

## **SUPPLEMENTARY INFORMATION**

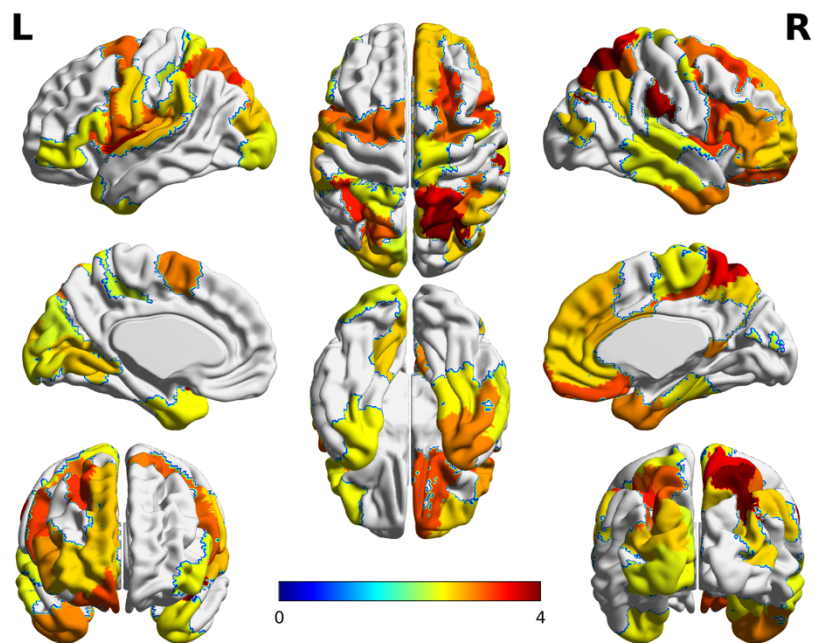
# **Dynamic Functional Hyperconnectivity After Psilocybin Intake Is Primarily Associated With Oceanic Boundlessness**

*Mortaheb et al.*

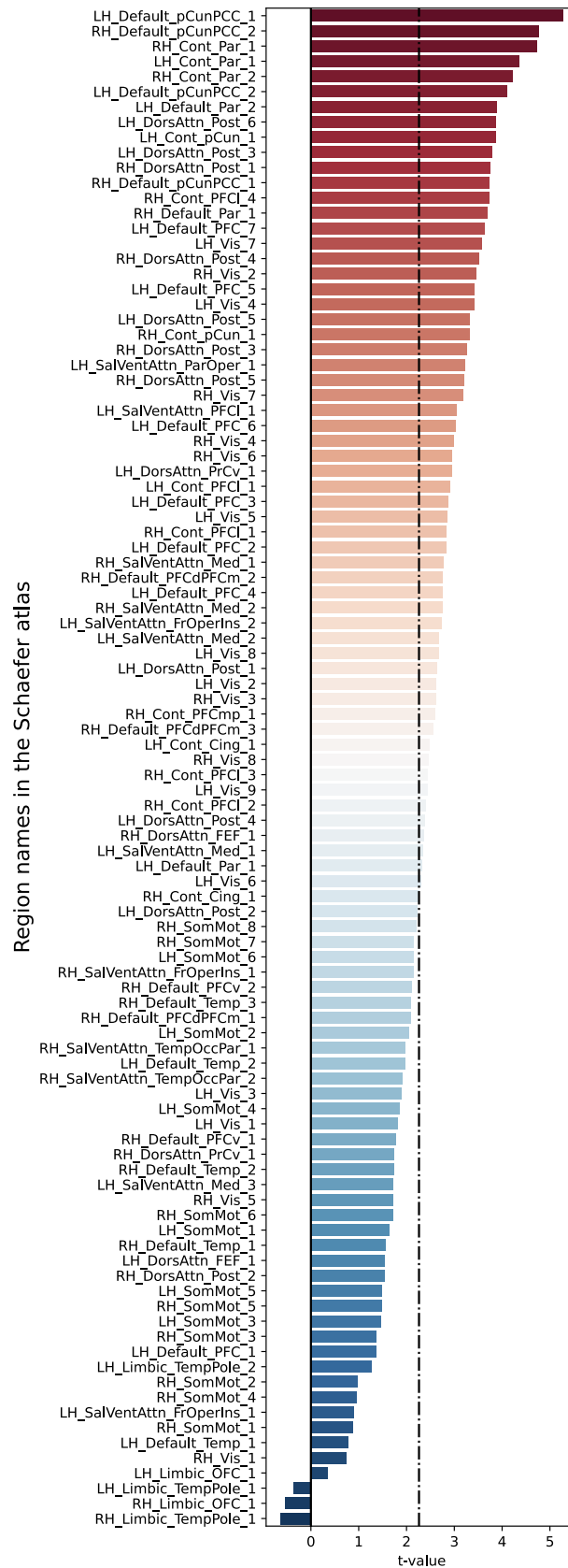
**Table S1.** Shapiro-Wilk test results showed that the normality assumption is rejected for all the phenomenological variables. (OBE: oceanic boundlessness, VRS: visual restructuralization, DED: dread of ego dissolution, AUA: auditory alterations, VIR: vigilance reduction).

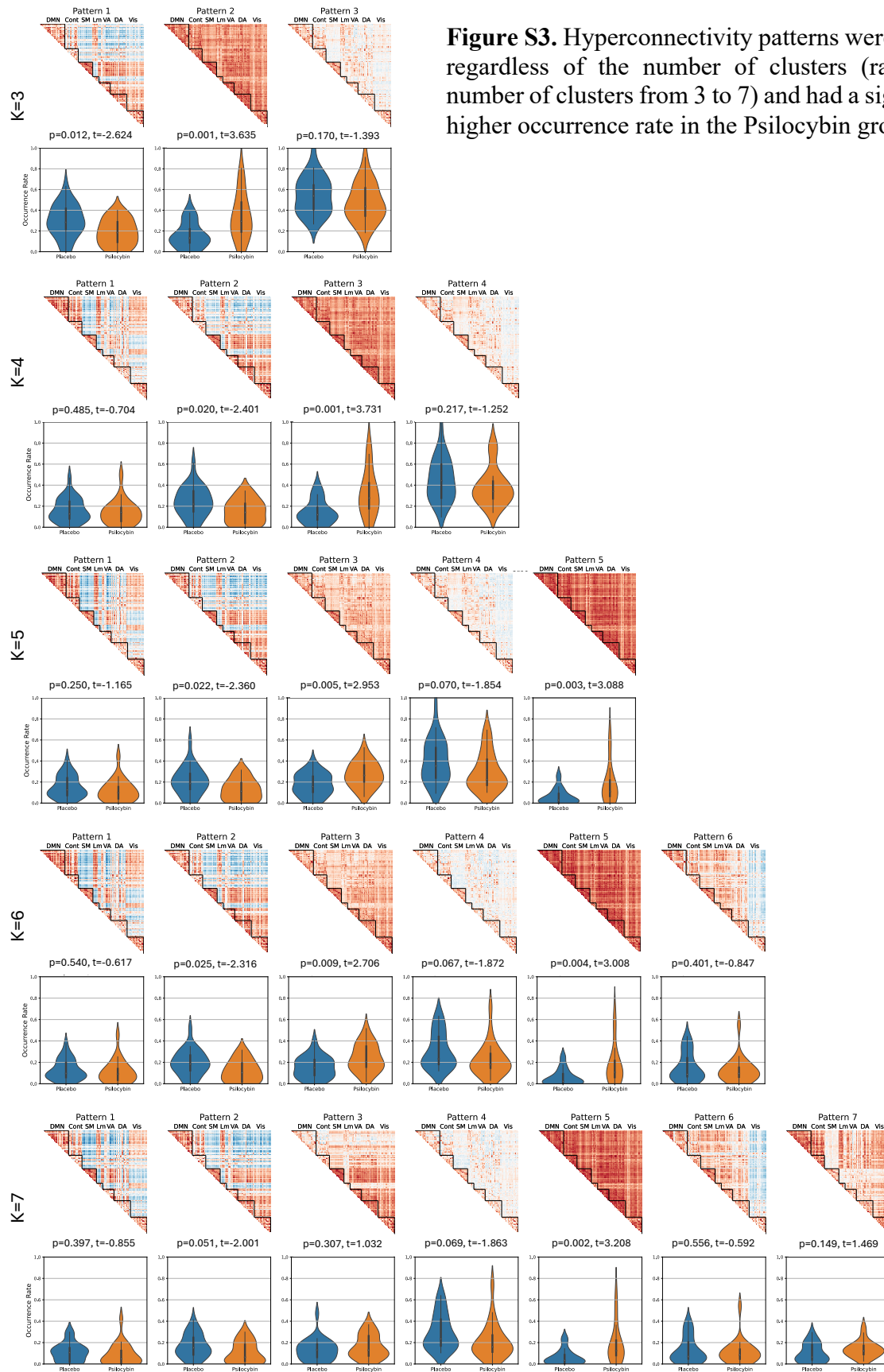
|               | <b>Variable</b>                       | <b>Statistic (W)</b> | <b>P-Value</b> |
|---------------|---------------------------------------|----------------------|----------------|
| <b>5D-ASC</b> | <b>OBE</b>                            | 0.762                | 1.58e-7        |
|               | <b>VRS</b>                            | 0.826                | 4.48e-6        |
|               | <b>DED</b>                            | 0.712                | 1.74e-8        |
|               | <b>AUA</b>                            | 0.637                | 9.44e-10       |
|               | <b>VIR</b>                            | 0.896                | 0.0004         |
| <b>11-ASC</b> | <b>Experience of Unity</b>            | 0.659                | 2.06e-9        |
|               | <b>Spiritual Experience</b>           | 0.647                | 1.31e-9        |
|               | <b>Blissful State</b>                 | 0.750                | 9.07e-8        |
|               | <b>Insightfulness</b>                 | 0.741                | 6.03e-8        |
|               | <b>Disembodiment</b>                  | 0.534                | 3.00e-11       |
|               | <b>Complex Imagery</b>                | 0.794                | 7.80e-7        |
|               | <b>Elementary Imagery</b>             | 0.814                | 2.23e-6        |
|               | <b>Audio-Visual Synesthesia</b>       | 0.743                | 6.58e-8        |
|               | <b>Changed Meaning of Percepts</b>    | 0.728                | 3.39e-8        |
|               | <b>Impaired Control and Cognition</b> | 0.730                | 3.67e-8        |
|               | <b>Anxiety</b>                        | 0.606                | 3.09e-10       |

**Figure S1.** Average connectivity per region significantly increased in transmodal regions after psilocybin administration. The colors show indicate t-values of independent t-tests performed to compare average connectivity at each region (Psilocybin – Placebo). The results were FDR-corrected for multiple comparisons.



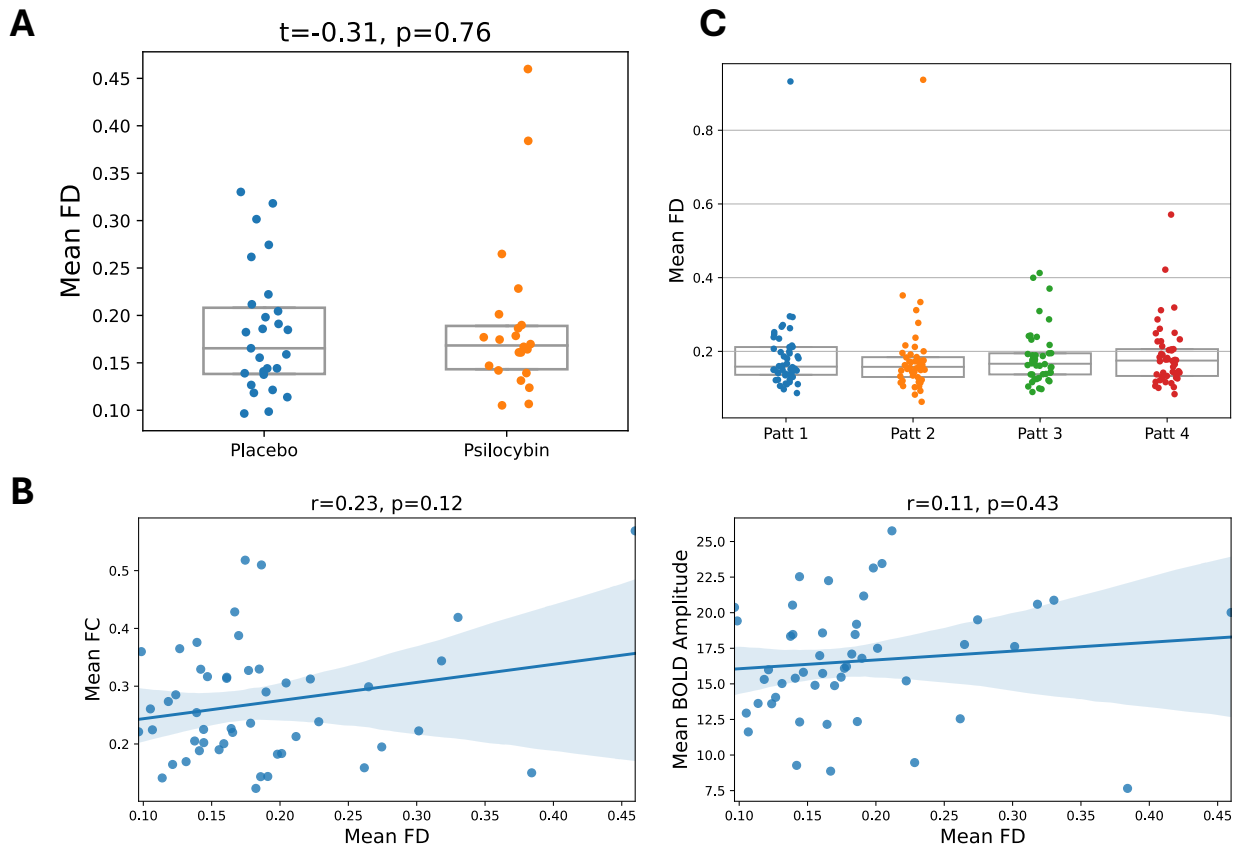
**Figure S2.** Results of the independent t-test between regional Euclidean norm of the BOLD time series of *Psychedelic* and *Placebo* groups. Statistics (t-value) show the differences between the two groups (Placebo - Psilocybin) after FDR correction across the number of regions. The dashed line shows the significance threshold after FDR correction. T-values higher than the threshold are related to significant difference.





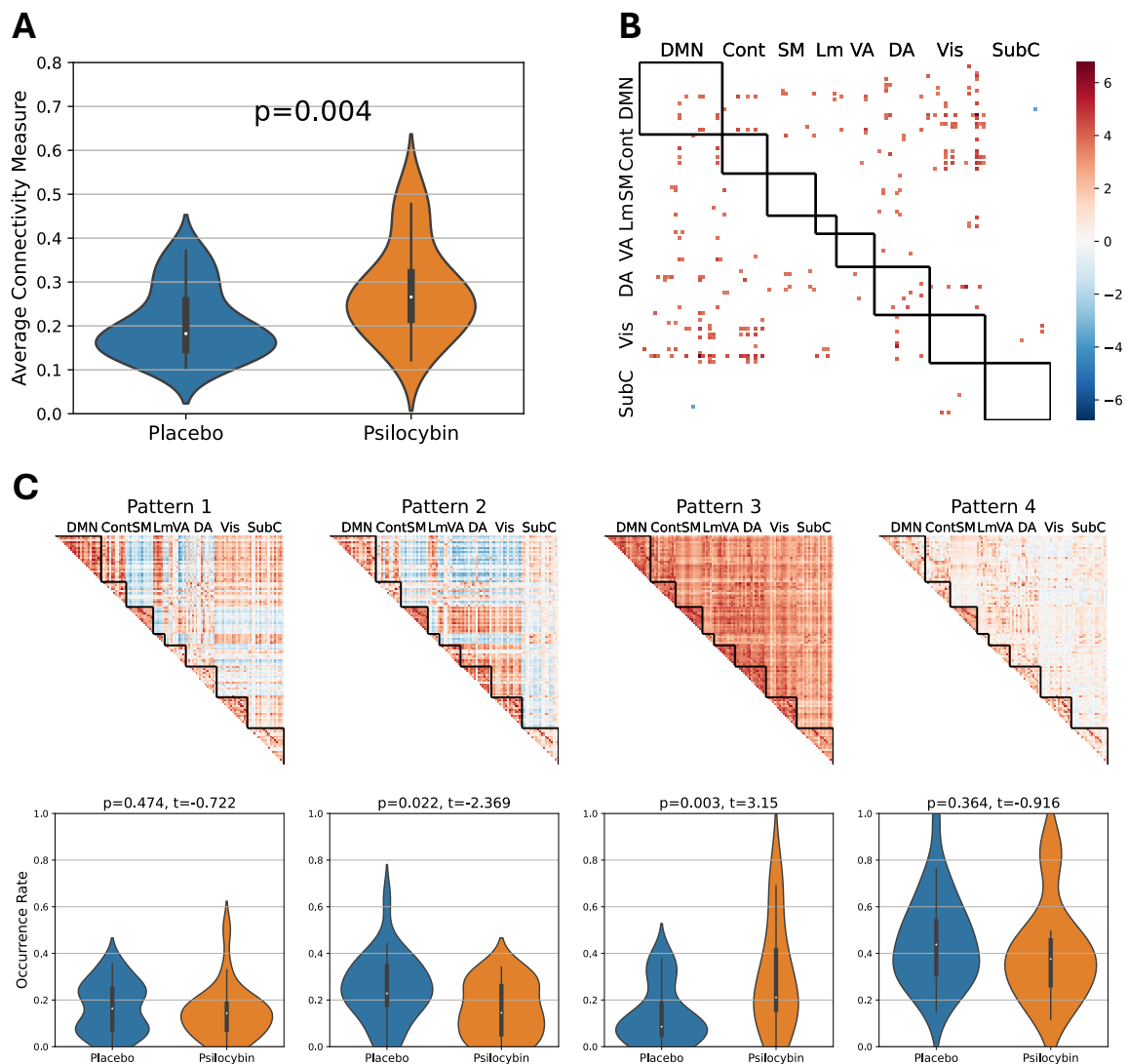
**Figure S3.** Hyperconnectivity patterns were observed regardless of the number of clusters (ranging the number of clusters from 3 to 7) and had a significantly higher occurrence rate in the Psilocybin group.

**Figure S4.** The functional connectivity and BOLD amplitude results were not associated with the mean framewise displacement. **A)** Mean framewise displacement was not significantly different between the Placebo and Psilocybin groups. **B)** Mean framewise displacement was not correlated with either mean functional connectivity or mean BOLD signal amplitude. **C)** There were no significant differences between framewise displacement values corresponding to each connectivity pattern.



**Figure S5.** Functional connectivity changes in cortical and sub-cortical regions are observed after psilocybin administration. **A)** Average whole-brain functional connectivity increased significantly in the psilocybin group. **B)** Higher inter-regional connectivity values were observed in the psilocybin group. The matrix represents t-value of comparisons between the connectivity matrices of the psilocybin group and those of the placebo group (contrast: psilocybin minus placebo). Only significant t-values are colored. **C)** The time-varying functional connectome reconfigured in four connectivity patterns, ranging from complex inter-areal interactions (Pattern 1) to a low inter-areal connectivity profile (Pattern 4). After psilocybin administration, there was a significant increase in the occurrence rate of the global cortex-wide positive connectivity (Pattern 3).

*Notes:* DMN: Default Mode Network, Cont: Executive Control Network, SM: Somatomotor Network, Lm: Limbic Network, VA: Ventral Attentional Network, DA: Dorsal Attentional Network, Vis: Visual Network, SubC: Sub-cortical regions.



**Figure S6.** After global signal regression (GSR), no significant functional connectivity changes were observed after psilocybin administration. **A)** Average whole-brain functional connectivity was comparable between the Psilocybin and the Placebo group. **B)** No significant changes in the inter-regional connectivity values could be observed in the Psilocybin group. The matrix represents the t-value of comparisons between the connectivity matrices of the psilocybin group and those of the placebo group (contrast: psilocybin minus placebo). **C)** The time-varying functional connectome reconfigured in four connectivity patterns, ranging from complex inter-areal interactions (Pattern 1) to a low inter-areal connectivity profile (Pattern 4). No hyperconnectivity pattern could be observed after GSR.

*Notes:* DMN: Default Mode Network, Cont: Executive Control Network, SM: Somatomotor Network, Lm: Limbic Network, VA: Ventral Attentional Network, DA: Dorsal Attentional Network, Vis: Visual Network, SubC: Sub-cortical regions.

