

Do naps enhance memory during early childhood?

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Introduction

- With time, memories fade. This is called decay.
- However, research has shown that afternoon naps in early childhood protect against decay (Kurdziel et. al, 2013; Lokhandwala & Spencer, 2020).
- The active consolidation hypothesis suggests that sleep also enhances or restores memories lost due to decay (Rasch & Born, 2013).
- **Purpose:** the purpose of this investigation is to test the active consolidation hypothesis in early childhood.

Methods

Participants

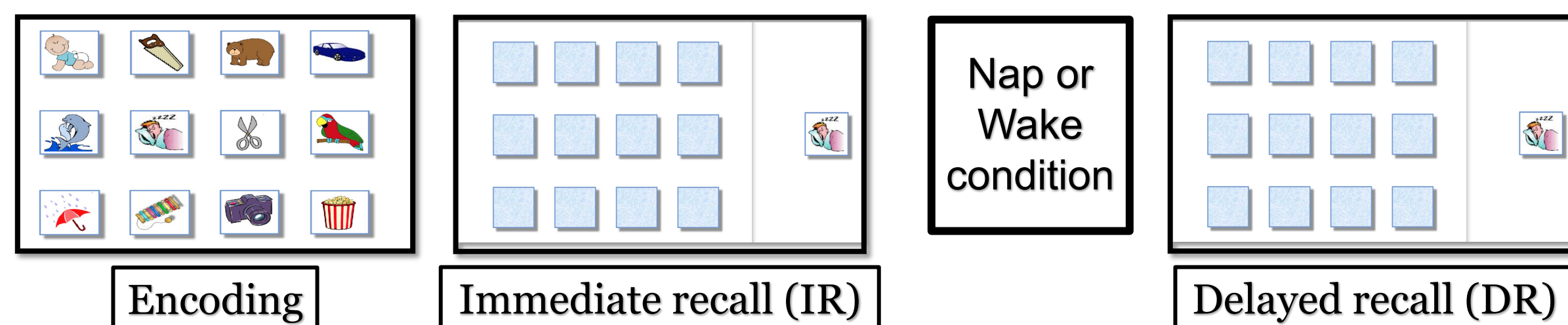
- Participants were part of a larger longitudinal study investigating memory, sleep, and brain development.
- Preliminary analyses included 65 participants ($M_{age}=3.9$, 33 female). Participants were habitual nappers aged 3 to 5 years.

Experimental Design

- All children were asked to participate in three consecutive visits, one week apart. For the purpose of this investigation, only the wake and nap visits were examined (see Allard et al., 2019).



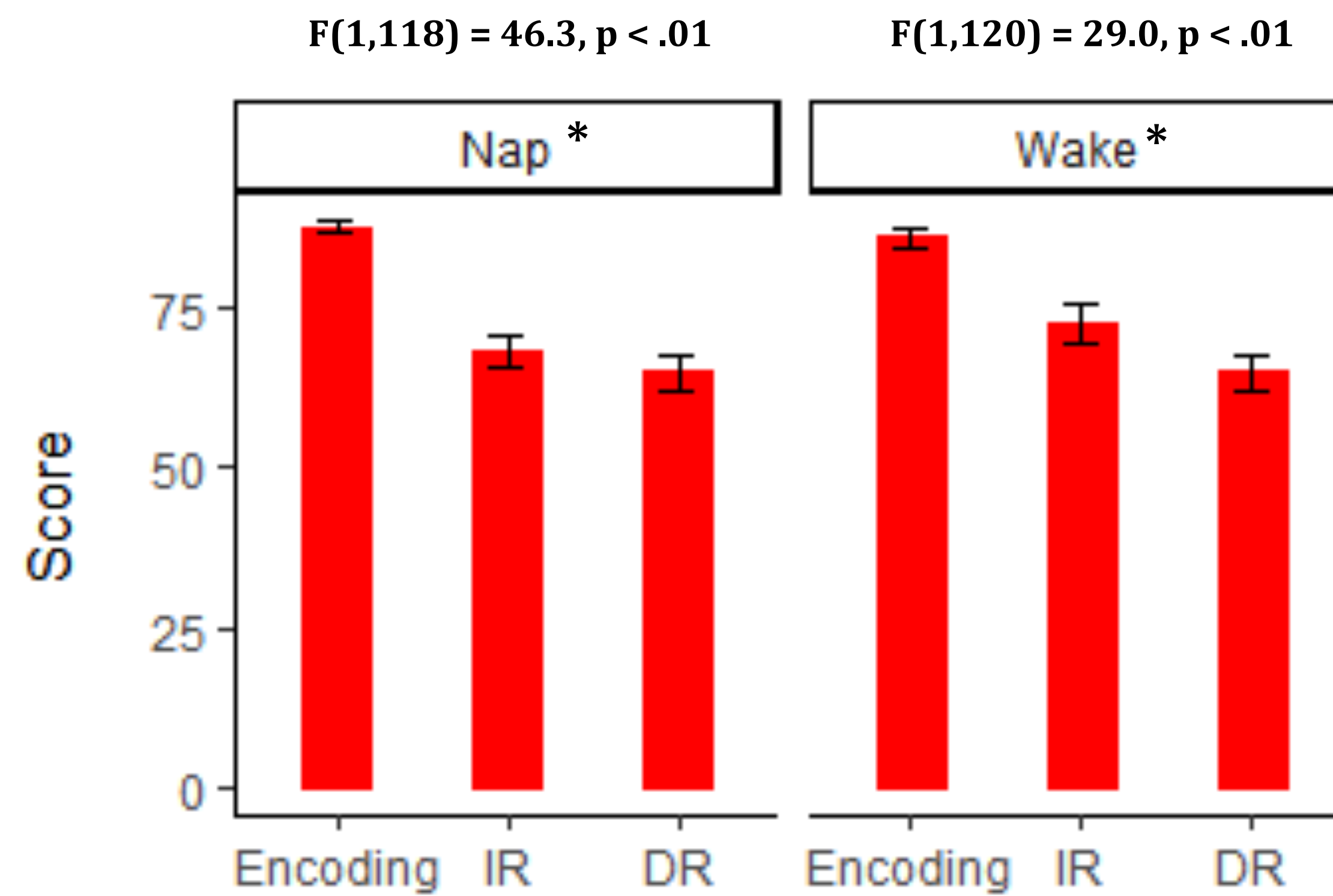
Behavioral Memory Task



- To explore memory enhancement, half of the participants had an additional 45-minute delay (long) between Immediate Recall and Delayed Recall to allow for additional decay while others did not (short).
- Memory change scores were calculated as follows:

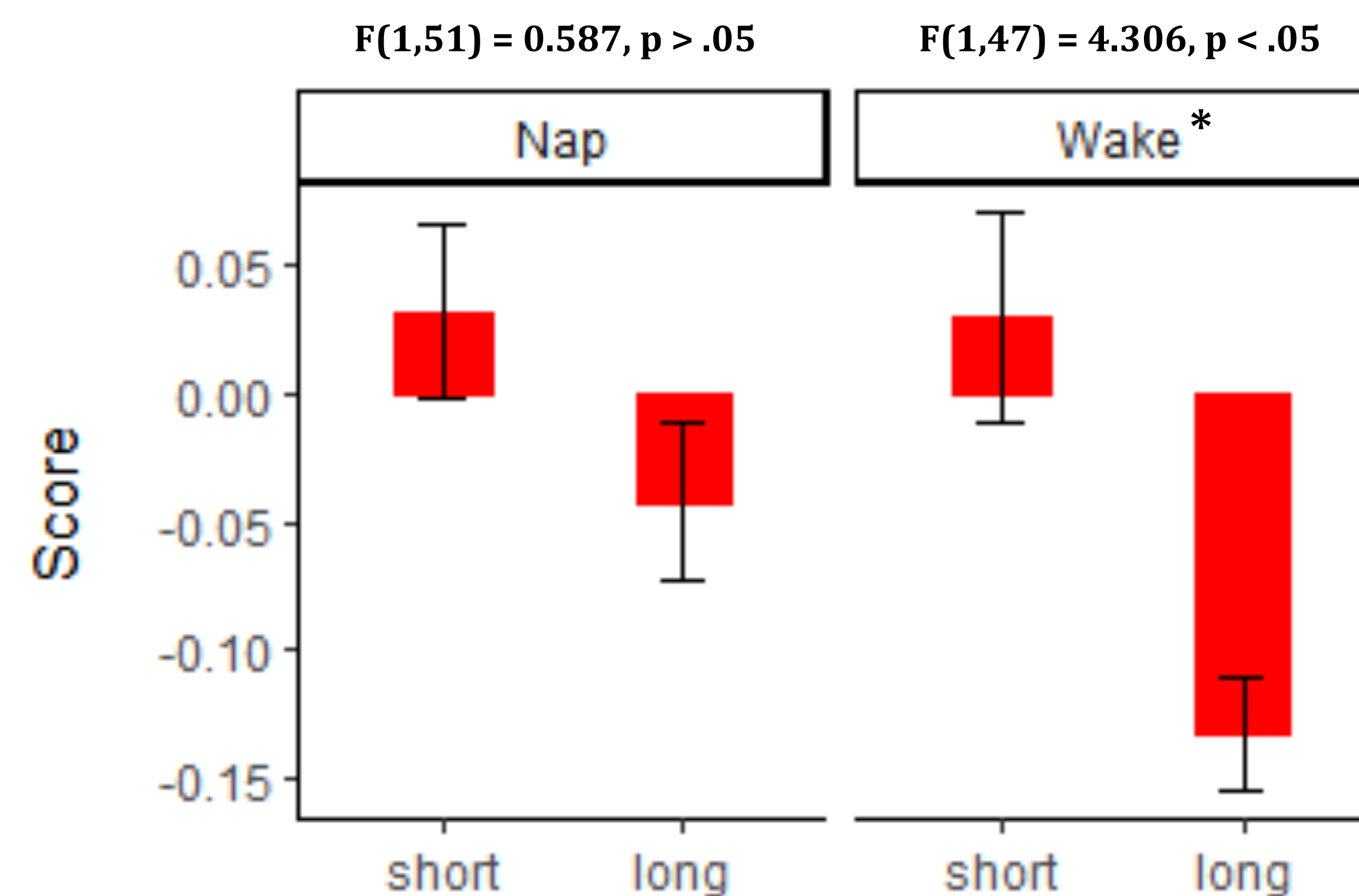
$$\text{Memory Change Score} = \frac{(\text{DR} - \text{IR})}{\text{IR}}$$

Results: Nap/Wake Differences



- Results demonstrated that there was significant decay in memory for the wake and nap conditions. Specifically, memory decreased from encoding to IR in both conditions.
- However, memory decay from IR to DR was only present for the wake condition.

Results: Delay Differences



- In the wake condition but not the nap condition, children who experienced a longer delay showed significantly more memory decay ($M = -0.13$) than those with a shorter delay ($M = 0.03$).

Discussion

- This study examined the role of naps during early childhood in the active consolidation hypothesis.
- These findings demonstrate that afternoon naps do play a critical role in memory enhancement during early childhood.
 - Results showed that memory decay occurred between immediate and delayed recall for the wake condition only.
 - Additionally, children who experienced a longer delay between encoding and immediate recall had significantly more memory decay, but only in the wake condition.
 - These findings suggest memories were consolidated during the afternoon nap, but not wake session.
- **Future Directions:**
 - Future studies should explore the effects of additional delay within subjects. In other words, participants would be tested 45 minutes before the nap/wake condition, immediately before the nap/wake condition, and immediately after a nap/wake condition.

Take-Home Message

An afternoon nap does not only protect memories, it enhances them, although not to originally learned levels.

References

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