

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

Michael K Scullin, Chenlu Gao, Paul Fillmore, R Lynae Roberts, Natalya Prueett, Donald L Bliwise

Sleep, Volume 42, Issue 6, June 2019, zsz055, <https://doi.org/10.1093/sleep/zsz055>

Published: 12 March 2019 [Article history](#) ▼

Views ▼ Cite Permissions Share ▼

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](#)

© Sleep Research Society 2019. Published by Oxford University Press on behalf of the Sleep Research Society. All rights reserved. For permissions, please e-mail journals.permissions@oup.com.

This article is published and distributed under the terms of the Oxford University Press, Standard Journals Publication Model

Topic:

[aging](#)

[polysomnography](#)

[rem sleep](#)

[sleep](#)

[elderly](#)

[sleep spindles](#)

[memory, prospective](#)

Issue Section: [Cognitive, Affective and Behavioral Neuroscience of Sleep](#)

You do not currently have access to this article.

Sign in

Don't already have an Oxford Academic account? [Register](#)

Oxford Academic account

Email address / Username [?](#)

Password

[Sign In](#)

[Forgot password?](#)

[Don't have an account?](#)

Sleep Research Society members



[Sign in via society site](#)

American Academy of Sleep Medicine members

Sign in via your Institution

[Sign in](#)

Purchase

[Subscription prices and ordering](#)

Short-term Access

To purchase short term access, please sign in to your Oxford Academic account above.

Don't already have an Oxford Academic account? [Register](#)

Rapid eye movement sleep mediates age-related decline in prospective memory consolidation - 24 Hours access

EUR €36.00

GBP £28.00

USD \$45.00

Rental



This article is also available for rental through DeepDyve.

[View Metrics](#)

Email alerts

[New issue alert](#)

[Advance article alerts](#)

[Article activity alert](#)

[Subject alert](#)

[Receive exclusive offers and updates from Oxford Academic](#)

More on this topic

REM sleep without atonia with REM sleep-related motor events: broadening the spectrum of REM sleep behavior disorder

Prevalence and determinants of rapid eye movement sleep behavior disorder in the general population

The Benefit of Directed Forgetting Persists After a Daytime Nap: The Role of Spindles and Rapid Eye Movement Sleep in the Consolidation of Relevant Memories

Reduced Rapid Eye Movement Density in Parkinson Disease: A Polysomnography-Based Case-Control Study

Related articles in

[Google Scholar](#)

Related articles in PubMed

Taurine and its analogs in neurological disorders: Focus on therapeutic potential and molecular mechanisms.

Clinical features of isolated sleep paralysis.

Identification of Post-Concussion Dual-Task Gait Abnormalities Using Normative Reference Values.

Nightmares Are Associated With Future Suicide Attempt and Non-Suicidal Self-Injury in Adolescents.

Citing articles via

[Google Scholar](#)

[CrossRef](#)

Latest | **Most Read** | **Most Cited**

Characterization of the sleep disorder of anti-IgG disease

Actigraphic detection of periodic limb movements: development and validation of a potential device-independent algorithm. A proof of concept study

Simultaneous tonic and phasic REM sleep without atonia best predicts early phenotypic conversion to neurodegenerative disease in idiopathic REM sleep behavior

disorder

Residual symptoms after natural remission of insomnia: associations with relapse over 4 years

Sleep duration and fragmentation in relation to leukocyte DNA methylation in adolescents

Looking for your next opportunity?

Chair of Pain Research
Boston, Massachusetts

PEDIATRIC EMERGENCY PHYSICIAN
Saskatoon Shines, Saskatchewan

Endowed Chair of Occupational Health/Medicine
Saint John, New Brunswick

CHIEF OF THE DIVISION OF ALLERGY, IMMUNOLOGY AND INFECTIOUS DISEASE
New Brunswick, New Jersey

[View all jobs](#)

OXFORD
UNIVERSITY PRESS

[About SLEEP](#)

[Editorial Board](#)

[Author Guidelines](#)

[Facebook](#)

[Twitter](#)

[Contact Us](#)

[Purchase](#)

[Recommend to your Library](#)

[Advertising and Corporate Services](#)

[Journals Career Network](#)

Online ISSN 1550-9109

Print ISSN 0161-8105

Copyright © 2019 Sleep Research Society

[About Us](#)

[Contact Us](#)

[Careers](#)

[Help](#)

[Access & Purchase](#)

[Rights & Permissions](#)

[Open Access](#)

Connect

[Join Our Mailing List](#)

[OUPblog](#)

[Twitter](#)

[Facebook](#)

[YouTube](#)

[Tumblr](#)

Resources

Explore

[Authors](#)

[Librarians](#)

[Societies](#)

[Sponsors & Advertisers](#)

[Press & Media](#)

[Agents](#)

[Shop OUP Academic](#)

[Oxford Dictionaries](#)

[Oxford Index](#)

[Epigeum](#)

[OUP Worldwide](#)

[University of Oxford](#)

Oxford University Press is a department of the University of Oxford. It furthers the University's objective of excellence in research, scholarship, and education by publishing worldwide

[Copyright © 2019 Oxford University Press](#)

[Accessibility](#)

[Get Adobe Reader](#)

[Cookie Policy](#)

[Privacy Policy](#)

[Legal Notice](#)

[Site Map](#)