

# Rapid eye movement sleep mediates age-related decline in prospective memory consolidation

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## Abstract

### Study Objectives

Prospective memory, or remembering to execute future intentions, accounts for half of everyday forgetting in older adults. Sleep intervals benefit prospective memory consolidation in young adults, but it is unknown whether age-related changes in slow wave activity, sleep spindles, and/or rapid eye movement (REM) sleep mediate hypothesized effects of aging on prospective memory consolidation.

### Methods

After an adaptation night, 76 adults aged 18–84 completed two experimental nights of in-laboratory polysomnography recording. In the evening, participants encoded and practiced a prospective memory task and were tested the next morning. On a counterbalanced night, they encoded and practiced a control task, and were tested the following morning.

### Results

Increasing age predicted worse prospective memory consolidation ( $r = -.34$ ), even when controlling for encoding, speed, and control-task performance (all  $ps < .05$ ). Frontal delta power, slow oscillations, and spindle density were not related to prospective memory consolidation. REM sleep duration, however, explained significant variance in prospective memory consolidation when controlling for age ( $\Delta R^2 = .10$ ). Bootstrapping mediation showed that less REM sleep significantly mediated the aging effect on prospective memory consolidation [ $b = -.0016$ ,  $SE = 0.0009$  (95% confidence interval [CI] =  $-0.0042$  to  $-0.0004$ )]. REM sleep continued to mediate 24.29% of the total effect of age on prospective memory after controlling for numerous demographic, cognitive, mental health, and sleep variables.

### Conclusion

Age-related variance in REM sleep is informative to how prospective memory consolidation changes with increasing age. Future work should consider how both REM sleep and slow wave activity contribute, perhaps in a sequential or dynamic manner, to preserving cognitive functioning with increasing age.

[intention](#), [prospection](#), [older adults](#), [polysomnography](#), [slow wave activity](#), [sleep spindles](#), [rapid eye movement sleep](#), [spontaneous retrieval](#), [preplay](#)

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