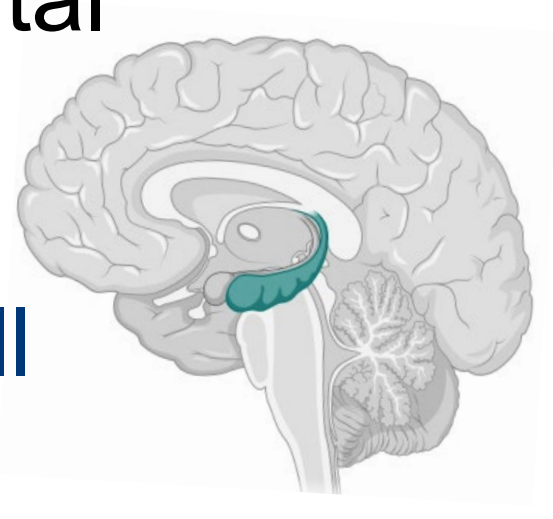


Investigating the Impact of Digital Memory Augmentation on Accelerated Long-Term Forgetting of Autobiographical Memory and Psychological Well-Being in Patients with Transient Epileptic Amnesia

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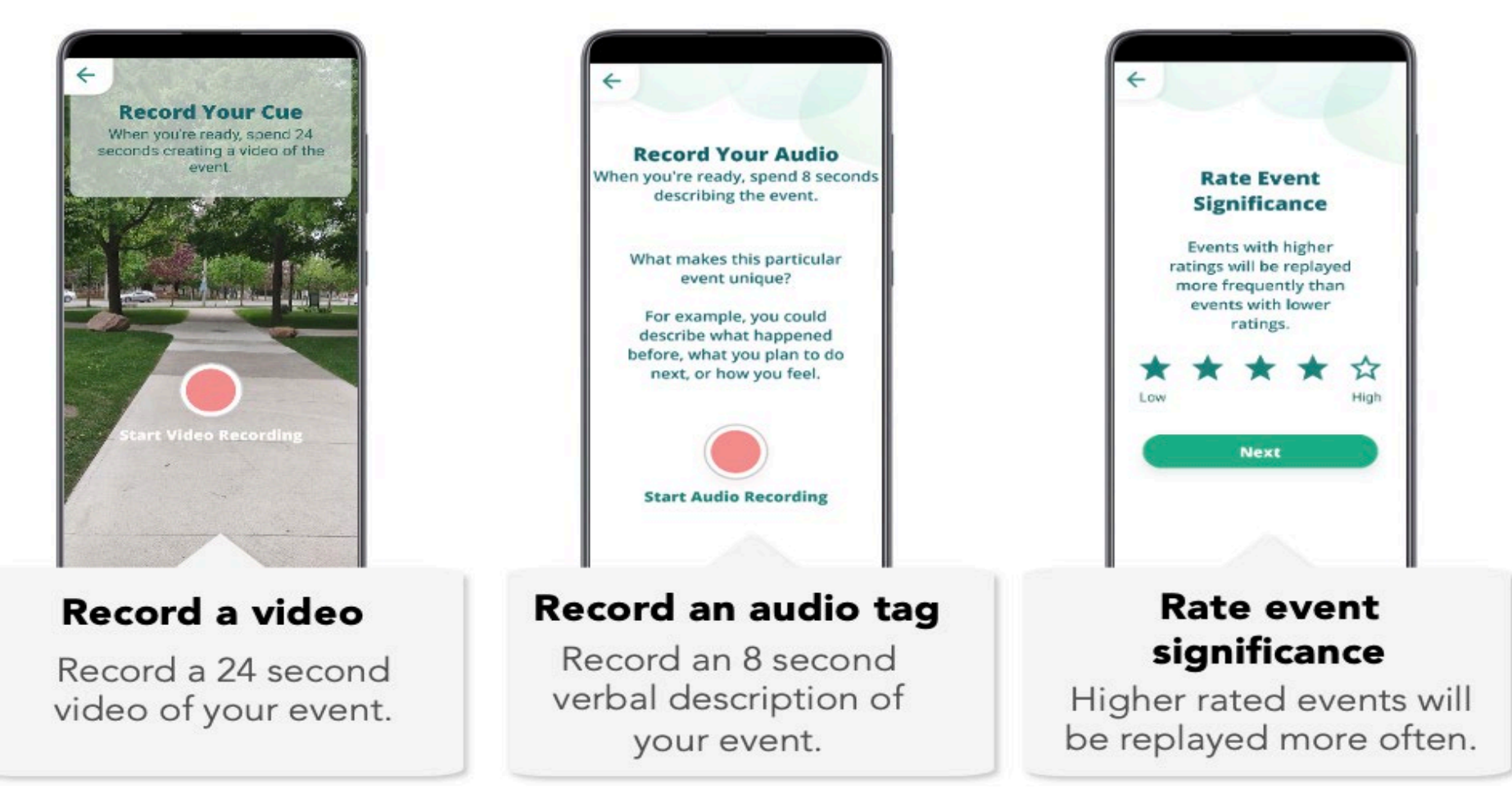
Introduction
Accelerated long-term forgetting (ALF) is the abnormally fast fading of memories.¹ Affects autobiographical memory for real-world events.³
Particularly high in temporal lobe epilepsies,² such as Transient Epileptic Amnesia (TEA).² Appears to be a deficit in memory consolidation.⁴
HippoCamera is a digital memory augmentation (DMA) device which enhances episodic recall and hippocampal differentiation.⁵



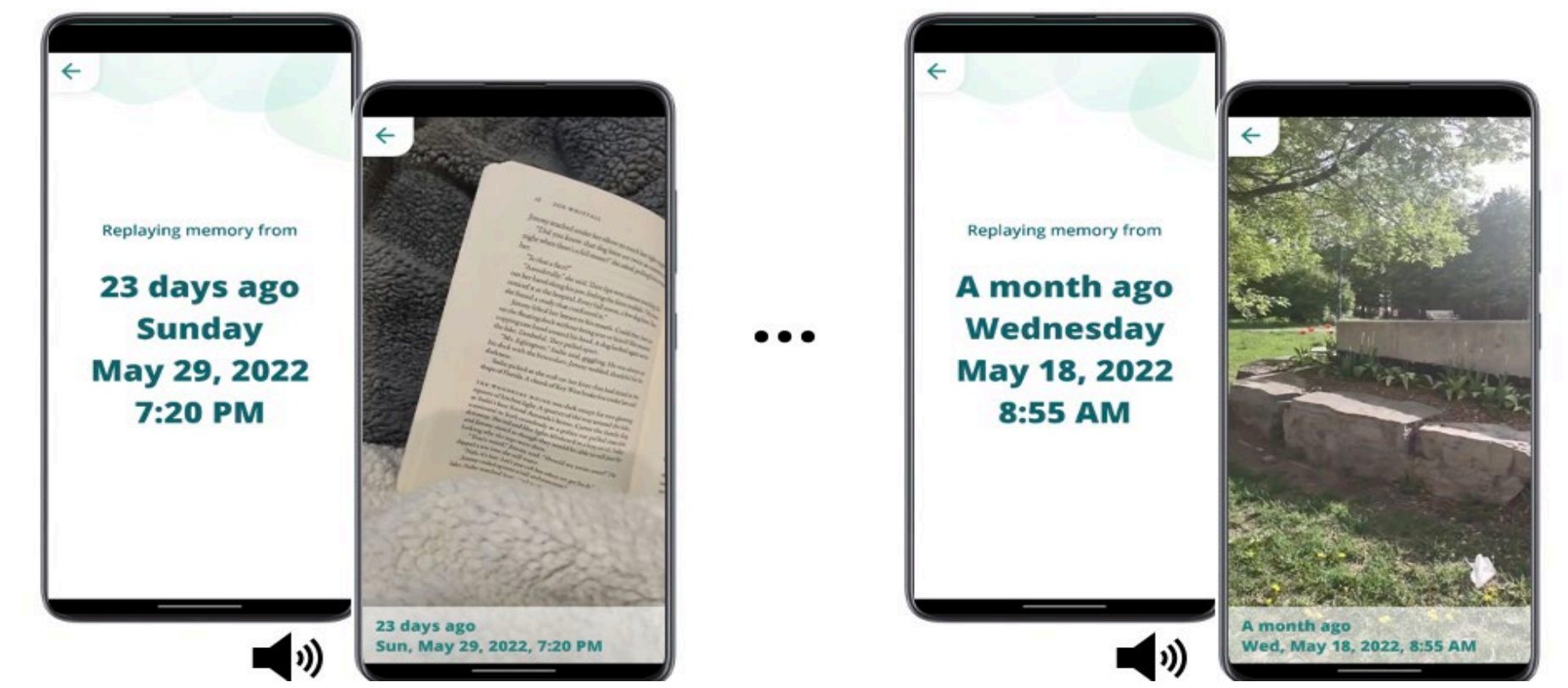
Aims
HippoCamera aims to improve autobiographical memory recall via replay of temporally compressed, self-generated cues.⁵

We investigated the impact of HippoCamera on episodic and semantic recall in TEA patients with ALF and healthy controls.
We also examined the effect of HippoCamera usage on psychological wellbeing.

Method
8 patients with TEA and ALF and 7 healthy controls used HippoCamera for 5.5 weeks. Participants recorded 2 cues and watched 2 replay sessions per day. Cues were assigned to a “replayed” condition or a “hidden” condition.



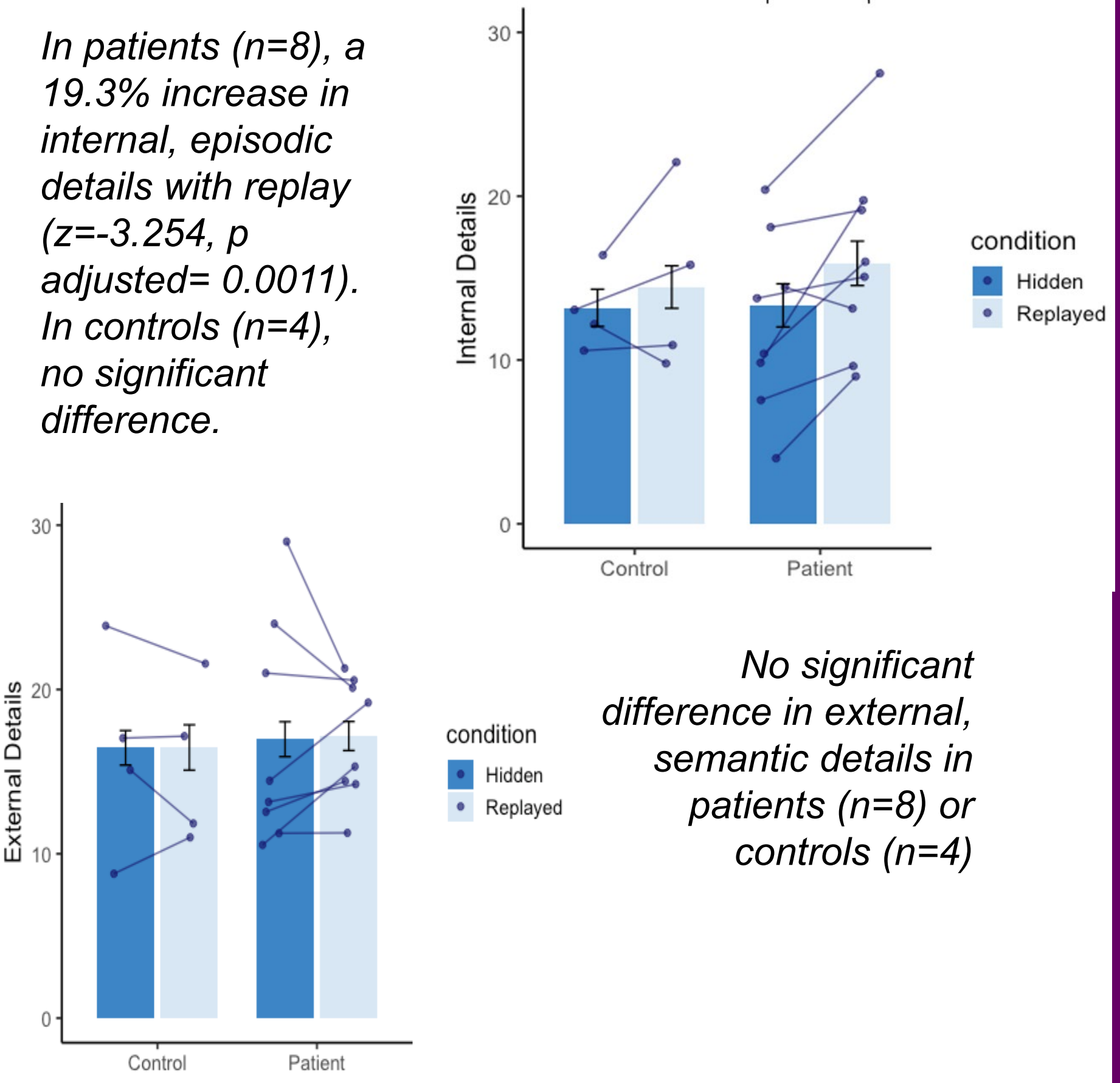
Recording a cue with HippoCamera involves a 24 second video clip and an 8 second audio description.



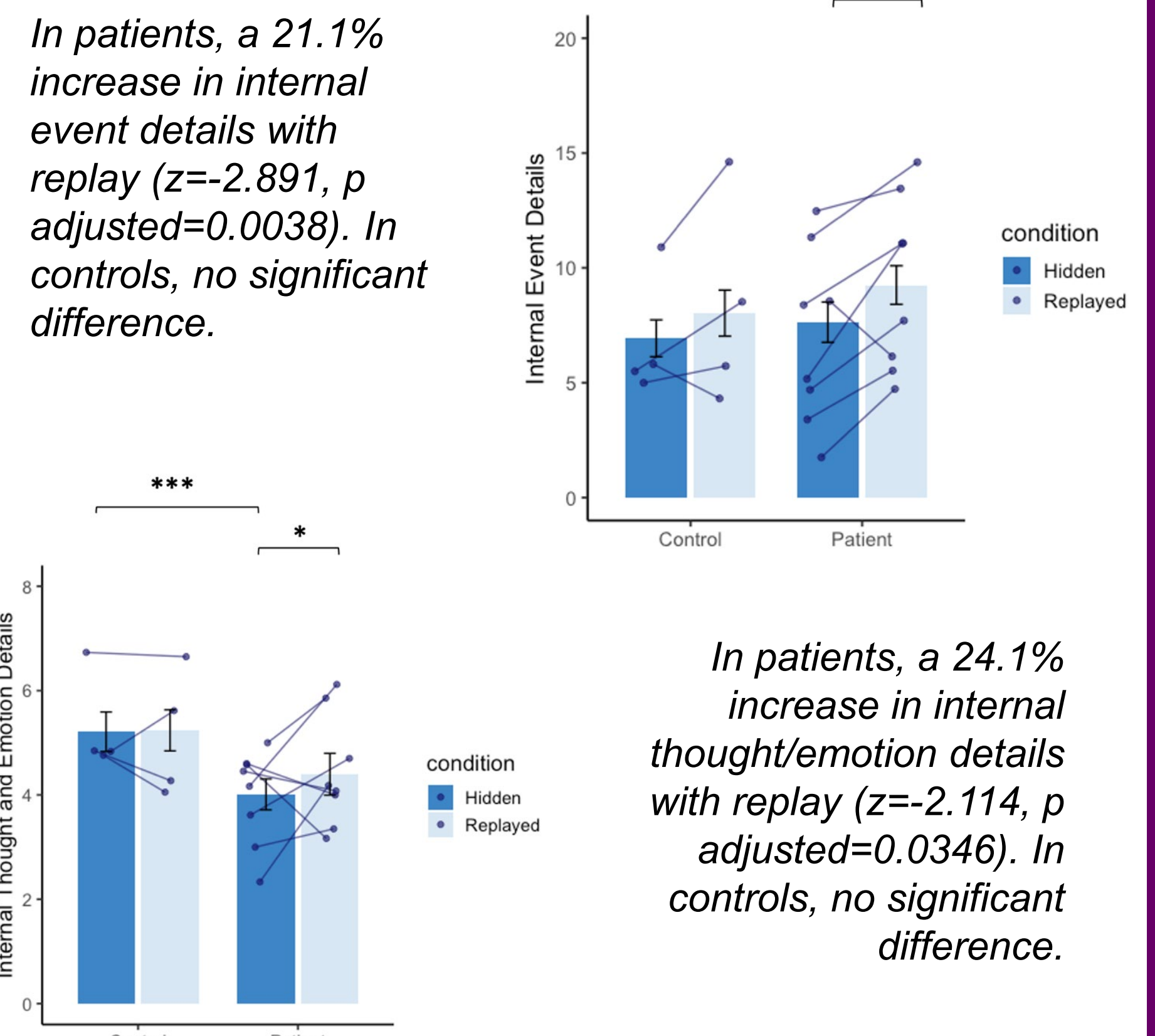
Replay sessions consist of up to 5 previously recorded cues. Playback of each video cue is increased threefold to align with the audio tag.

Recall for replayed vs hidden cues assessed at a 2.5-week delay using the Autobiographical Interview.⁶
Recall is scored by categorising details as internal (episodic memory) or external (semantic memory). In-cue details that can be taken directly from the video or audio tag are excluded from analysis.

Results
Replay enhances recall of episodic elements of autobiographical memories in patients with TEA and ALF, but not semantic memory

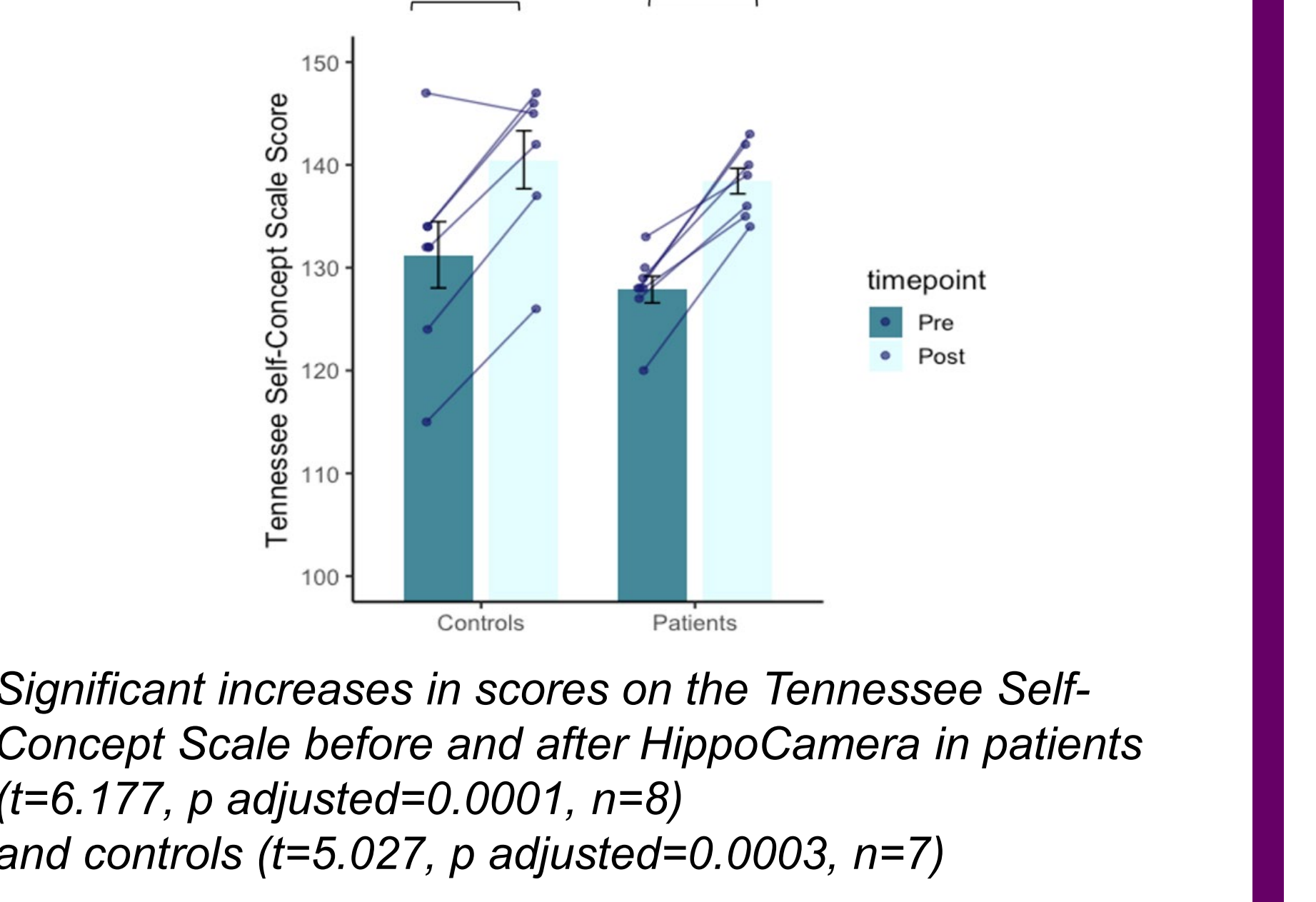


Replay Increases Event Details and Thought/Emotion Details of Episodic Recall



Results
Patients rated replayed memories as more vivid ($t= -3.694$, p adjusted=0.0003) and accessible ($t=-4.763$, p adjusted <.0001)

HippoCamera Usage Elicits More Positive Self-Perceptions



Recall on RAVLT
The mean words recalled for controls (n=7) and patients (n=8) at timepoints: 40 seconds, 1 hour and 1 week. No significant differences between patients and controls at 40 seconds or 1 hour. A significant difference in words recalled between 1 hour and 1 week for patients (p adjusted=0.0442581) but not for controls

Demographics

| | Patients (n=8) | Controls (n=7) |
|--------------------------------|----------------|----------------|
| Age (Mean (SD)) | 70.6 (12.1) | 64.3 (10.8) |
| Sex Distribution (F:M) | 3:5 | 5:2 |
| Years of Education (Mean (SD)) | 16.1 (3.1) | 17.3 (2.3) |
| ACE-III Score (Mean (SD)) | 93.6 (5.3) | 92.7 (6.2) |

Conclusions
Replaying cues with HippoCamera enhances episodic memory in TEA patients with ALF but does not impact semantic memory.
Replay specifically benefits recall of episodic memory concerning event details and thoughts or emotions.
Replayed memories are perhaps less susceptible to ALF because they have been repeatedly reactivated with HippoCamera replay.
No change in semantic recall suggests that HippoCamera specifically enhances episodic memory, perhaps via hippocampal replay of memory engrams.
HippoCamera encourages more positive self-perceptions in patients and healthy older individuals.
This study highlights the potential of HippoCamera for other autobiographical memory impairments.

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