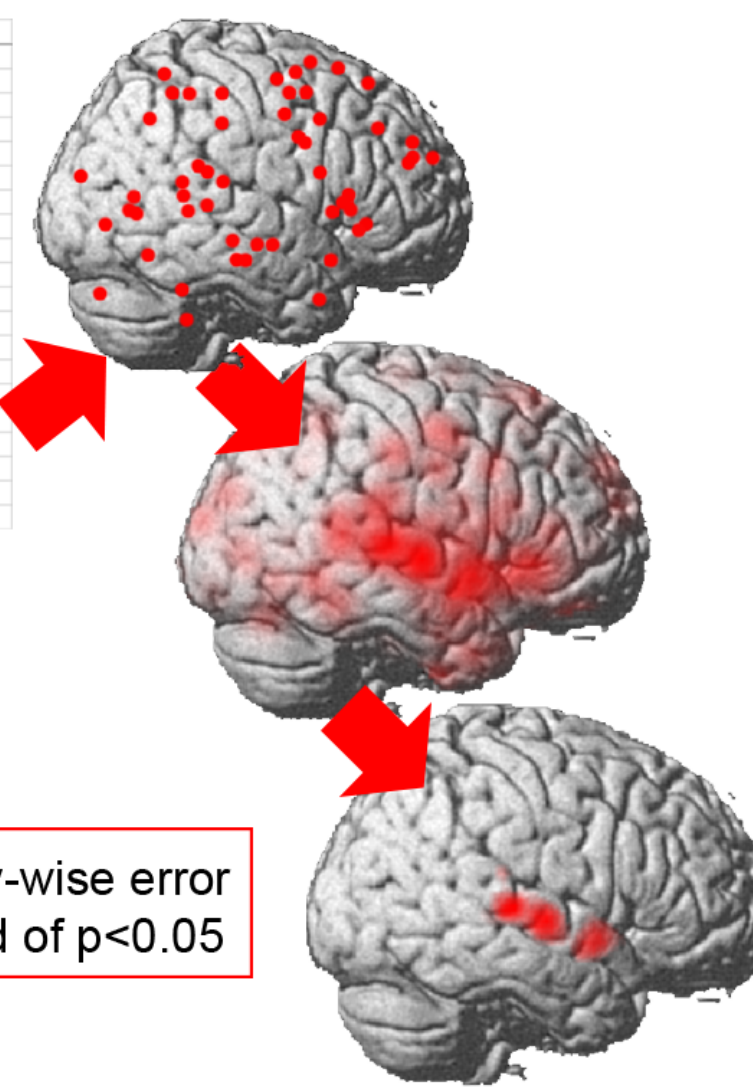
Delineation of regions involved in affective auditory processing (AAP):

Inclusion Criteria: Emotion>Neutral Contrast, Whole-brain analysis, coordinates in standard reference space, healthy adults

Inclusion of 29 experiments:
16 prosody
7 music
8 affective sounds:

Acitvation Likelihood Meta-Analysis [5]

Experiment	Subjects	X	Y	Z
Experiment 1	28	-40	37	13
Experiment 1	28	-39	22	-9
Experiment 1	28	38	25	-4
Experiment 1	28	-18	27	16
Experiment 1	28	14	27	24
Experiment 1	28	57	3	31
Experiment 2	28	41	-39	-10
Experiment 2	28	-29	39	5
Experiment 2	28	54	-45	-5
Experiment 2	28	-40	77	-18
Experiment 2	28	39	78	-3
Experiment 3	28	33	-40	-15
Experiment 3	28	45	-69	23
Experiment 3	28	30	-60	42
Experiment 3	28	27	-54	60
Experiment 3	28	24	0	60
Experiment 3	28	33	-30	51



cluster-level family-wise error
corrected threshold of $p < 0.05$

Methods

Relationship of Symptoms and Gray Matter of AAP regions in Schizophrenia:

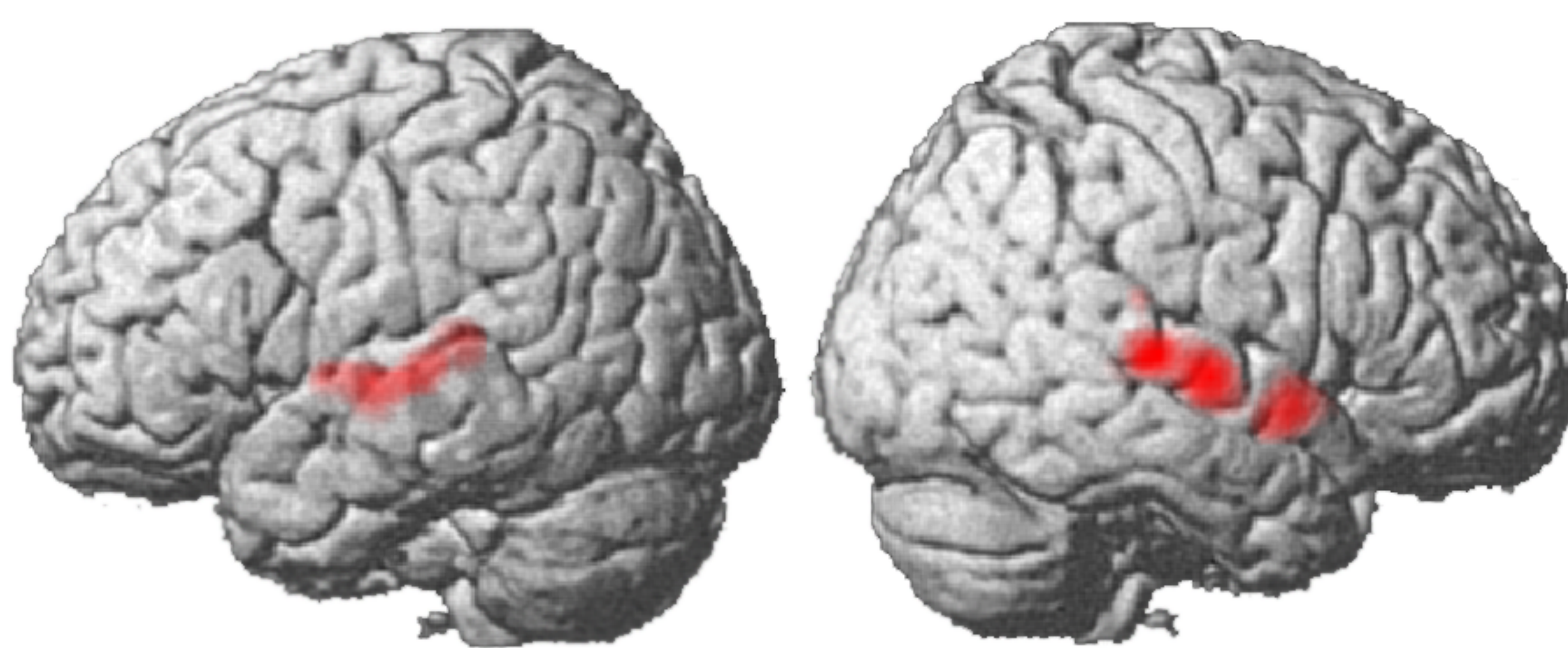
- 66 SZ patients (13 female) of the COBRE sample [6].
- Preprocessing of MRI data with CAT12.5 (bias-field correction, spatial normalization using the Geodesic Shooting Algorithm, segmentation into GM, WM and CSF, non-linear modulation).
- Calculation of gray matter volume (GMV) for each subject for right and left STG clusters identified in the meta-analysis.
- Spearman correlation ($p < .05$, corrected for multiple comparison) of GMV with the positive, negative and general symptom score of the PANSS (removing effects of age, gender and intracranial volume). Explorative correlations with individual item scores on an uncorrected level.

Results

Sample Description

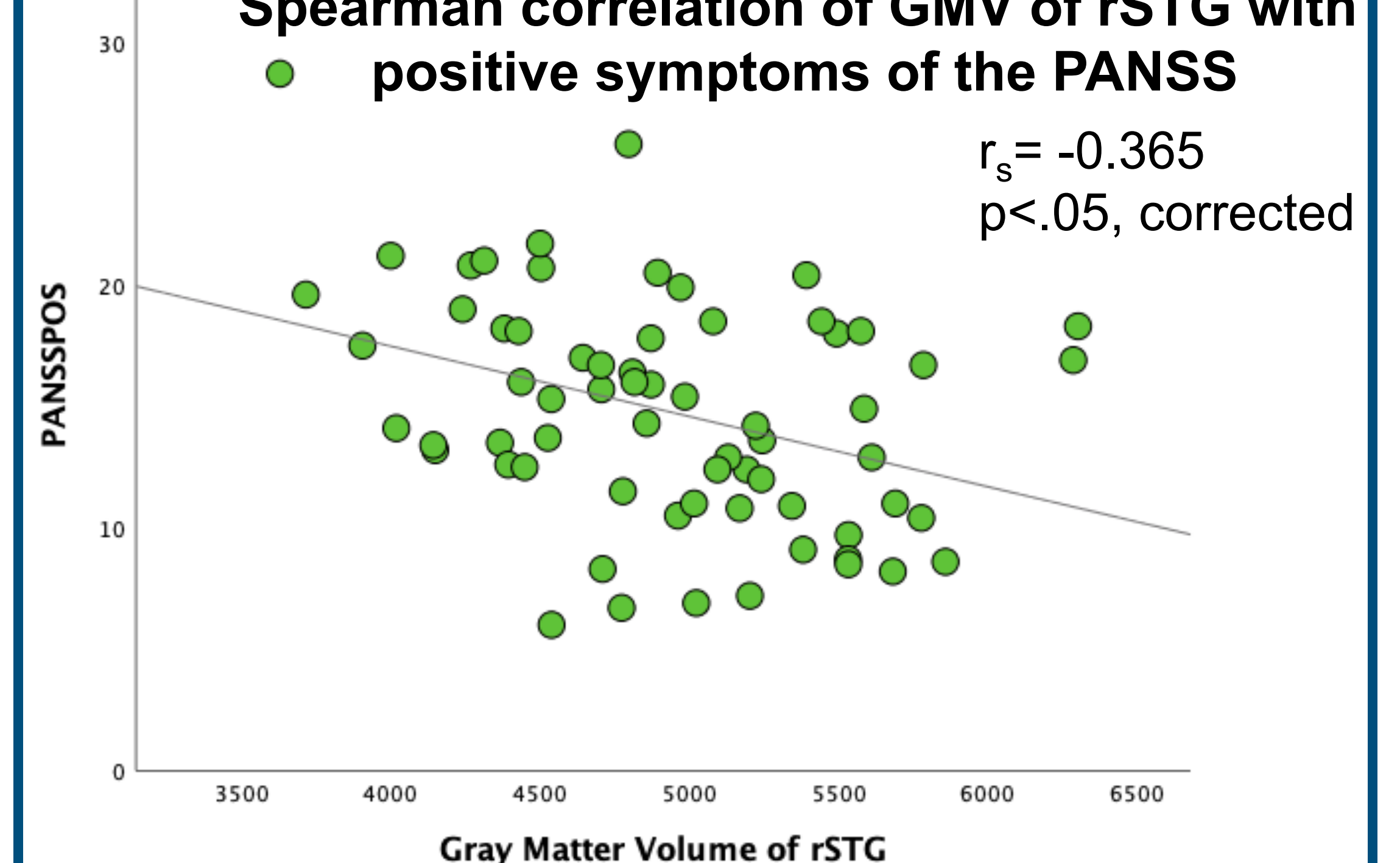
	Mean	SD
Age	38.6	13.5
Age Onset	21.1	7.5
Illness Duration	17.3	13
PANSS Positive	14.8	4.7
PANSS negative	14.6	5

Regions involved in affective auditory processing revealed by meta-analysis across 29 experiments

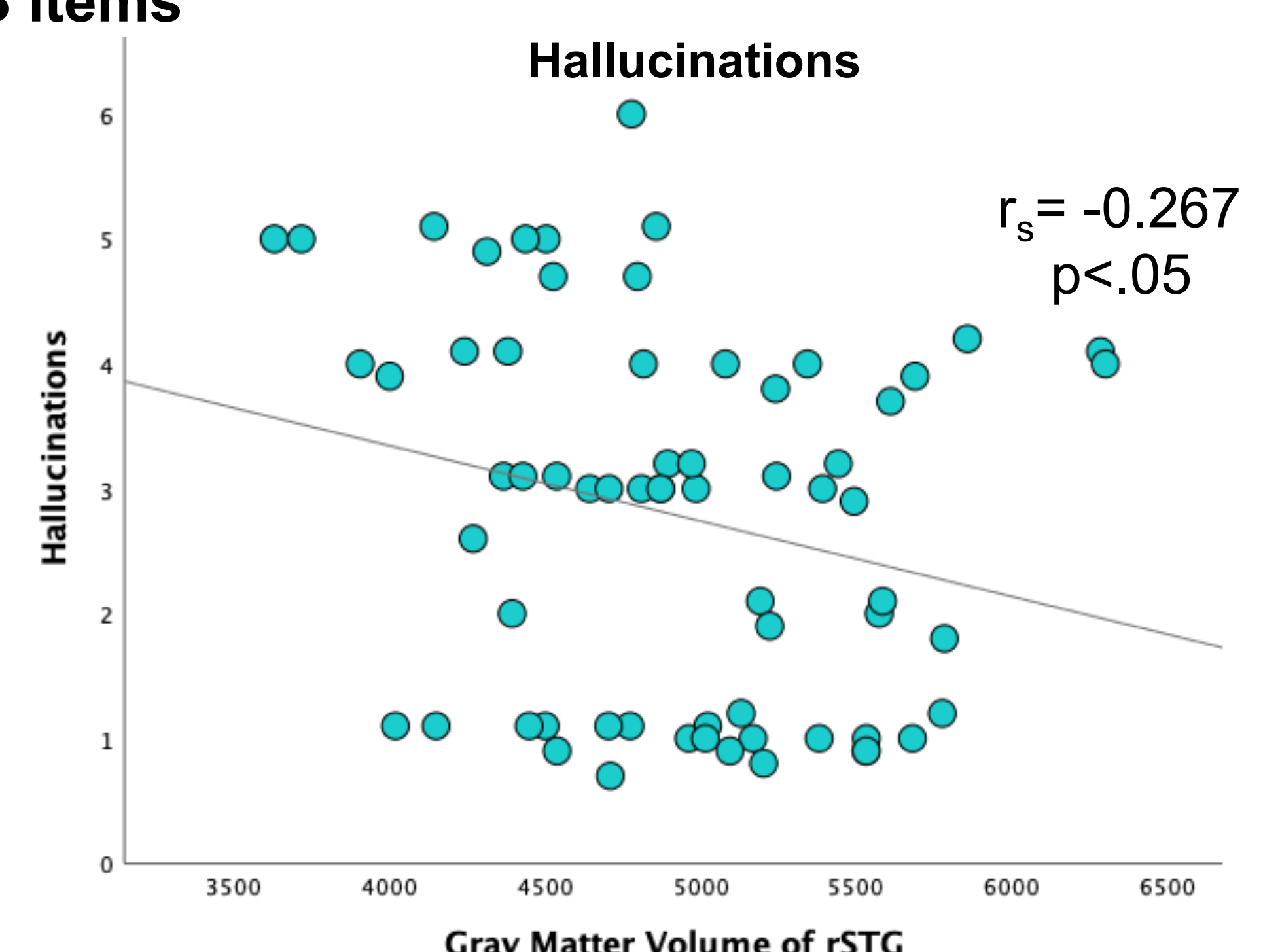
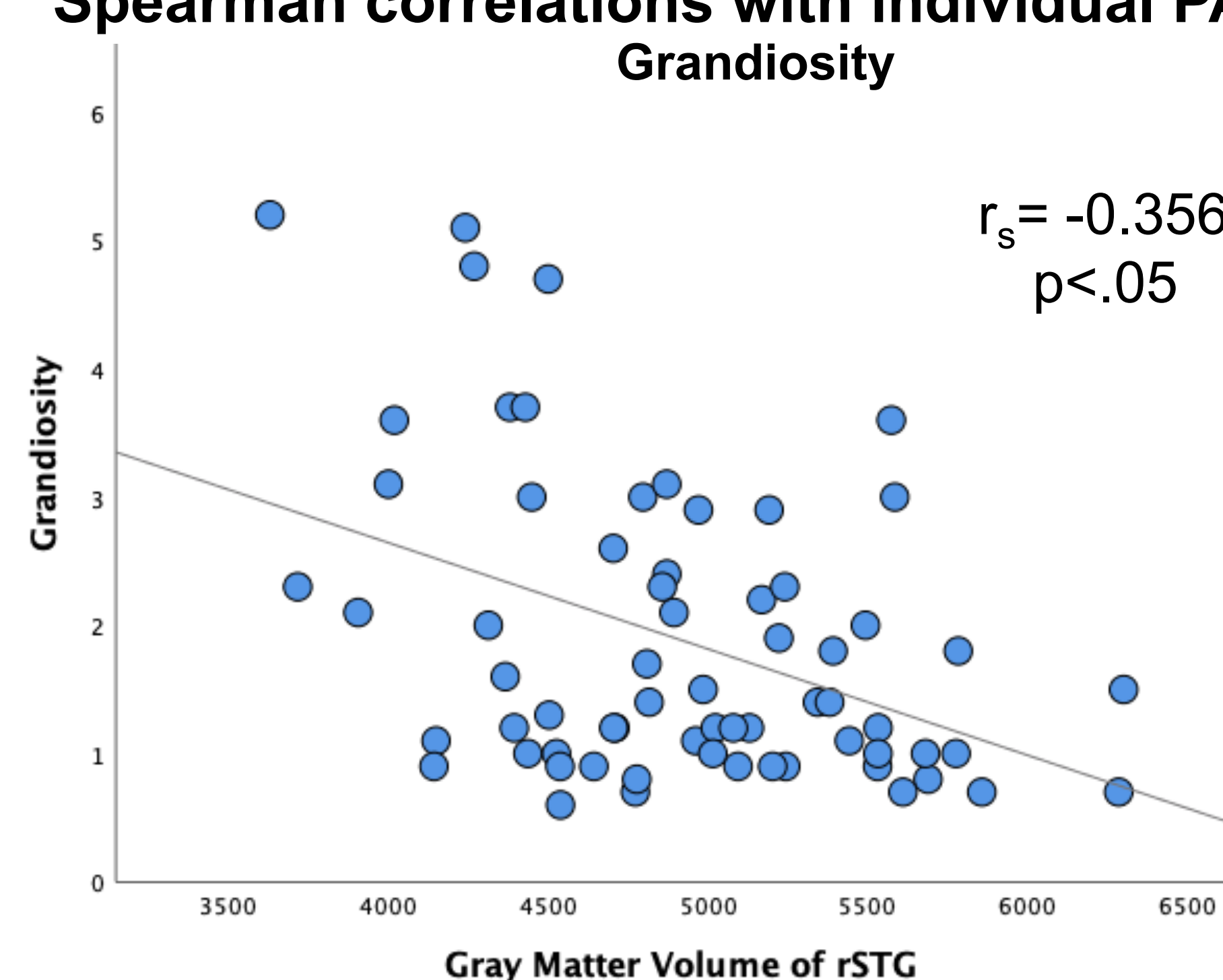
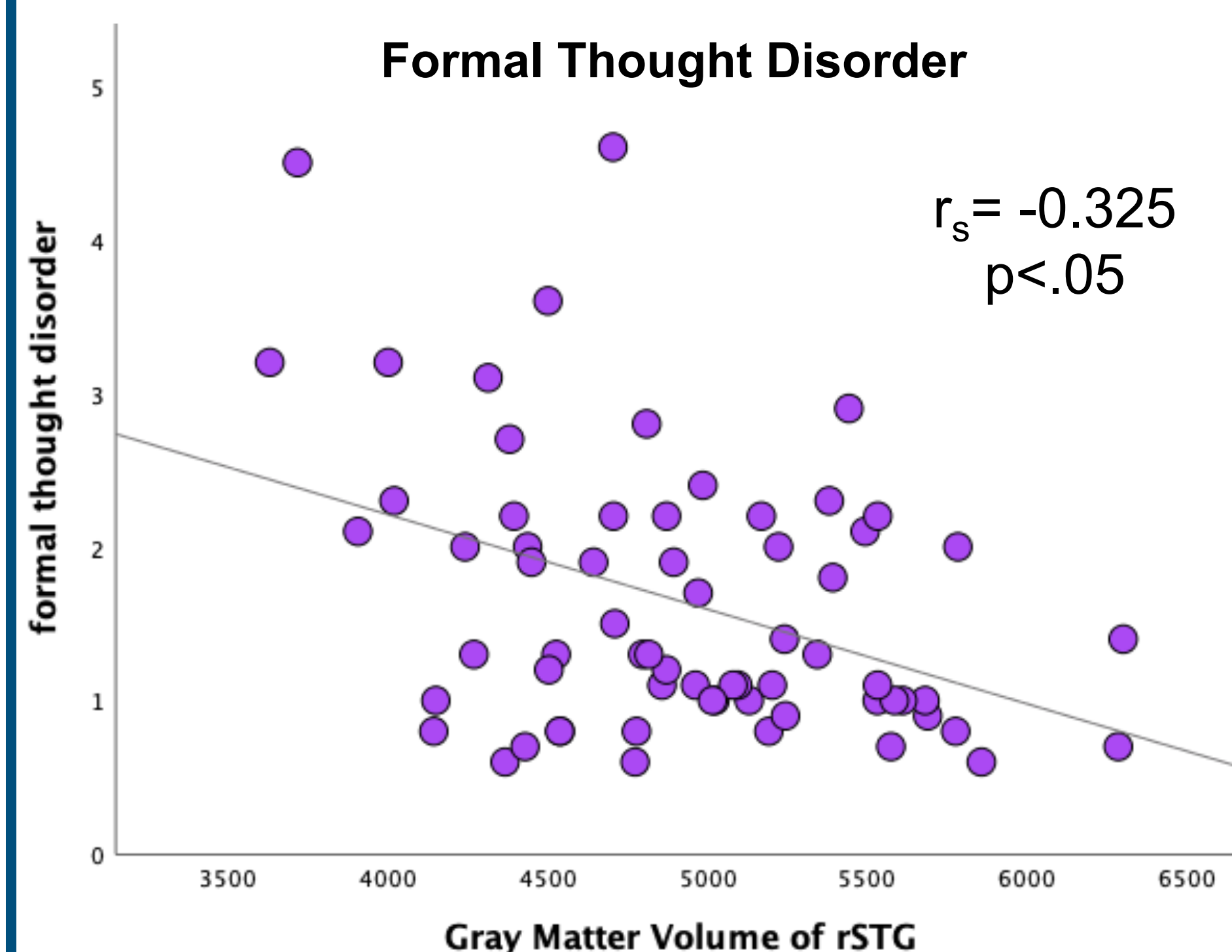


Spearman correlation of GMV of rSTG with

- **positive symptoms of the PANSS**



Spearman correlations with individual PANSS items



Discussion

- Auditory affective processing involves regions of the temporal lobe and thus mainly regions of auditory processing.
- No convergence in „traditional“ emotional regions like the amygdala or cingulate cortex.
- This indicates that early and late auditory processing regions play a major role during perception of auditory emotions and that involvement of affective regions is more state and modality specific.
- In line with impairments of affective auditory processing [2], associations of symptoms with Gray Matter Volume of right STG, a regions previously found to show reduced GMV in schizophrenia [7] were found.
- Interestingly, associations were only found for positive but not negative symptoms of the PANSS with GMV of rSTG, highlighting the link of affective auditory processing and psychotic symptoms in schizophrenia.
- Explorative analyses point to a link between the severity of formal thought disorder, grandiosity and hallucinations and affective auditory brain structures.
- This expands results, which have shown relationships between emotional deficits and in particular formal thought disorder [8] and hallucinations [9], to a neural level.
- These results converge with the clinically predominant affective nature of positive symptoms.

References: [1] Krings (2013). *Annu. Rev. Clin. Psychol.*, 9, 409-33.
[4] Waters (2012). *Schizophrenia Bulletin.*, 38, 463-92.
[7] Gao (2018). *J Psychiatry Neurosci.*, 43 (2), 131-42.

[2] Lin (2018). *Journal of Clinical Medicine.*, 7 (363), 1-26.

[5] Eickhoff (2012). *NeuroImage.*, 59 (3), 2349-61.

[8] Yildirim (2018). *Arch Neuropsychiatry.*, 55, 118-22.

[3] Freeman (2013). *Schizophrenia Bulletin.*, 39 (6), 1181-87.

[6] http://fcon_1000.projects.nitrc.org/indi/retro/cobre.html

[9] Shea (2006). *Schizophr Res*, 90 (1-3), 114-20.

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