

Autobiographical memory loss and increased hippocampal volume after electroconvulsive therapy



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CONCLUSION

Autobiographical memory (AM) consistency declines significantly more after electroconvulsive therapy (ECT) compared to both healthy (HC) and depression controls. The difference remains stable after six months.

Hippocampal volume increases significantly after ECT.

There is no association between AM loss and hippocampal volume increase after ECT.

BACKGROUND

ECT is associated with long-term AM loss – the most recent episodic memories being the most vulnerable to loss¹.

Parallel to this, the hippocampus increases in volume after ECT², but the association between these two processes is virtually unexplored.

We aimed to shed light on the possible association between these two phenomena, hypothesizing that patients with larger hippocampal volume increases had more AM loss.

METHODS

Autobiographical memory interview¹



Structural MRI scan²

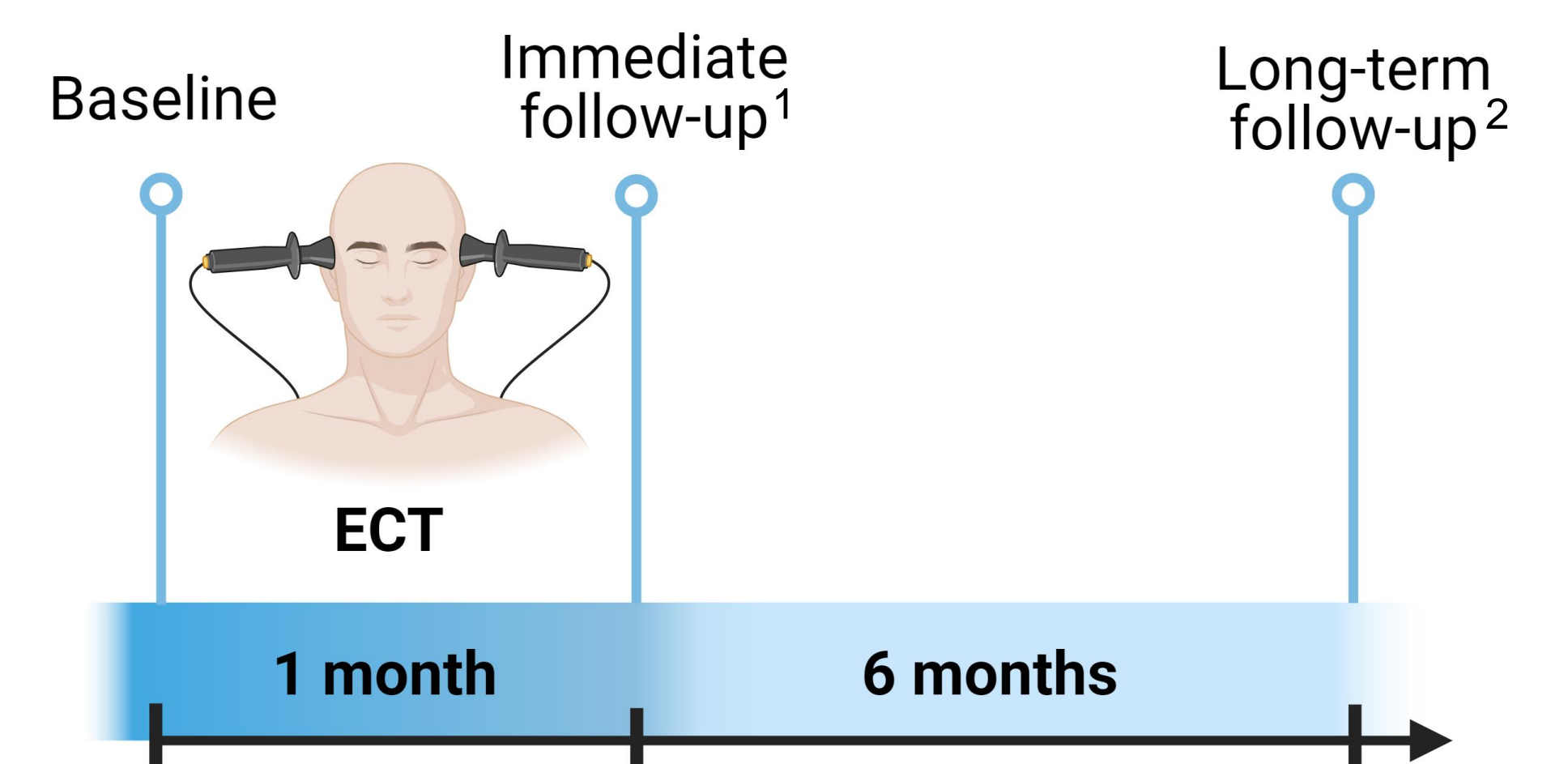
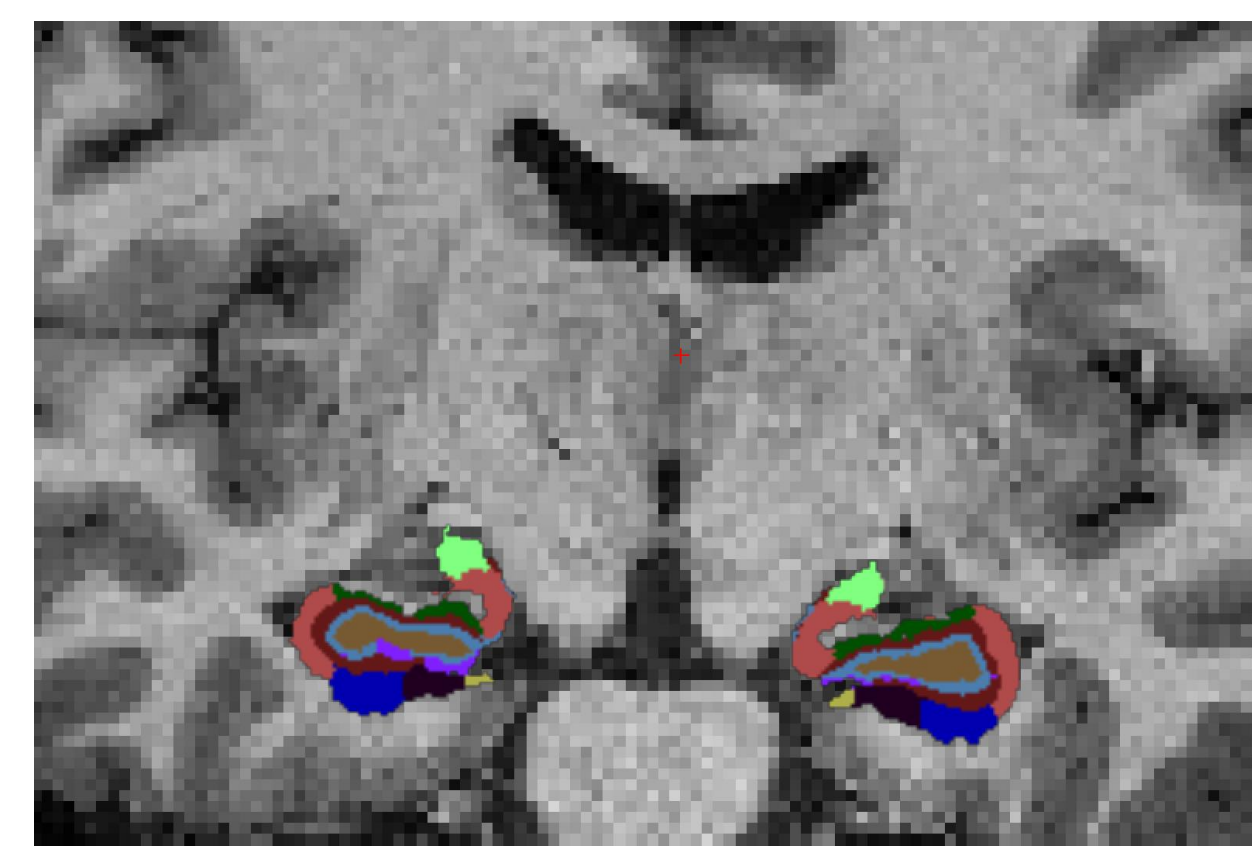
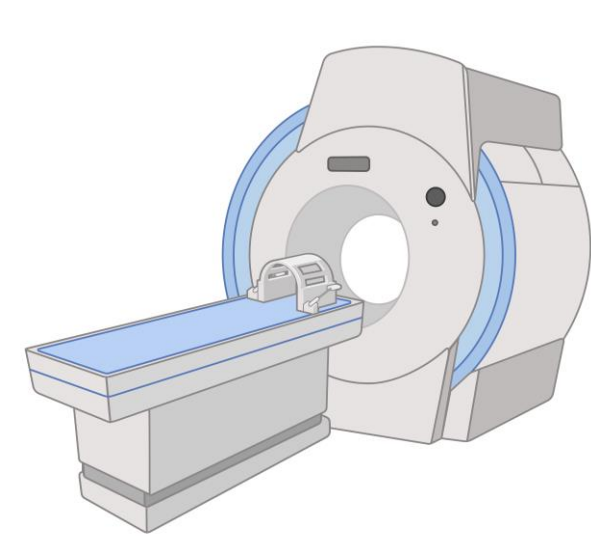


Figure 1. Overview of examination program.

¹ Columbia Autobiographical Memory Interview – Short Form.

² 3 Tesla. T1- and T2-weighted sequences. Only the ECT group was scanned.

Figure 2. ROI bilateral hippocampi Segmentation and volumetric analyses completed using FreeSurfer.

Figure 3. Timeline of examinations.

¹ ECT group: 5 +/- 2 days after completion of ECT.

Control groups: 30 days after baseline.

² 6 +/- 2 months after immediate follow-up.

RESULTS

Autobiographical memory consistency

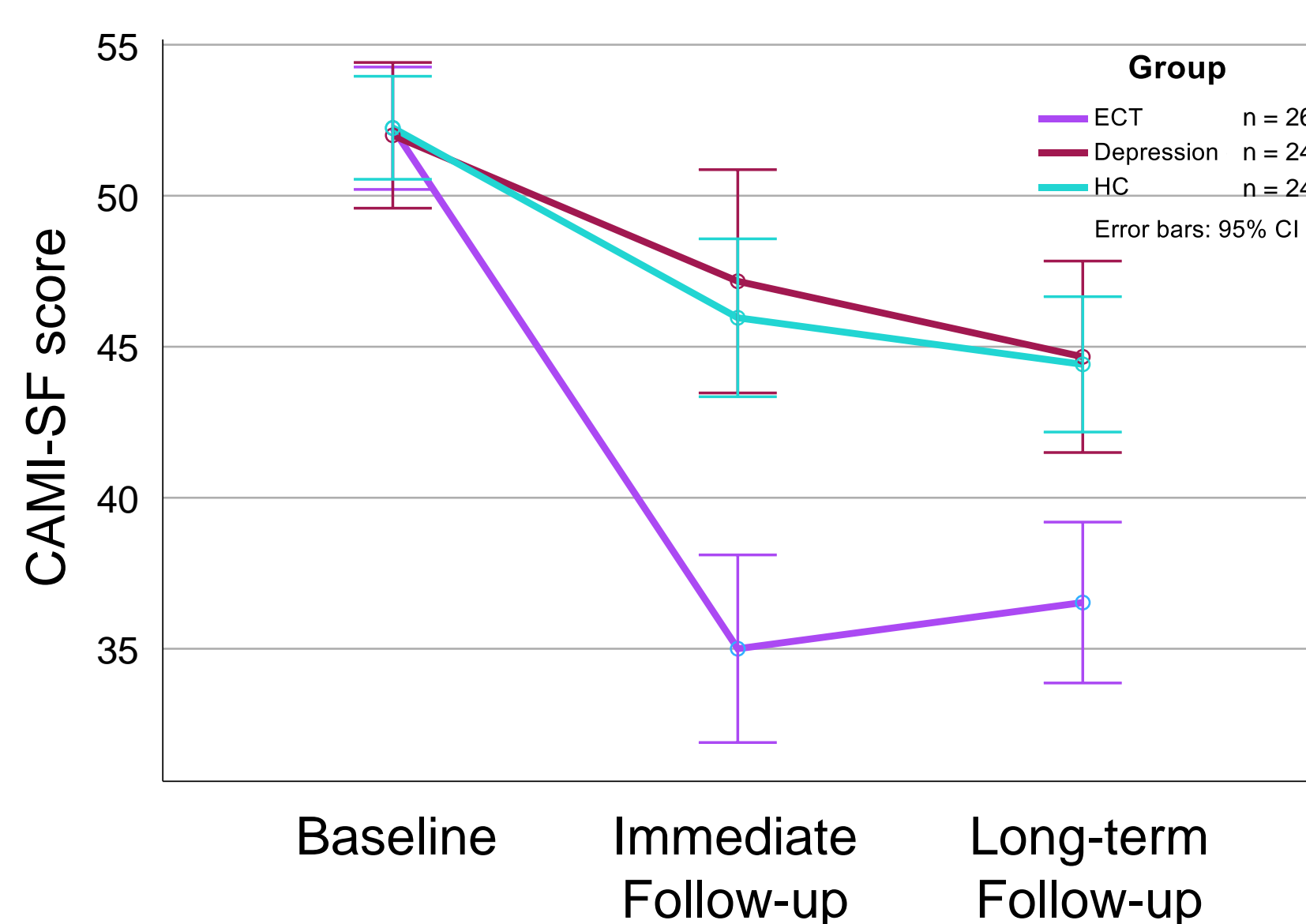


Figure 4. Autobiographical memory consistency

The ECT group showed significantly larger decreases in AM consistency at immediate follow-up, and also a significant difference at long-term follow-up. No difference between groups at baseline and control groups did not differ at any time point.

Hippocampal volume change after ECT

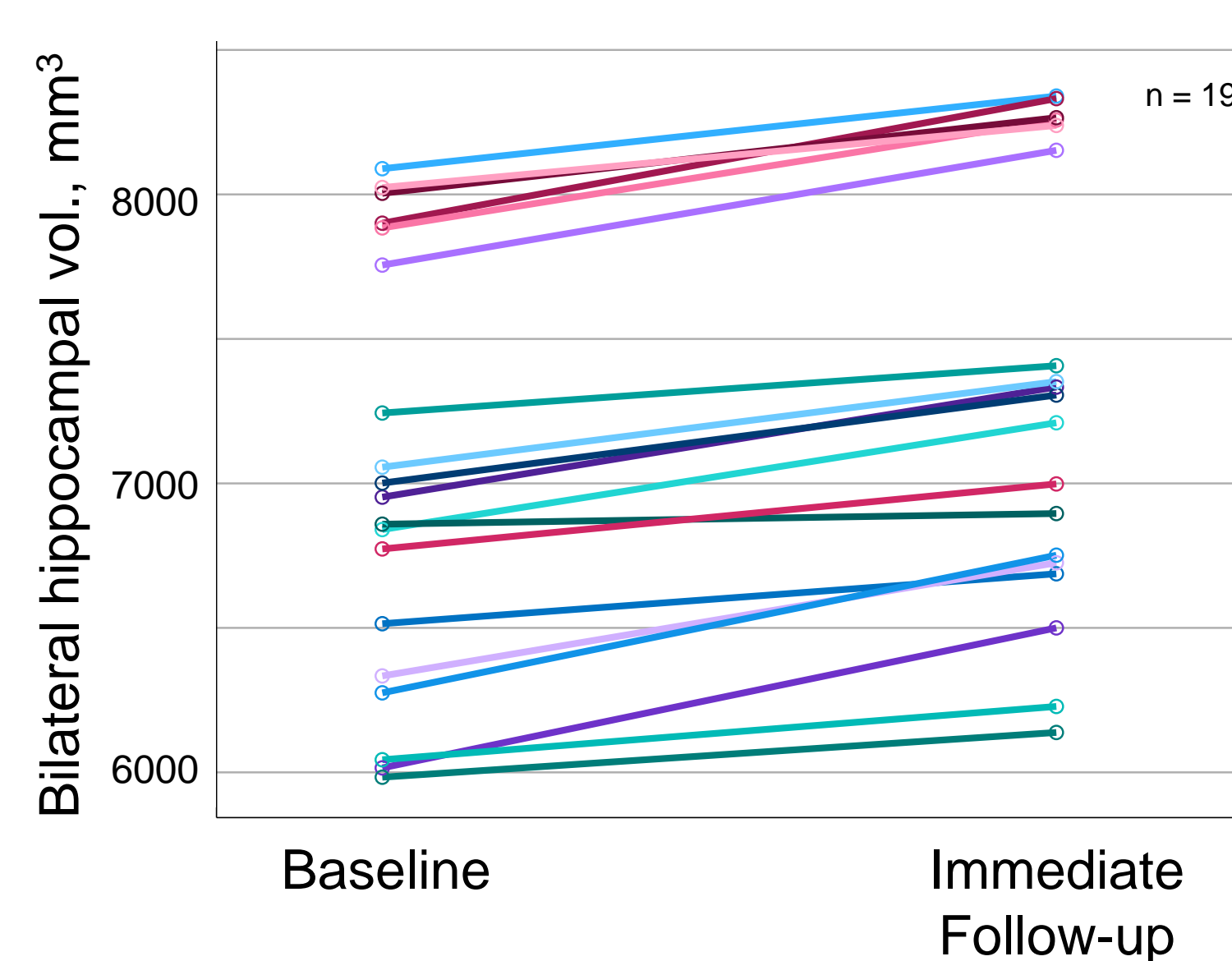


Figure 5. Hippocampal volume change after ECT

The ECT group showed a significant ($p < .001$) bilateral hippocampal volume increase at immediate follow-up. The mean volume increase was 4.2 % (SD = 1.9 %).

Hippocampal volume change and AM loss after ECT

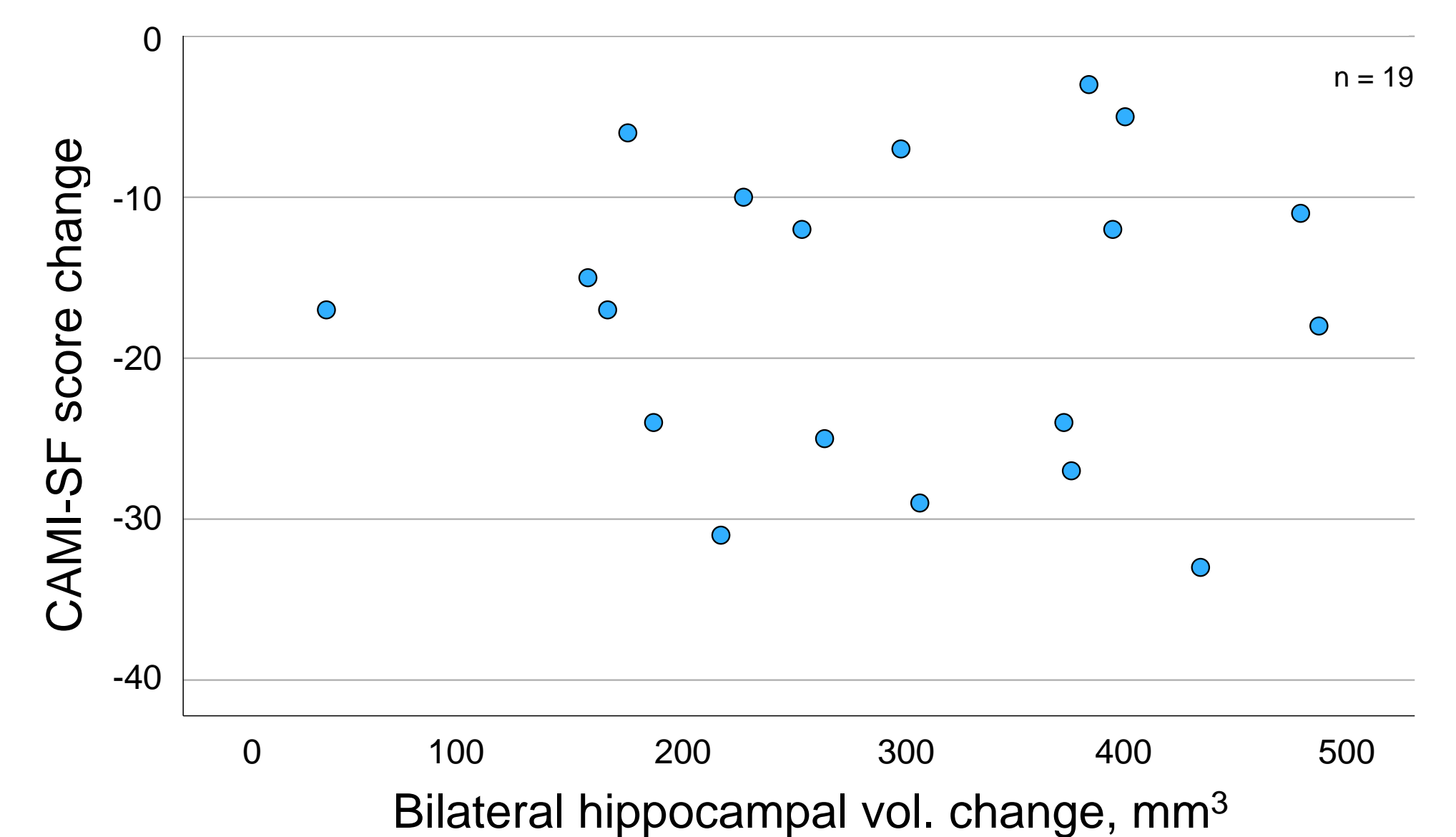


Figure 6. Hippocampal volume change and AM loss after ECT

There was no association between bilateral hippocampal volume increase and AM loss after ECT at immediate follow-up: $r(17) = .002$, $p = .992$.

FUTURE STUDIES

To explore the neural mechanisms of ECT-related AM loss using structural MRI, future studies should explore volumetric changes in other ROI's relevant to retrieval of episodic memories.

Furthermore, we encourage including DTI sequences to study potential associations between changes in structural connectivity of temporal and frontal lobes and AM loss.

REFERENCES

¹ Fraser, L. M., O'Carroll, R. E., & Ebmeier, K. P. (2008). The Effect of Electroconvulsive Therapy on Autobiographical Memory: A Systematic Review. *The Journal of ECT*, 24(1), 10–17.

² Gbyl, K., & Videbech, P. (2018). Electroconvulsive therapy increases brain volume in major depression: a systematic review and meta-analysis. *Acta Psychiatrica Scandinavica*, 138(3), 180–195.