

# **Correlation Between Levels of Delusional Beliefs and Perfusion of the Hippocampus and an Associated Network in a Non-Help Seeking Population**

## ***Supplementary Information***

### **SUPPLEMENTARY METHODS**

#### **Scan parameters**

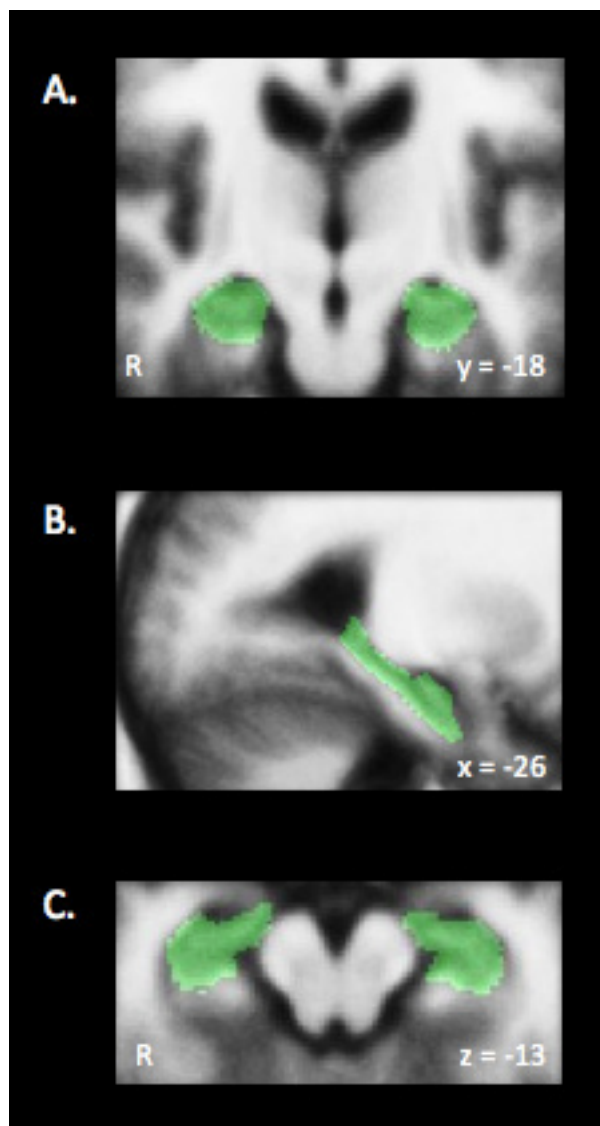
Parameters of the high-resolution three-dimensional structural T1 magnetization prepared rapid acquisition gradient-echo (MPRAGE) scans: 8 min 7 sec; 128 sagittal slices; FOV = 256 mm; repetition time (TR) = 2530 ms; echo time (TE) = 3.39 ms; flip angle = 7 degrees; voxel size: 1.3 x 1.0 x 1.3 mm.

Parameters of the pulsed arterial spin labeling scans: TR = 3000 ms; TE = 13 ms; T11 = 700 ms; T12 = 1700 ms; voxel size = 3.515 x 3.515 x 6.25 mm; number of slices = 16 (5 mm thickness with a 1.25 mm gap); FOV = 22.5 cm; matrix = 64 x 64; flip angle = 90 degrees.

#### **The voxel-wise regression analysis**

To confirm and further localize effects observed in the primary ROI analysis, we used FreeSurfer to perform a voxel-wise regression analysis, using the PDI total score as a regressor. First, the native-space first-level PASL maps were registered to MNI305 space. Then, we ran the regression across subjects at each voxel. To facilitate comparison to prior work, we converted the data from MNI to Talairach space. An uncorrected p-value of .01 (small volume-corrected) was used as the significance threshold for clusters within the hippocampus (as defined by the hippocampal segmentation of an average brain).

## SUPPLEMENTARY FIGURE

**Figure S1. Illustration of FreeSurfer segmentation of the hippocampus.**

Representative right and left hippocampal ROIs generated by the FreeSurfer automated segmentation of the hippocampus (in this case, the right and left hippocampus of an average brain) are displayed using the FreeSurfer tool tkmedit (<http://surfer.nmr.mgh.harvard.edu/>). Shown in panels A, B, and C, respectively, is a coronal ( $y = -18$ ), sagittal ( $x = -26$ ), and axial ( $z = -13$ ) view.

**SUPPLEMENTARY TABLES****Table S1. Summary of the symptoms and other characteristics of the sample (n = 77).**

<b>Scale</b>	<b>Mean</b>	<b>SD</b>
PDI Total Score	2.33	2.90
PDI Distress Subscale Score	3.82	5.16
PDI Conviction Subscale Score	6.47	8.47
PDI Preoccupation Subscale Score	4.45	6.05
BDI	1.35	1.99
STAI-S	26.77	5.27
STAI-T	28.57	6.88
Average IQ	108.63	7.83

Means and standard deviations (SD) for the scores of the following scales, the Peters et al. Delusions Inventory (PDI) (1), Beck Depression Inventory (BDI) (2), Spielberger State and Trait Anxiety Inventory (STAI-S/T) (3), are listed, as well as average IQ (measured by the North American Adult Reading Test, NAART, (4)). None of the participants had ever been treated with a psychotropic medication. For 48 (62%) of the participants, presence or absence of a family history of psychosis was assessed; none of these 48 participants had a family member with a psychotic illness.

**Table S2. Correlations between PDI total score and normalized subscale scores (n = 77).**

	PDI Total Score	PDI Distress Subscale Score	PDI Conviction Subscale Score	PDI Preoccupation Subscale Score
PDI Total Score	1	r = .770 p = 2.66 x 10 <sup>-16</sup>	r = .693 p = 2.93 x 10 <sup>-12</sup>	r = .817 p = 1.24 x 10 <sup>-19</sup>
PDI Distress Subscale Score	r = .770 p = 2.66 x 10 <sup>-16</sup>	1	r = .749 p = 5.04 x 10 <sup>-15</sup>	r = .825 p = 2.86 x 10 <sup>-20</sup>
PDI Conviction Subscale Score	r = .693 p = 2.93 x 10 <sup>-12</sup>	r = .749 p = 5.04 x 10 <sup>-15</sup>	1	
PDI Preoccupation Subscale Score	r = .817 p = 1.24 x 10 <sup>-19</sup>	r = .825 p = 2.86 x 10 <sup>-20</sup>	r = .856 p = 3.58 x 10 <sup>-23</sup>	1

Spearman's rho and p-values for correlations between PDI total scores and normalized PDI subscales scores are listed.

**Table S3. Results of the secondary regions-of-interest (ROI) analysis (with findings for the right and left hemisphere listed separately).**

	Left Hemisphere		Right Hemisphere	
	Correlation coefficient	P-value	Correlation coefficient	P-value
<b>1) Psychosis-linked circuitry</b>				
<i>Medial prefrontal/ cingulate cortices:</i>				
- Medial orbitofrontal cortex	0.02	0.90	-0.07	0.56
- Rostral anterior cingulate cortex	0.11	0.38	0.05	0.66
- Caudal anterior cingulate cortex	<b>0.25</b>	<b>0.03</b>	<b>0.25</b>	<b>0.03</b>
- Posterior cingulate cortex	<b>0.27</b>	<b>0.02</b>	<b>0.34</b>	<b>0.00</b>
<i>Thalamus</i>	<b>0.23</b>	<b>0.05</b>	<b>0.25</b>	<b>0.03</b>
<i>Striatum:</i>				
- Caudate nucleus	0.16	0.19	0.19	0.10
- Putamen	0.13	0.27	0.18	0.12
- Nucleus accumbens	-0.02	0.84	-0.12	0.30
<b>2) Temporal lobe regions</b>				
<i>Amygdala</i>	0.07	0.56	0.12	0.33
<i>Parahippocampal cortex</i>	0.20	0.09	<b>0.25</b>	<b>0.03</b>
<i>Lateral temporal cortex:</i>				
- Inferior temporal cortex	0.06	0.60	0.13	0.27
- Middle temporal cortex	0.17	0.17	<b>0.33</b>	<b>0.01</b>
- Superior temporal cortex	<b>0.25</b>	<b>0.03</b>	<b>0.24</b>	<b>0.04</b>
<b>3) Control regions</b>				
<i>Fusiform cortex</i>	-0.03	0.80	0.04	0.72
<i>Lateral occipital cortex</i>	-0.16	0.19	-0.03	0.80

Spearman's rho and p-values for correlations between perfusion of selected regions-of-interest (ROIs), with the values for the left and right hemispheres listed separately, and total PDI score are listed. Ps < .05 (and the accompanying rho values) are indicated by bold type.

The potentially confounding effects of age, regional volume, symptoms of depression, anxiety levels, and image SNR were controlled for by using these factors as covariates in the analyses.

**SUPPLEMENTARY REFERENCES**

1. Peters E, Joseph S, Day S, Garety P (2004): Measuring Delusional Ideation: The 21-Item Peters et al. Delusions Inventory (PDI). *Schizophr Bull.* 30: 1005–1022.
2. Beck, A.T., Steer, R.A., 1993. Manual for the Beck Depression Inventory. San Antonio, TX: The Psychological Corporation.
3. Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). Manual for the State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists Press.
4. Blair JR, Spreen O (1989): Predicting premorbid IQ: A revision of the national adult reading test. *Clin Neuropsychol.* 3: 129–136.