



VANDERBILT

Thalamic nuclei volumes in psychotic disorders and youth with psychosis spectrum symptoms

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Background

Several models of psychosis emphasize involvement of thalamic association nuclei, including the mediodorsal and pulvinar nuclei, in the neuropathology, neurodevelopmental basis, and mechanisms of cognitive impairment in psychosis^{1,2}. While reduced whole thalamus volume is consistently found in psychosis^{3,4}, evidence of differential volume reduction in specific nuclei is sparse⁵.

1. Characterize volumes of specific thalamic nuclei in psychosis.
2. Determine if thalamic abnormalities extend to psychosis spectrum (PS) youth and establish whether reduced volumes are specific to PS youth compared to other psychopathologies.
3. Establish cognitive correlates with thalamic nuclei volumes in individuals with a psychotic disorder and PS youth.

Methods

Table 1. Psychosis cohort demographics

	Healthy Individuals (N=179)		Psychosis (N=293)		Statistics		
	Mean	SD	Mean	SD	df	X ² /F	p
Gender (F:M)	73:106		115:178		1	0.109	.741
Ethnicity (W:AA:O)	124:46:9		205:74:14		2	0.030	.985
Age	29.2	10.2	30.1	11.7	470	-0.86	.388
Global Cognition (SCIP z-score)	0.12	0.65	-0.92	0.96	456	12.81	<.001

Abbreviations: F=Female; M=Male; AA: African American; O: Other; W: White; SCIP=Screen for Cognitive Impairment in Psychiatry

Table 2. PNC demographics

	Typically Developing (N=386)		Psychosis Spectrum (N=398)		Other Psychopathology (N=609)		Statistics		
	Mean	SD	Mean	SD	Mean	SD	df	X ² /F	p
Gender (F:M)	189:197		211:187		332:277		1	2.97	.227
Ethnicity (W:AA:O)	213:128:43		121:228:48		293:248:64		2	58.39	<.001
Age	14.1	3.7	15.9	3.1	14.7	3.6	2,1390	26.01	<.001
Global Cognition (CNB z-score)	0.03	0.55	0.001	0.54	0.06	0.55	2,1390	1.36	.258

Abbreviations: F=Female; M=Male; AA: African American; O: Other; W: White; CNB=Computerized Neurocognitive Battery

Analyses:

- Thalamus segmentation done with FreeSurfer 6 thalamus segmentation module⁶ (<http://freesurfer.net/fswiki/ThalamicNuclei>)
- VBM Analysis done with Computational Anatomical Toolbox 12 (CAT12: <http://www.neuro.uni-jena.de/cat/>)



Example of FreeSurfer thalamus Segmentation

Results

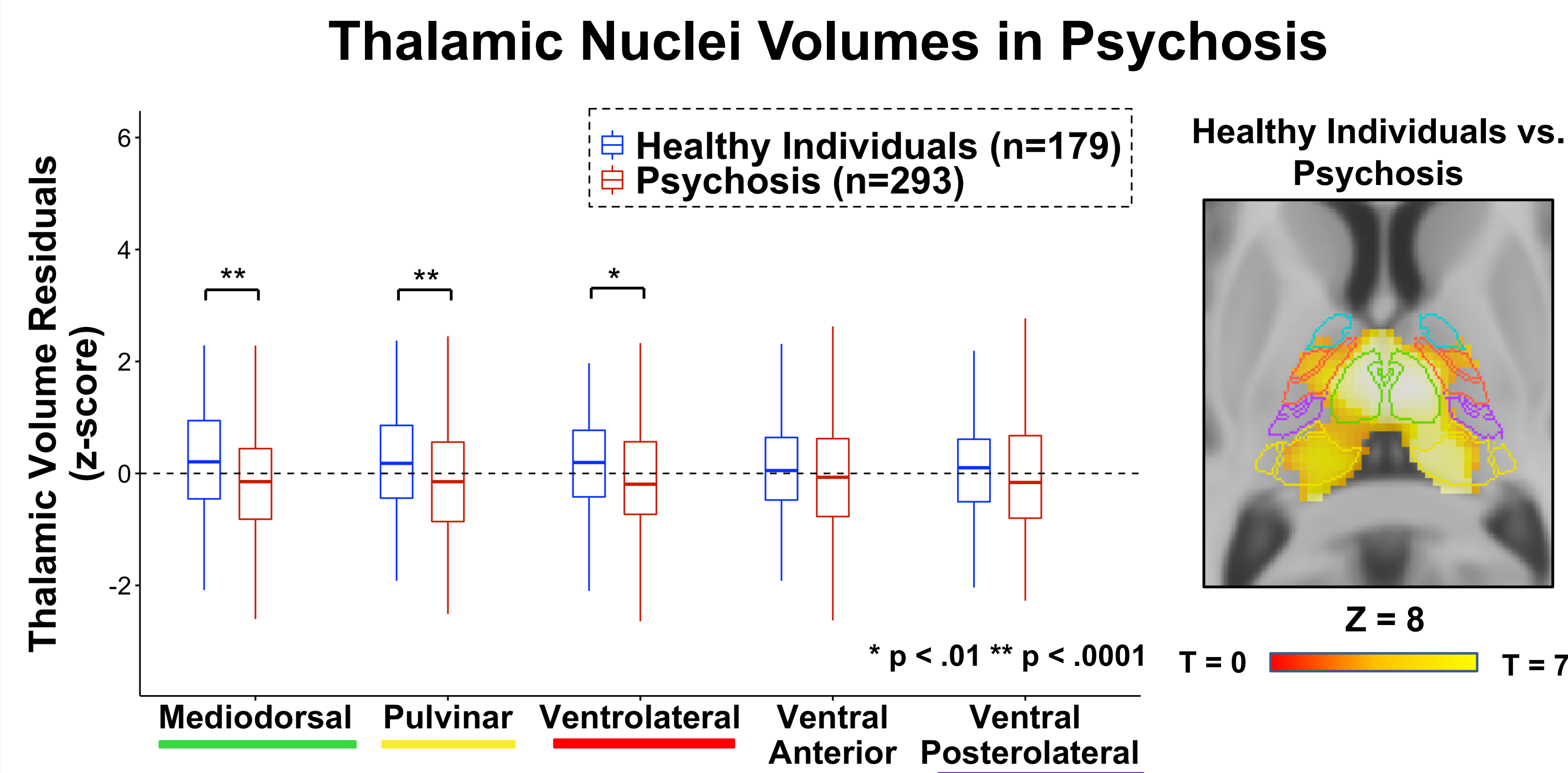


Figure 1. The volumes of mediodorsal, pulvinar and ventrolateral nuclei are reduced in psychosis.

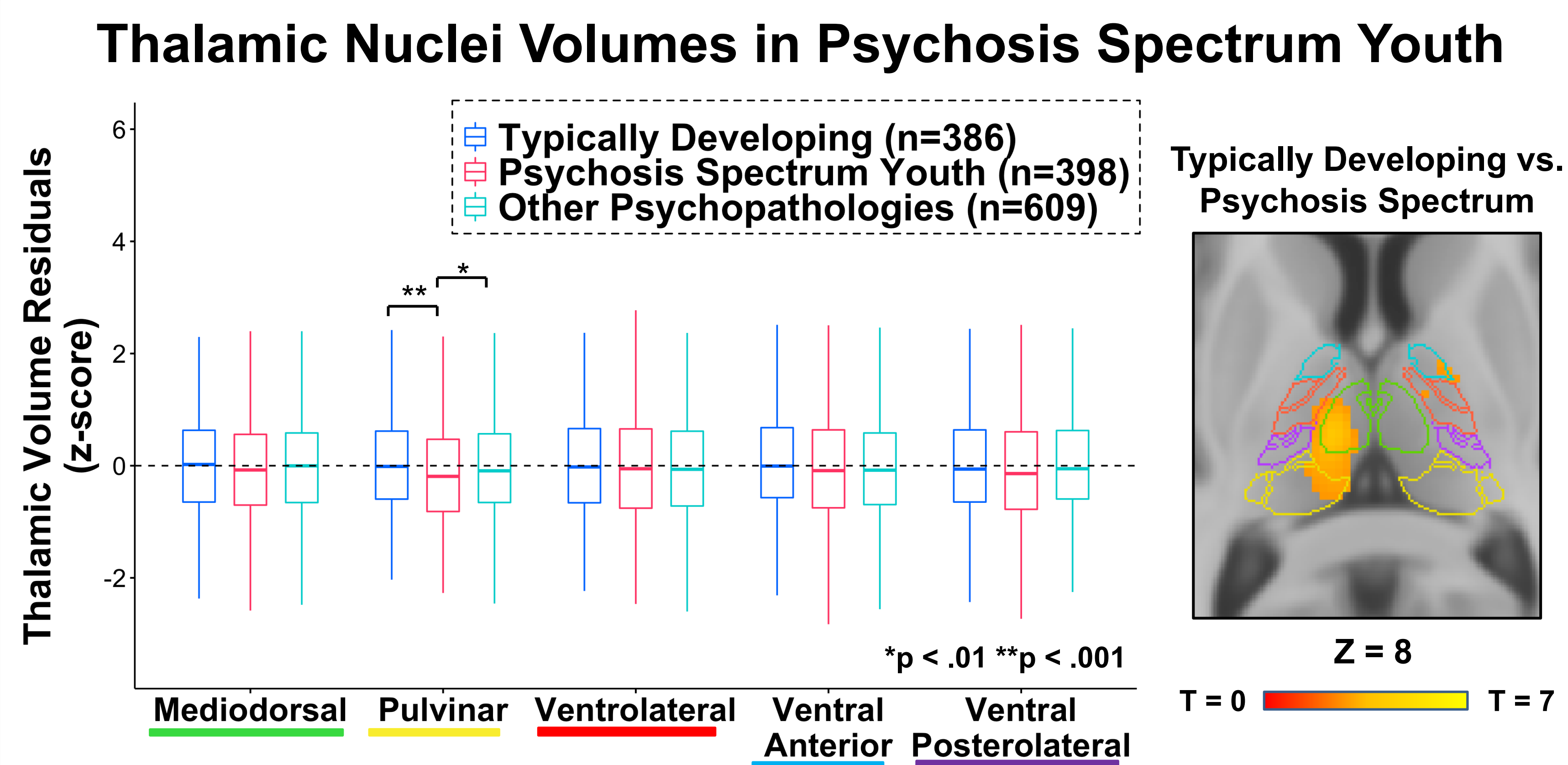


Figure 2. Pulvinar volume is reduced in psychosis spectrum youth, compared to typically developing and youth with other psychopathologies.

Thalamic Nuclei Volumes and Cognition

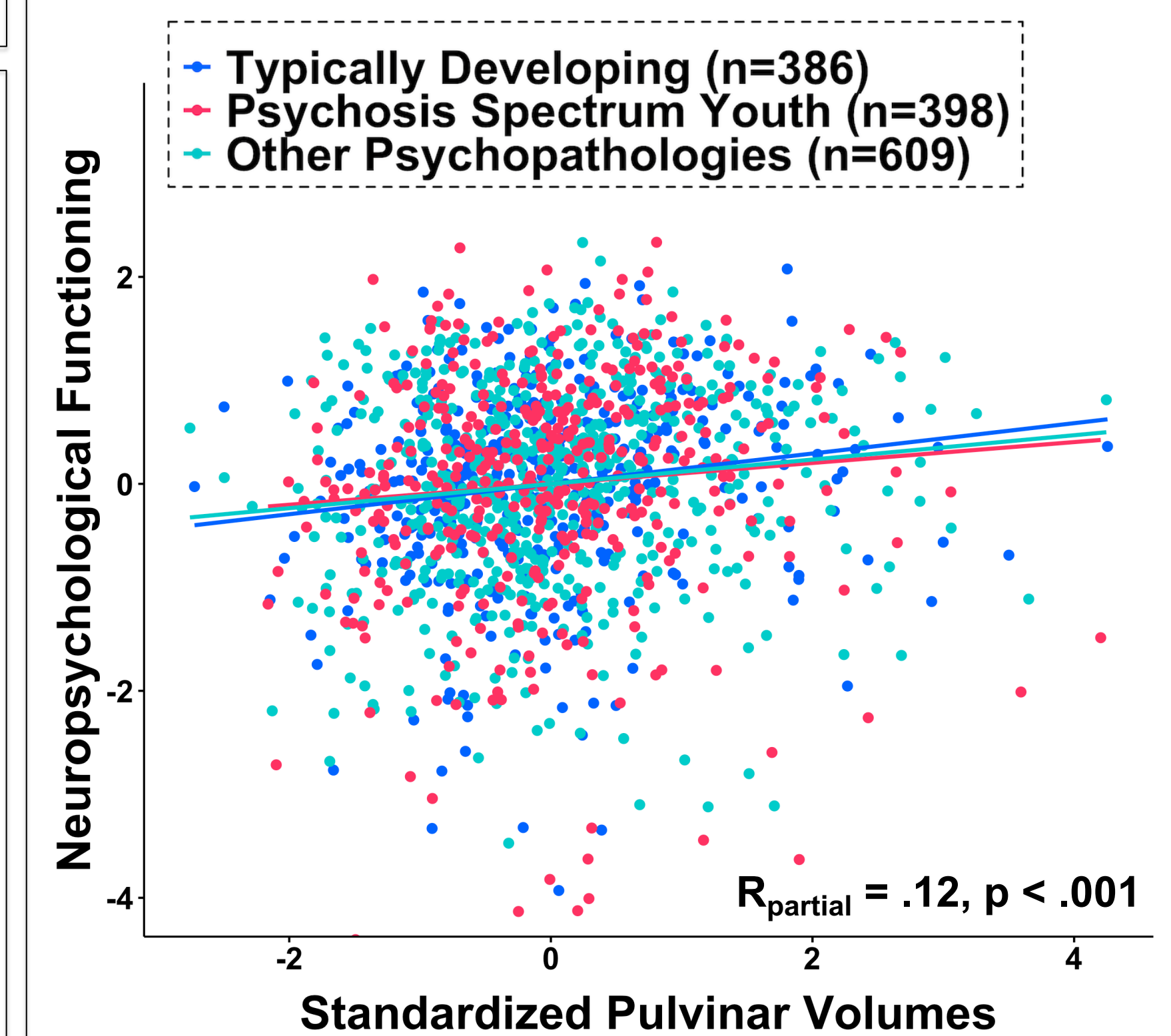
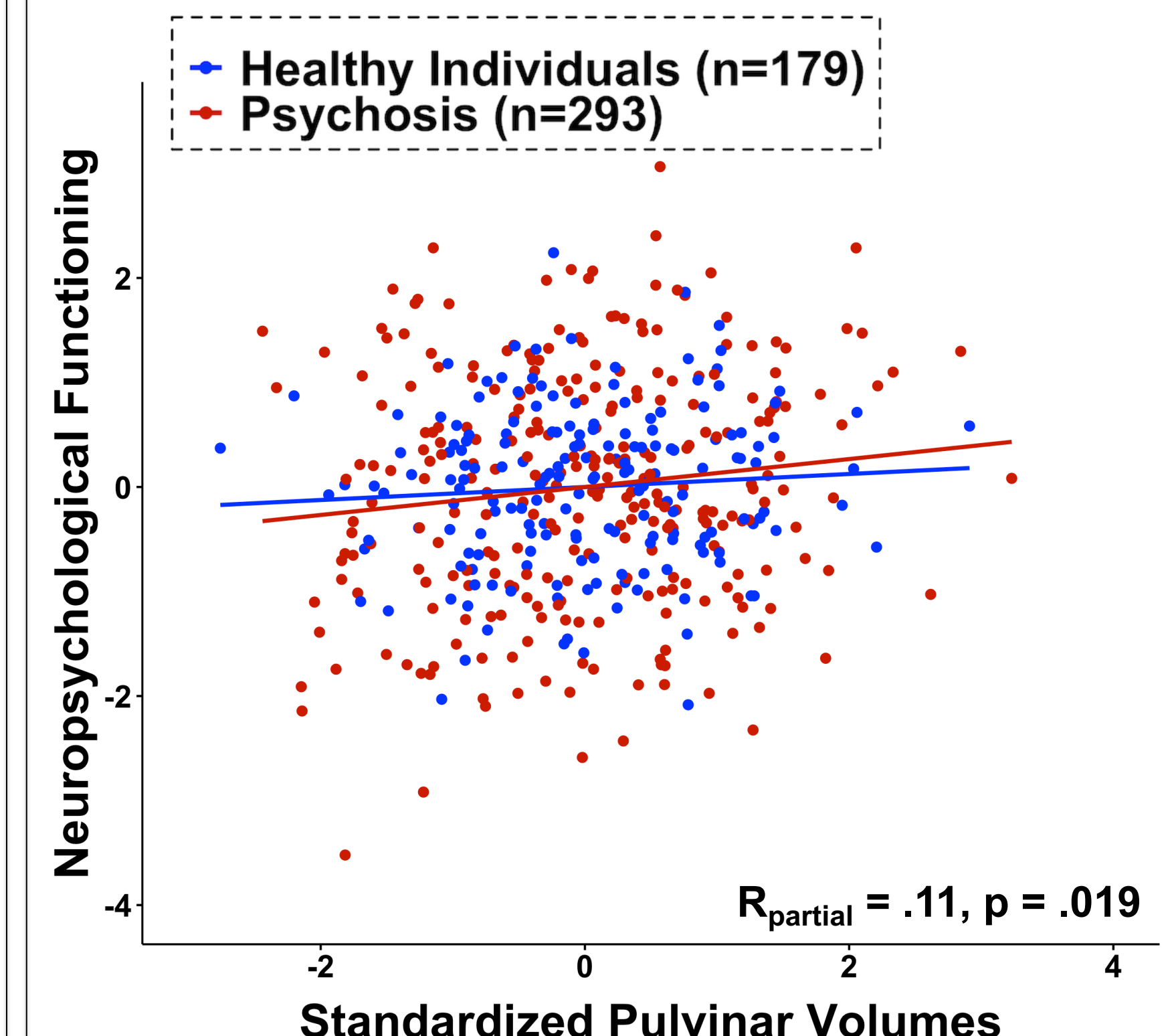


Figure 3. In both the psychosis cohort and PNC, pulvinar volumes showed a positive association with general cognitive function.

Conclusions

- Our results confirmed that mediodorsal nucleus and pulvinar volumes are reduced in psychosis.
- Reduced pulvinar volume extends to psychosis spectrum youth and correlates with cognition.

References

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