



Shifting Through the Smoke: Effects of Cannabis Abstinence on Cognitive Function

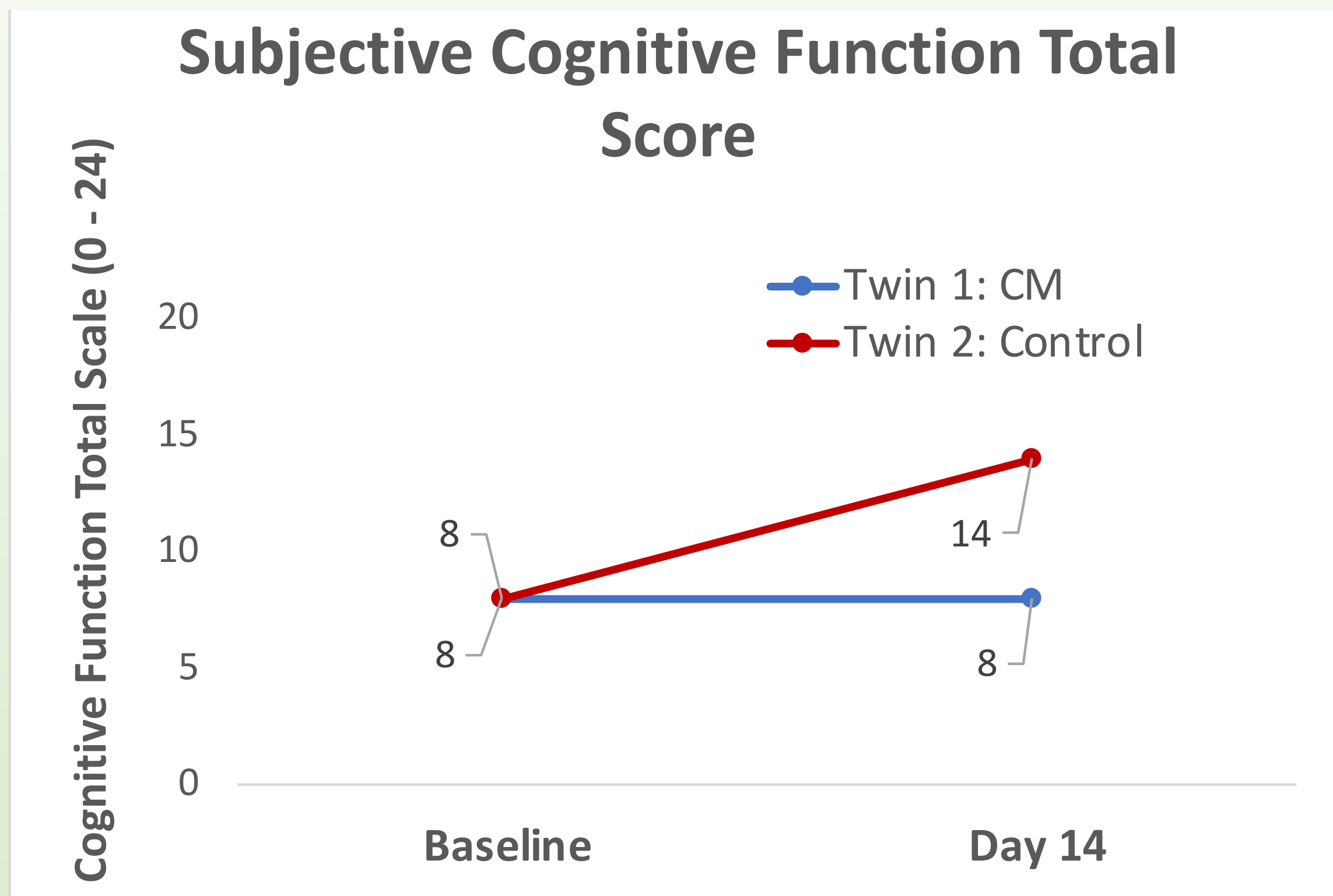
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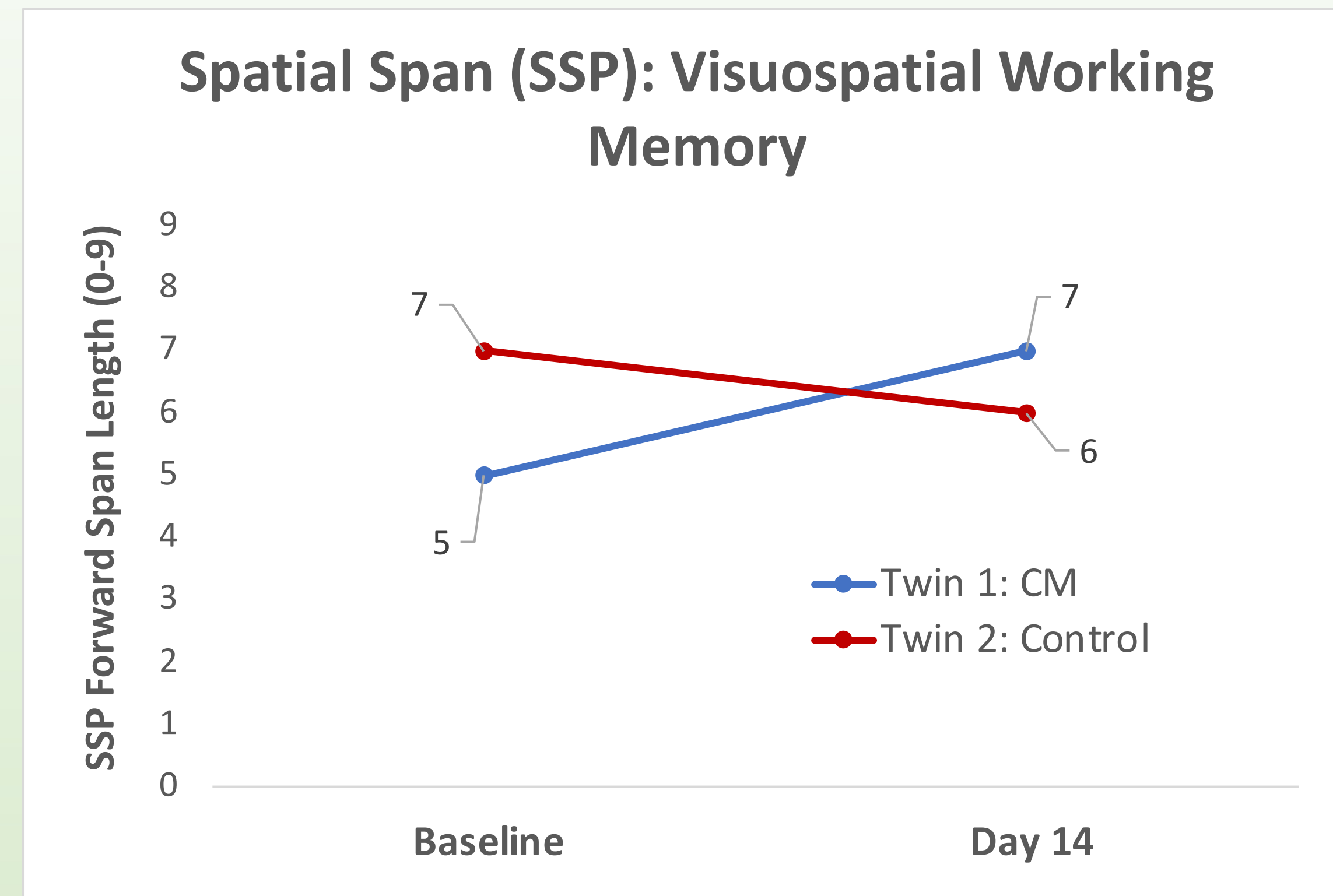
BACKGROUND

- Importance of Research:** Shifts in socio-political attitudes have increased cannabis usage and availability. Therefore, it is crucial to learn as much as possible about the plant and its effects.
- Prior research** indicates cannabis abstinence for one month **improves verbal memory**, but has **no effect on attention**.
- Unethical** to ask participants to use cannabis regularly, so best way to look at causal associations is by **paying those who use cannabis regularly to stop using**.
- Importance of Twin Study:** Controls for **shared environmental** and **genetic confounds**. Therefore, important in understanding whether an association between two variables is significant or coincidental.
- Participants are randomly assigned to contingency management protocol (paid to abstain from cannabis use) or control protocol; **twin one** assigned to **contingency management**, **twin two** assigned to **control**.
- Aim:** Understand the effects of **cannabis abstinence on cognitive function** utilizing a twin pair.

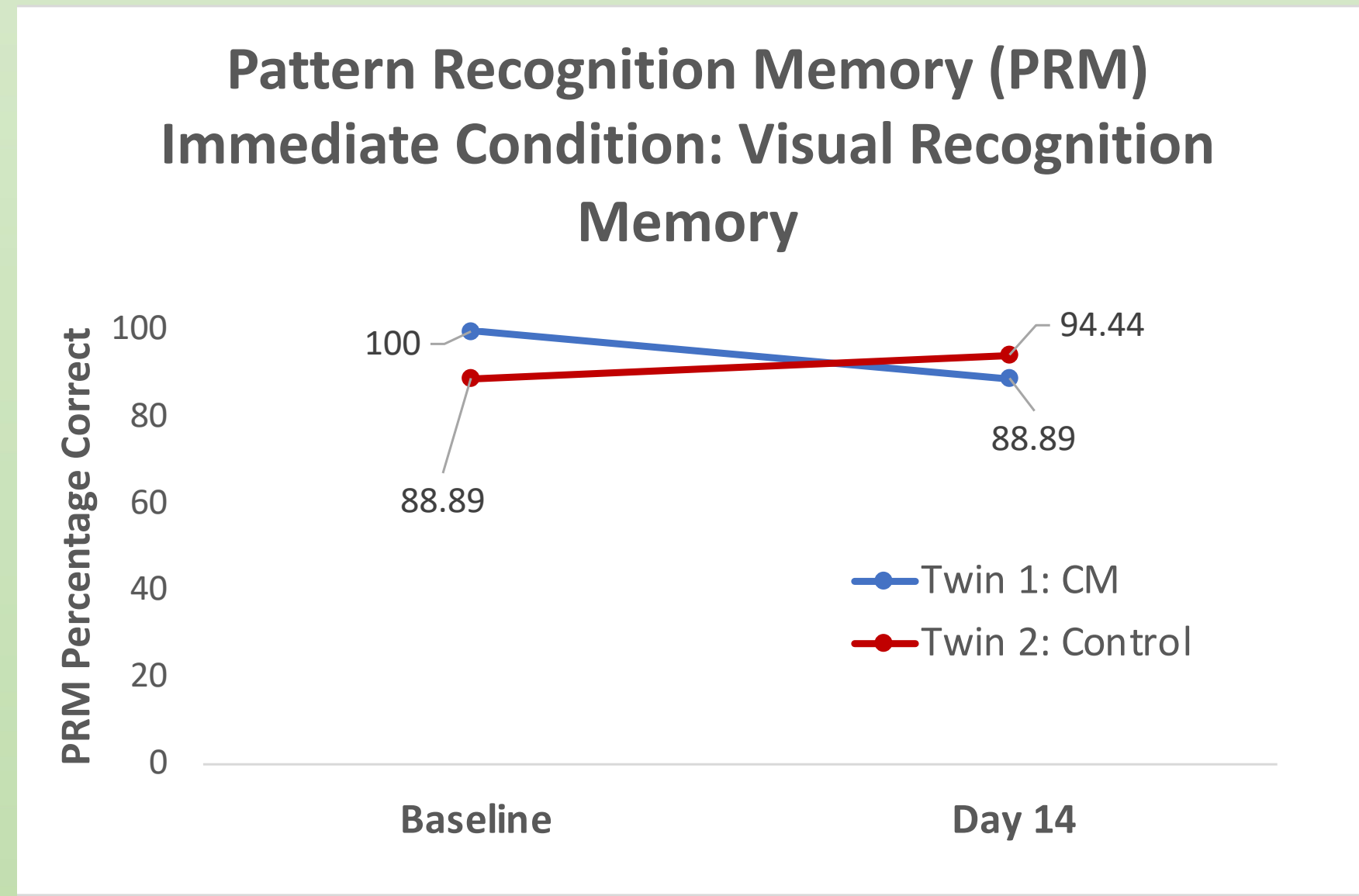
RESULTS



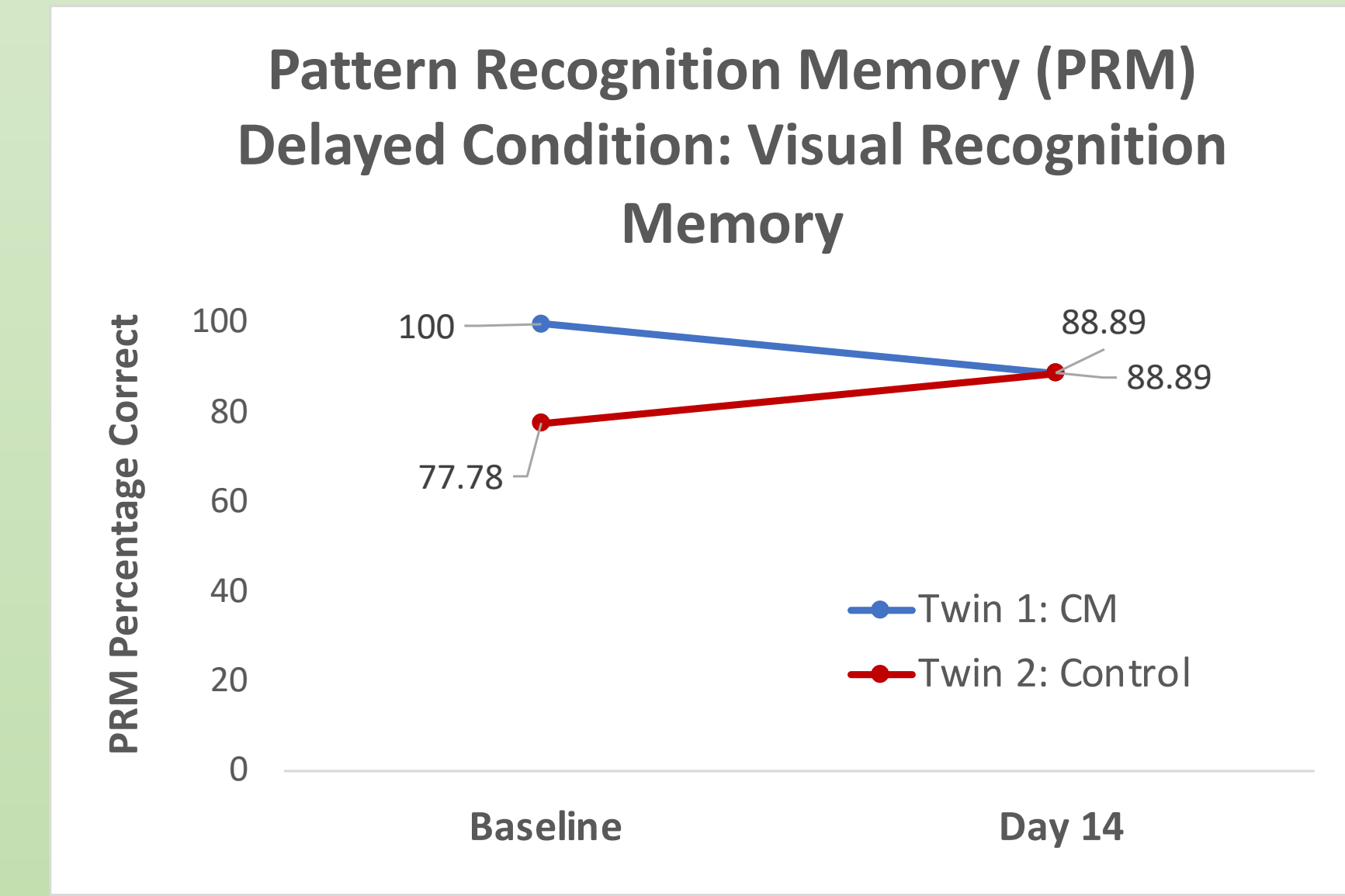
Higher score indicates worse cognitive function



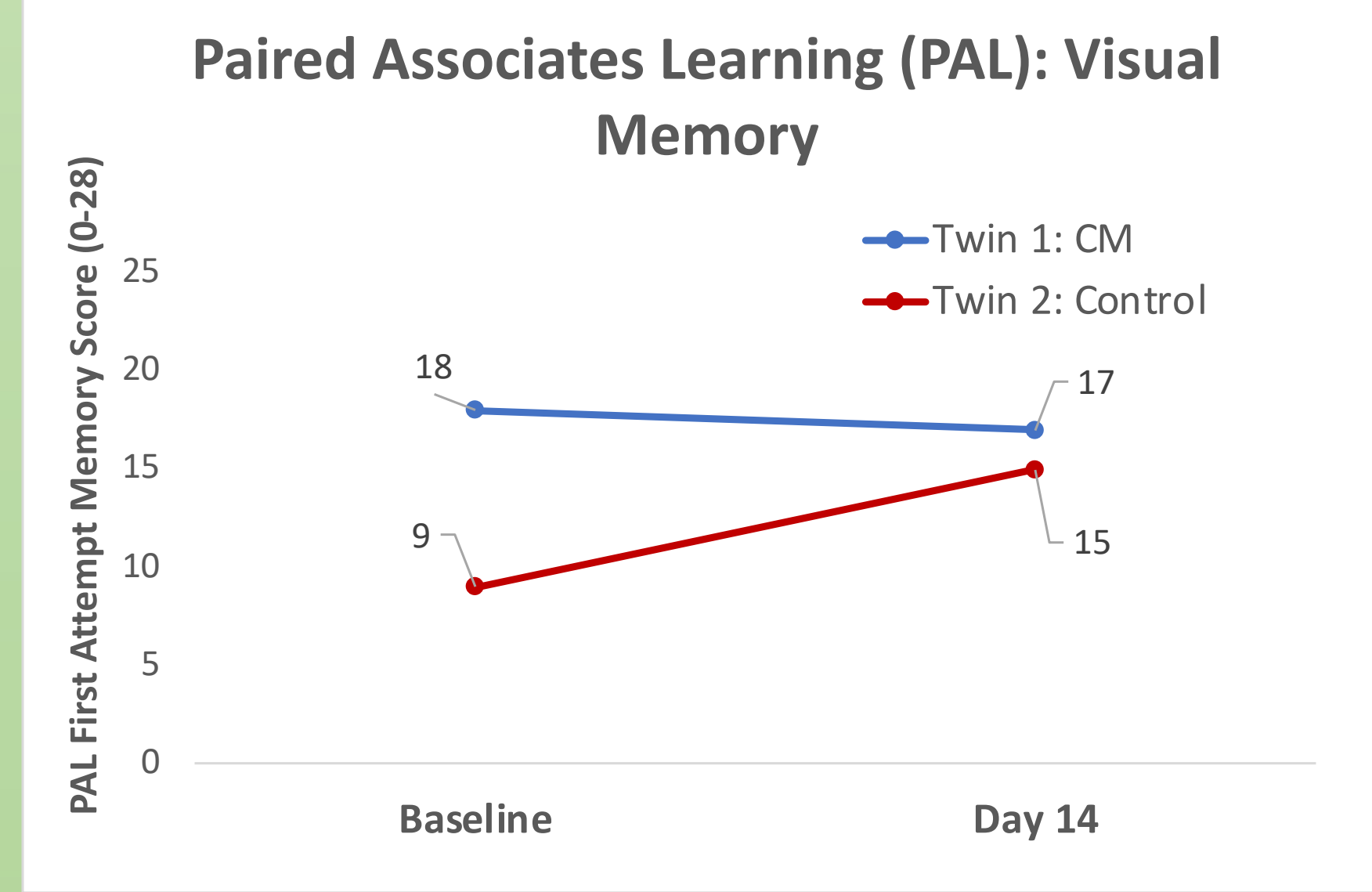
SSP: white boxes change color in specific sequence, participant must remember order of sequence; sequence length increases throughout task (up to 9 boxes); up to 3 attempts at remembering each sequence



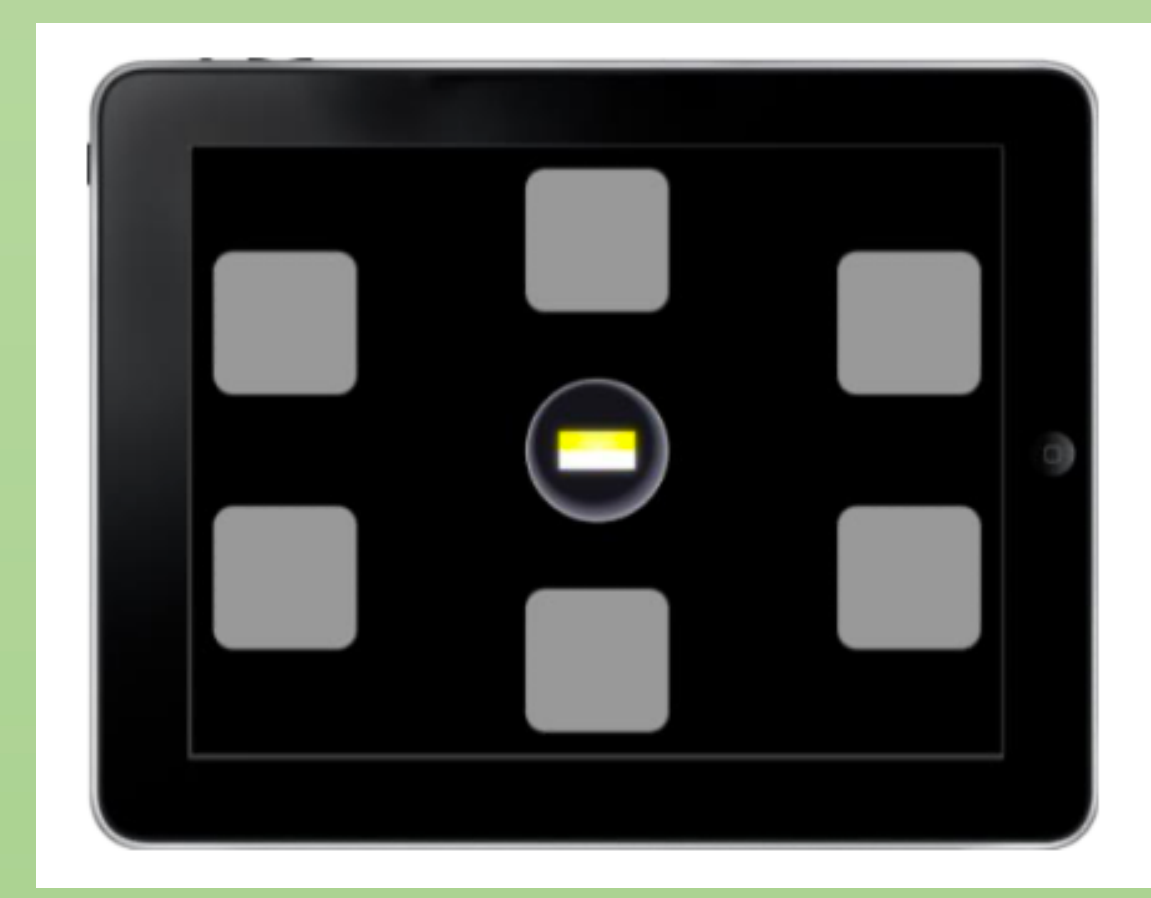
PRM (Immediate): 12 visual patterns (no verbal cues) appear on screen, one at a time; during recognition, participant must choose between two patterns, indicating which one they saw



PRM (Delayed): the second recognition phase occurs after a delay, typically 10-20 minutes



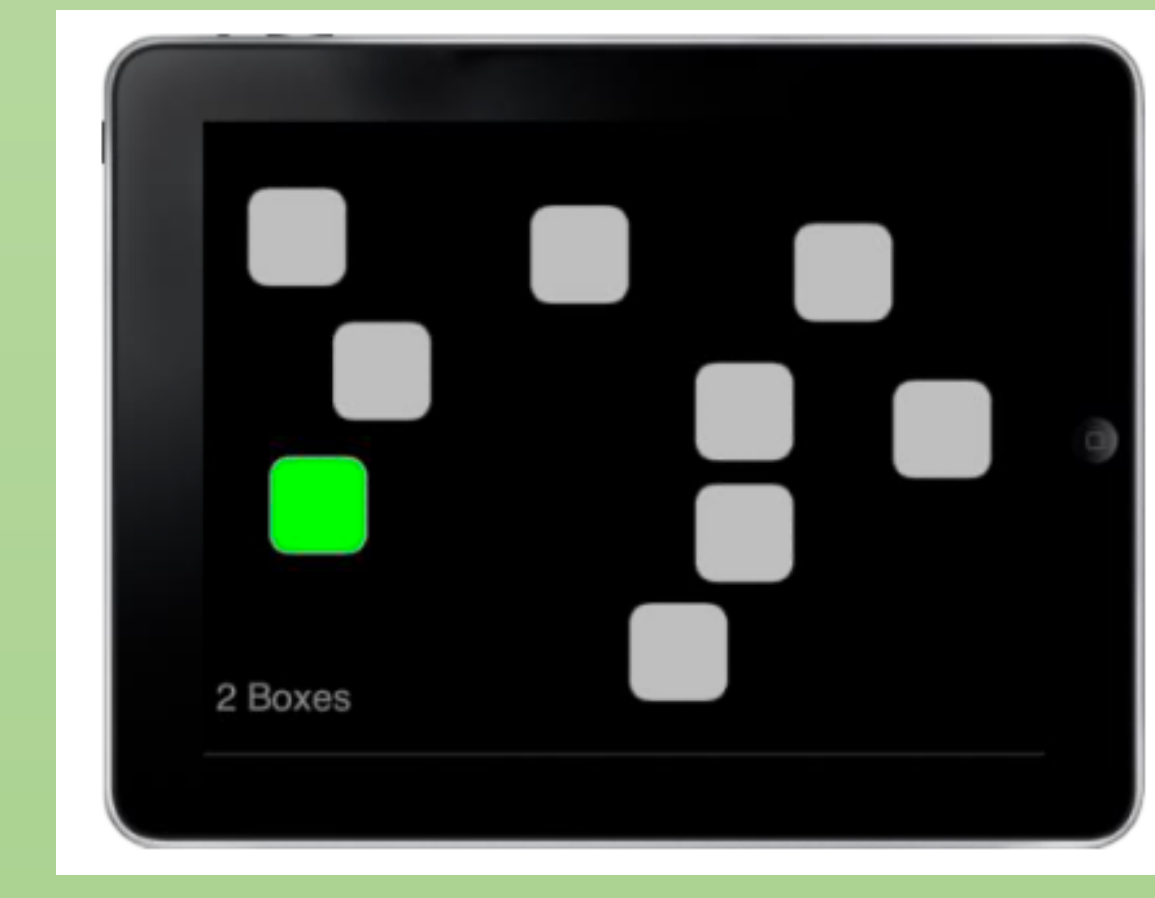
PAL: boxes on edge of screen open in randomized order to display different visual patterns; then, patterns are displayed in middle of screen one by one, participant must select the correct box each pattern was originally in



PAL



PRM



SSP

METHODS

- Contingency Management Protocol:** Reverses learned substance use with consistent, competing positive reinforcement.
 - Qualitative urine tests** at each visit to validate cannabis abstinence leads to **contingency management payment plan**.
- | Visit Number | Attendance | Abstinence |
|---------------|------------|------------|
| Baseline (V1) | \$10 | - |
| Day 3 (V2) | \$15 | \$30 |
| Day 5 (V3) | \$20 | \$45 |
| Day 7 (V4) | \$25 | \$60 |
| Day 14 (V5) | \$30 | \$75 |
- Higher frequency** of check-in dates at the **beginning** due to **withdrawal effects**, therefore ensuring contingency management protocol is working.
 - Contingency management has proved to be one of the **most effective protocols in promoting abstinence** (90% abstinence rate in previous studies).
 - Twin pairs control** for **important confounds** such as growing up in the same household and shared genetics.

FUTURE DIRECTIONS

- This Case Study:** **twin one (contingency management)** indicated maintenance of subjective cognitive function, improved SSP performance, and a decline in PRM and PAL performance; **twin two (control)** indicated a decline in subjective cognitive function and SSP performance, and improved PRM and PAL performance.
 - Plan to recruit **50 twin pairs (N = 100)** who use **cannabis at least weekly**: randomly assign contingency management protocol or control.
 - With larger sample size, we can conduct statistical analysis and draw more inferences.
 - Expect to see similar trends with larger sample size (**improved visuospatial working memory** correlated with cannabis abstinence).
 - Check-in Dates:** Days 1, 3, 5, 7, 14, 21, 28, 42
 - Continued contingency management payment plan:**
- | Visit Number | Attendance | Abstinence |
|---------------|------------|------------|
| Baseline (V1) | \$10 | - |
| Day 3 (V2) | \$15 | \$30 |
| Day 5 (V3) | \$20 | \$45 |
| Day 7 (V4) | \$25 | \$60 |
| Day 14 (V5) | \$30 | \$75 |
| Day 21 (V6) | \$35 | \$90 |
| Day 28 (V7) | \$45 | \$105 |
| Day 42 (V8) | \$55 | \$120 |
- All studies up to now focus on cannabis abstinence outcomes under 30 days, therefore plans with this study aim for a **longer period of abstinence (42 days)**.

ACKNOWLEDGMENTS

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PARTICIPANT DEMOGRAPHICS

	Twin One	Twin Two
Gender	Female	Female
Twin Type	Dizygotic	Dizygotic
Race	Caucasian	Caucasian
Age	38	38
Positive Marijuana Toxicology Result: Baseline	Present	Present
Positive Amphetamines Toxicology Result: Baseline	Not Present	Not Present
Positive Opiates Toxicology Result: Baseline	Not Present	Not Present
Positive Meth Toxicology Result: Baseline	Not Present	Not Present
Positive Cocaine Toxicology Result: Baseline	Not Present	Not Present
CUDIT* Total Score: Baseline	10.0	18.0
Number of Days Cannabis Use Past Two Weeks: Baseline	14.0	14.0
THC-COOH Toxicology Results**: Baseline	82.0	12.6
CWS*** Total Score: Baseline	41.0	39.0
Number of Days Cannabis Use Past Two Weeks: Day 14	0.0	14.0
THC-COOH Toxicology Results: Day 14	16.5	29.0
CWS Total Score: Day 14	66.0	35.0

*CUDIT: Cannabis Use Disorder Identification Test (0-32)
**11-Nor-9-carboxy- Δ^9 -tetrahydrocannabinol toxicology results can get up to 1000, but that is an extremely high score
***Cannabis Withdrawal Scale (0-190)