THE FUNCTION OF MID-DAY NAPS ON PRIOR DECLARATIVE LEARNING FOR PRESCHOOL CHILDREN

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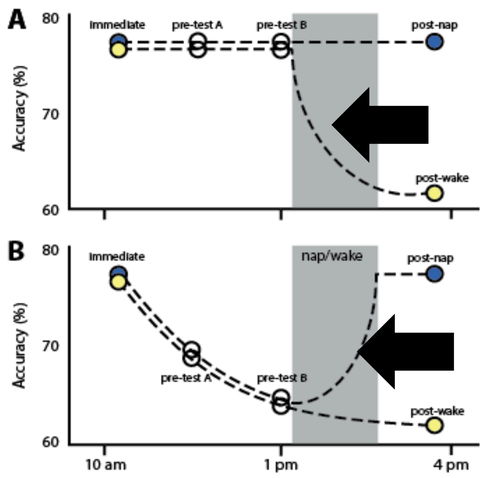
INTRODUCTION

Naps in preschoolers have been found to benefit declarative learning. Interestingly, inspection of these data also suggest that naps may recover memories from decay. That is, following an interval with >1 hr awake followed by 2 hrs of sleep, performance was unchanged while accuracy declined if the 3 hrs were spent awake (1). The present study tested whether memories indeed decayed over wake and were recovered by a delayed nap by including a probe of memory decay prior to the nap.



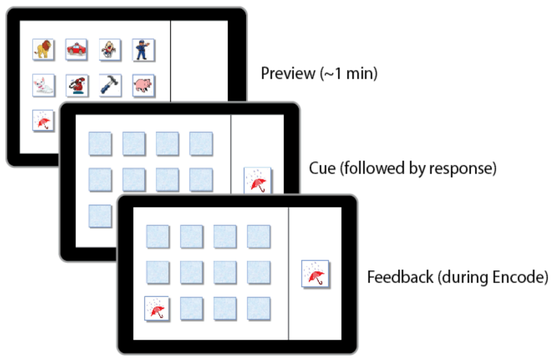
Decay over extended wake

Active recovery over nap

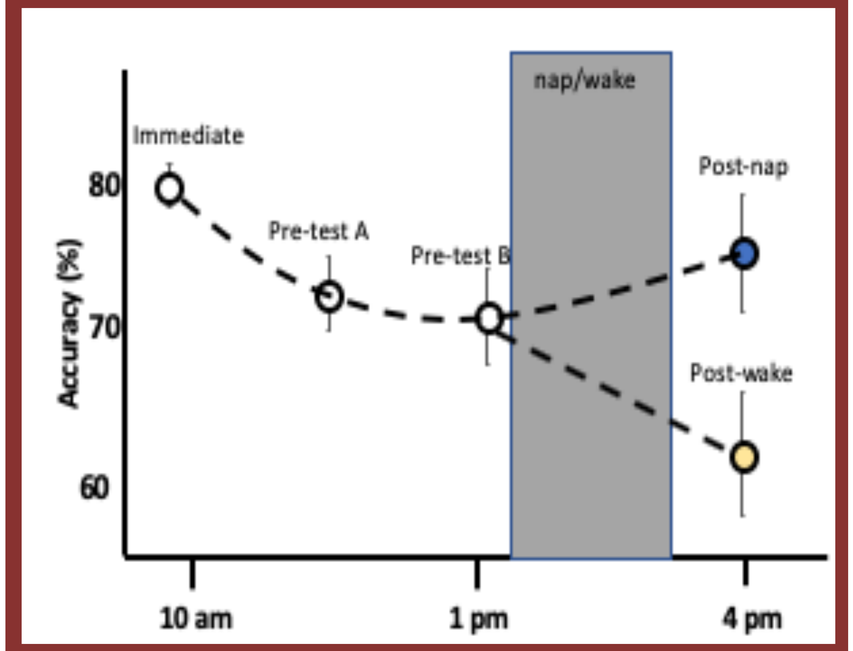
In figure A and B above, the filled circles are data from Kurdziel et al. (1)

METHODS

Forty-seven preschool-aged children (M age = 51.9 mo, 54.5% female) learned a visuo-spatial memory task in the morning on two separate occasions separated one week apart, where on one occasion they napped and the other they did not.



Does sleep-dependent memory consolidation rescue memories from decay in early childhood?



Naps may recover memories from decay

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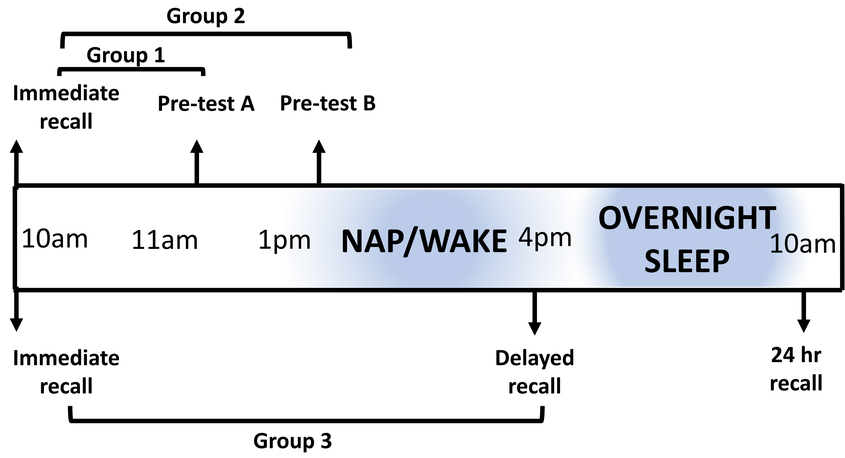
METHODS CONTINUED

Recall was tested immediately after encoding, and after the afternoon nap/wake interval. Additionally, performance was probed either 1 hr (pre-test A) or 2 hrs (pre-test B) after immediate recall.



RESULTS

- In group 1, accuracy decayed between immediate recall and pre-test A (p=0.010; n=27)
- In group 2, accuracy further decayed between immediate recall and pre-test B (p=0.005; n=20).
- Data from an additional 6 participants (group 3) replicated previous findings that learning was protected following the nap compared to immediate recall. However, it appears that the memories continued to decay over this later wake period as well. (p=0.038).

DISCUSSION

This study provides some suggestion that naps actively recover memories from decay. Moreover, memories continue to decay if this interval is spent in quiet wake, consistent with classic memory decay curves (2). This provides additional support for sleep playing an active role in memory processing. Memory reactivation during sleep may underlie this nap benefit (3). Together, this work demonstrates a function of naps in memory in early childhood.

REFERENCES

1. Kurdziel, L.B.F., K. Duclos, and R.M.C. Spencer, Sleep spindles in mid-day naps enhance learning in early childhood. Proceedings of the National Academy of Sciences, 2013. 110: p. 17267-17272
2. Ebbinghaus, H., Memory: A contribution to experimental psychology. 1964, New York, NY: Dover.
3. Diekelmann, S. and J. Born, The memory function of sleep. Nature Reviews Neuroscience, 2010. 11(2): p. 114-26