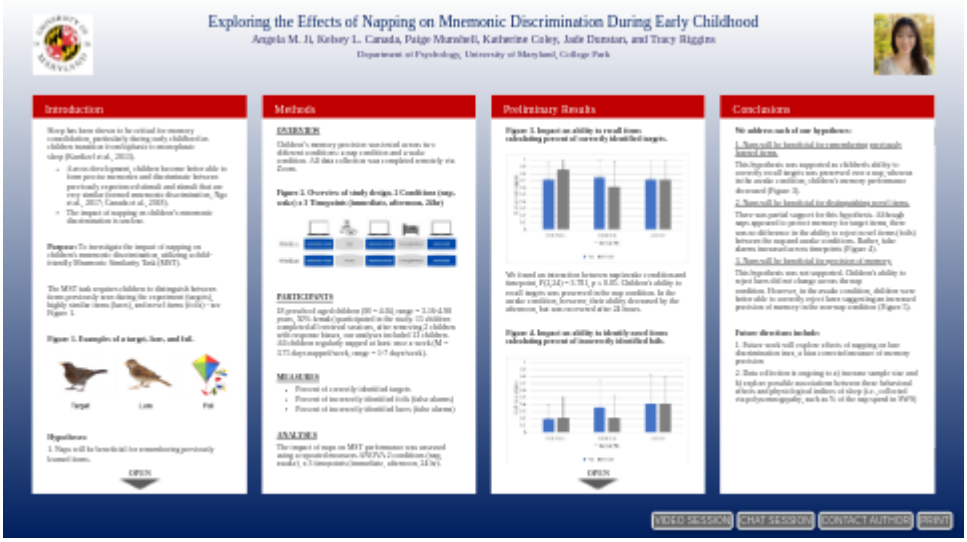
Exploring the Effects of Napping on Mnemonic Discrimination During Early Childhood



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PRESENTED AT:

INTRODUCTION

Sleep has been shown to be critical for memory consolidation, particularly during early childhood as children transition from biphasic to monophasic sleep (Kurdizel et al., 2013).

- Across development, children become better able to form precise memories and discriminate between previously experienced stimuli and stimuli that are very similar (termed mnemonic discrimination, Ngo et al., 2017; Canada et al., 2018).
- The impact of napping on children's mnemonic discrimination is unclear.

Purpose: To investigate the impact of napping on children's mnemonic discrimination, utilizing a child-friendly Mnemonic Similarity Task (MST).

The MST task requires children to distinguish between items previously seen during the experiment (targets), highly similar items (lures), and novel items (foils) - see Figure 1.

Figure 1. Examples of a target, lure, and foil.

Hypotheses:

1. Naps will be beneficial for remembering previously learned items.

2. Naps will be beneficial for distinguishing between learned and novel items.

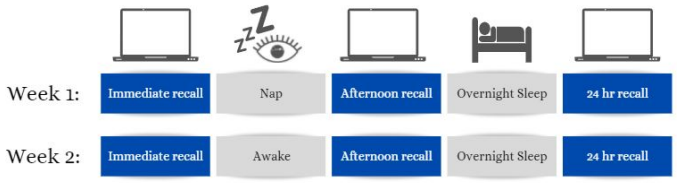
3. Naps will be beneficial for precision of memory (distinguishing between learned items and similar lures).

METHODS

OVERVIEW

Children's memory precision was tested across two different conditions: a nap condition and a wake condition. All data collection was completed remotely via Zoom.

Figure 2. Overview of study design, 2 Conditions (nap, wake) x 3 Timepoints (immediate, afternoon, 24hr)



PARTICIPANTS

18 preschool aged children (M = 4.04, range = 3.16-4.90 years, 50% female) participated in the study. 15 children completed all retrieval sessions, after removing 2 children with response biases, our analyses included 13 children. All children regularly napped at least once a week (M = 3.75 days napped/week, range = 1-7 days/week).

MEASURES

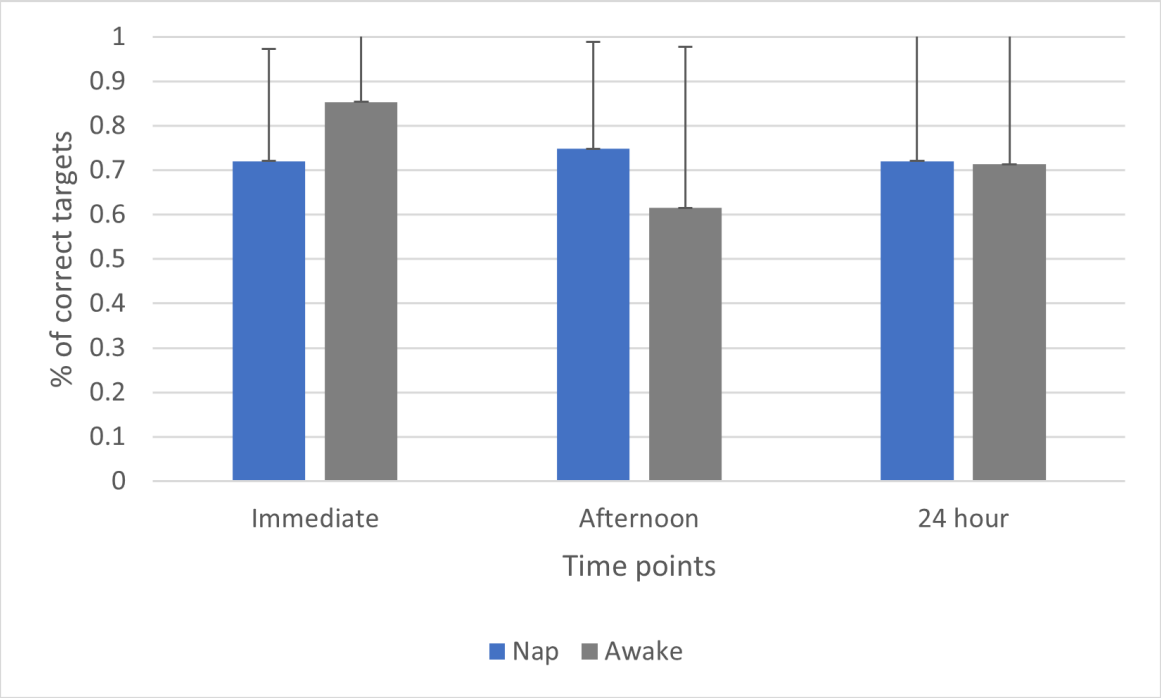
- Percent of correctly identified targets
- Percent of incorrectly identified foils (false alarms)
- Percent of incorrectly identified lures (false alarms)

ANALYSES

The impact of naps on MST performance was assessed using a repeated measures ANOVA 2 conditions (nap, awake), x 3 timepoints (immediate, afternoon, 24 hr).

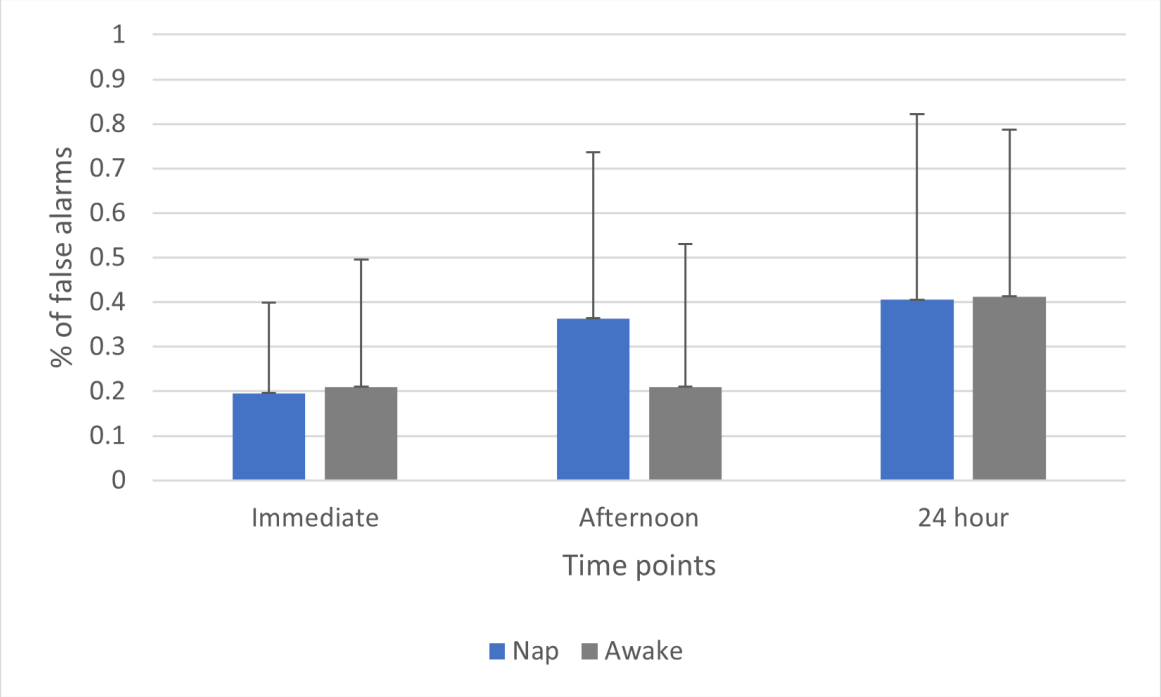
PRELIMINARY RESULTS

Figure 3. Impact on ability to recall items calculating percent of correctly identified targets.



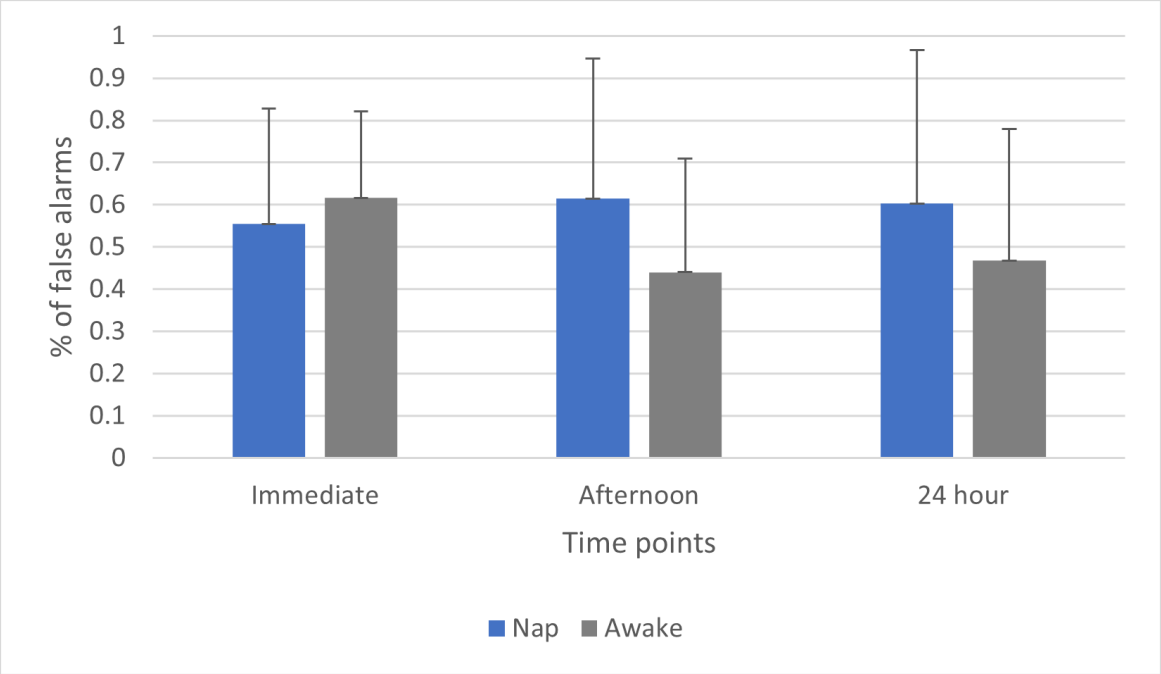
We found an interaction between nap/awake condition and timepoint, $F(2,24) = 3.781$, $p \leq 0.05$. Children's ability to recall targets was preserved in the nap condition. In the awake condition, however, their ability decreased by the afternoon, but was recovered after 24 hours.

Figure 4. Impact on ability to identify novel items calculating percent of incorrectly identified foils.



We found a main effect in timepoint, $F(2,24) = 8.558$, $p \leq 0.05$. Across conditions, children's ability to correctly reject lures decreased after 24 hours.

Figure 5. Impact on precision of memory by calculating percent of incorrectly identified lures.



We found an interaction between condition and timepoint, $F(2,24) = 4.228$, $p \leq 0.05$. In the nap condition, children's ability to reject lures stayed similar across all time points. In the awake condition, however, children showed increased ability to correctly reject lures in the afternoon and 24 hours.

CONCLUSIONS

We address each of our hypotheses:

1. Naps will be beneficial for remembering previously learned items.

This hypothesis was supported as children's ability to correctly recall targets was preserved over a nap, whereas in the awake condition, children's memory performance decreased (Figure 3).

2. Naps will be beneficial for distinguishing novel items.

There was partial support for this hypothesis. Although naps appeared to protect memory for target items, there was no difference in the ability to reject novel items (foils) between the nap and awake conditions. Rather, false alarms increased across timepoints (Figure 4).

3. Naps will be beneficial for precision of memory.

This hypothesis was not supported. Children's ability to reject lures did not change across the nap condition. However, in the awake condition, children were better able to correctly reject lures suggesting an increased precision of memory in the non-nap condition (Figure 5).

Future directions include:

1. Future work will explore effects of napping on lure discrimination inex, a bias corrected measure of memory precision

2. Data collection is ongoing to a) increase sample size and b) explore possible associations between these behavioral effects and physiological indices of sleep (i.e., collected via polysomnogrpahy, such as % of the nap spend in SWS)