

# Lower medial thalamic nuclei volumes are linked to cognition across the schizophrenia spectrum

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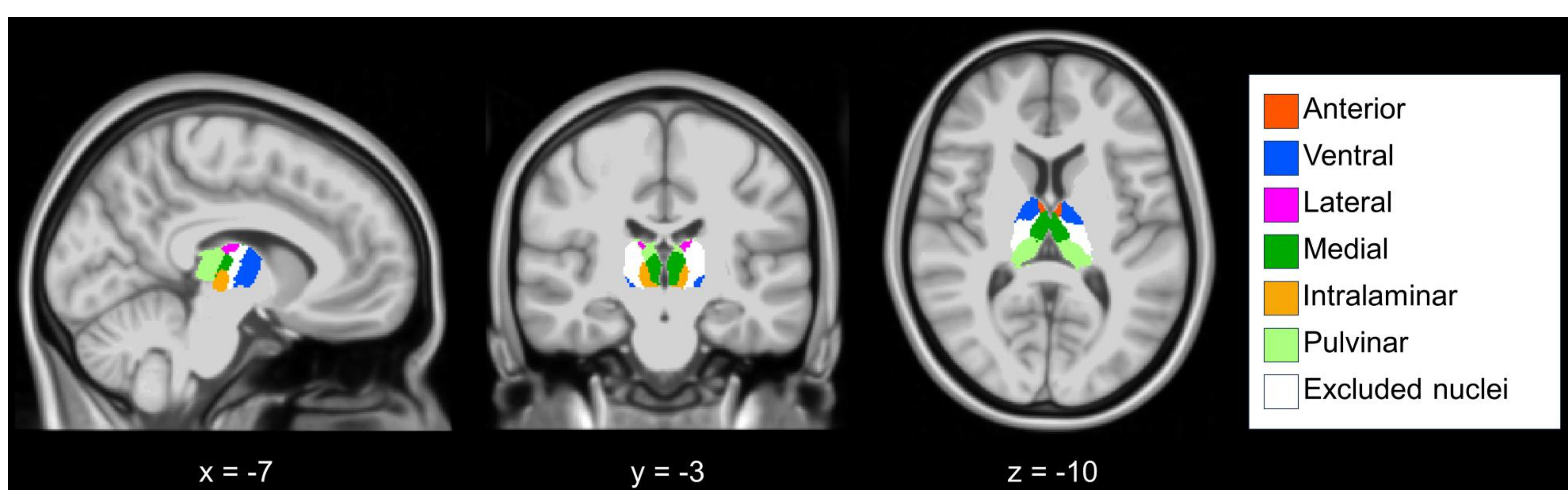
## Introduction

- Reduced thalamic nuclei volumes previously found in patients with schizophrenia but also pre-stages, particularly medial ones [1-4]
- But sparse and controversial results
- No studies on volumetric aberrations of distinct thalamic nuclei in schizophrenia spectrum yet

## Research questions

- Which **thalamic nuclei groups** have significantly **lower volume across the schizophrenia spectrum**?
- Are volume reductions of the medial and lateral nuclei groups related to **cognitive symptomatology**?

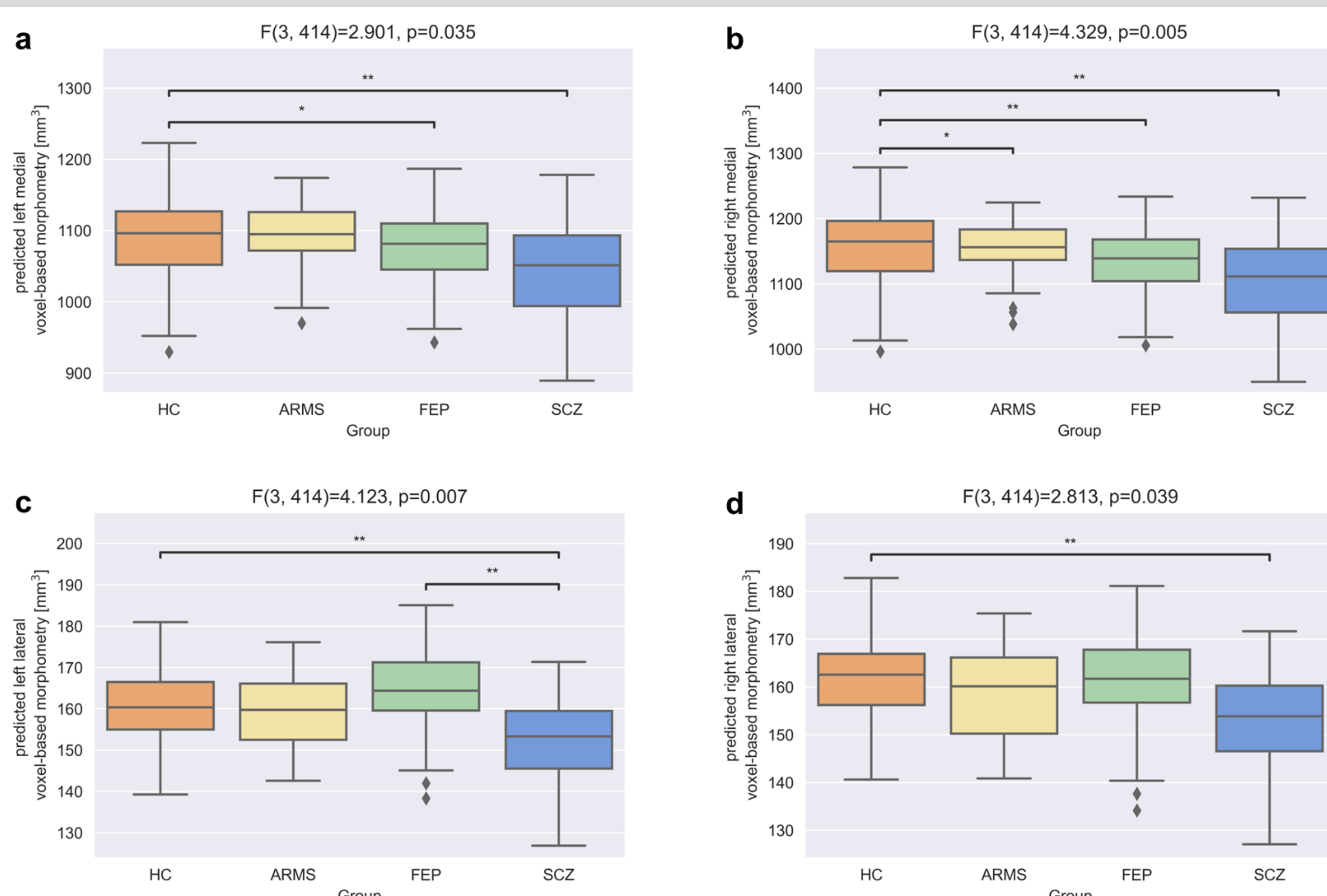
## Methods



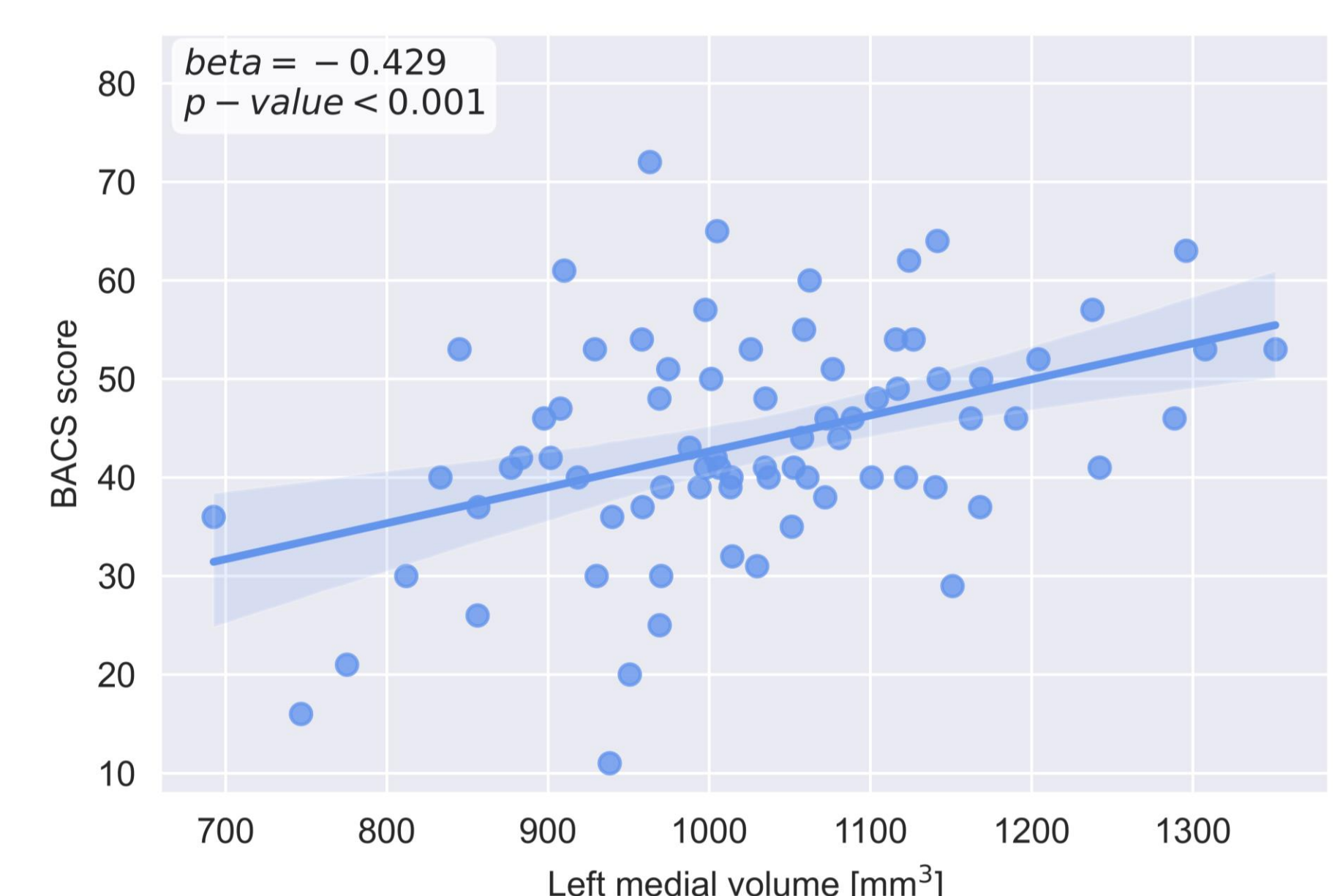
**Figure 1: Thalamic nuclei grouping based on segmentation in FreeSurfer.** Based on literature recommendations, thalamic nuclei were grouped into six nuclei per hemisphere. Excluded nuclei due to previous segmentations or overall poor segmentation quality are summarized and shown in white. Subregions are overlaid on a bias-field corrected T1w image of the MNI152 template as obtained from FSL standards. MNI Montreal Neurological Institute.

- T1w MRI images of 522 subjects representing different stages of the schizophrenia spectrum and healthy controls processed in FreeSurfer (v 7.1.1)
- Built-in ThalamicNuclei pipeline [5] applied to subdivide the thalamus into 26 nuclei per hemisphere
- Intensive quality control after each step
- Final cohort:
  - 137 healthy controls (HC)
  - 66 at-risk mental state (ARMS) subjects
  - 89 patients with a first-episode psychosis (FEP)
  - 126 patients with chronic schizophrenia (SCZ)
- Grouping into six nuclei groups per hemisphere
- Scanner harmonization with NeuroCombat [6]
- Multiple linear regression models for group difference estimation, adjusted for age, sex, and eTIV

## Results



**Figure 2: Medial and lateral subregional volume differences across the schizophrenia spectrum.** Whereas lateral (c, d) nuclei are smaller in chronic schizophrenia patients only, medial (a, b) nuclei exhibit lower volume in pre-stages of the disease as well.



**Figure 3: Significant association between left medial volume and BACS score in chronic schizophrenia.** Unadjusted values are depicted for illustration purposes.

- Patients with SCZ have significantly lower lateral nuclei volumes compared to HC (Fig. 2 c, d)
- Across the whole spectrum, medial nuclei volumes were lower compared to HC (Fig. 2 a, b)
- Medial volume in ARMS and chronic SCZ was related to some dimensions of cognitive symptomatology (Fig. 3)

## References

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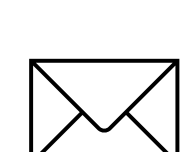
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## Conclusion

- Lower **medial** thalamus nuclei volume **across the schizophrenia spectrum**, linked to cognitive symptoms
- Lower **lateral** thalamus nuclei volume only in patients with **chronic schizophrenia**