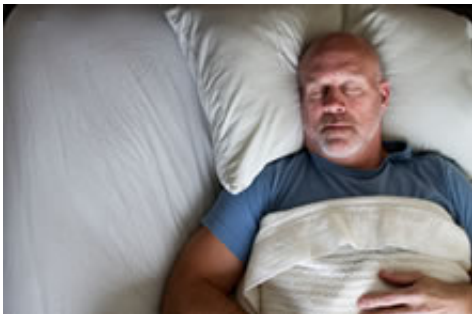


Sleep improves memory in people with Parkinson's disease

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The ability of sleep to improve scores on a test of working memory specifically depends on how much slow wave sleep Parkinson's patients obtain, researchers have found.

(Medical Xpress) -- People with Parkinson's disease performed markedly better on a test of working memory after a night's sleep, and sleep disorders can interfere with that benefit, researchers have shown.

While the classic symptoms of Parkinson's disease include tremors and slow movements, Parkinson's can also affect someone's memory, including "working memory." Working memory is defined as the ability to temporarily store and manipulate information, rather than simply repeat it. The use of working memory is important in planning, problem solving and independent living.

The findings underline the importance of addressing [sleep disorders](#) in

the care of patients with Parkinson's, and indicate that working [memory capacity](#) in patients with Parkinson's potentially can be improved with training. The results also have implications for the biology of sleep and memory.

The results were published this week in the journal *Brain*.

"It was known already that sleep is beneficial for memory, but here, we've been able to analyze what aspects of sleep are required for the improvements in working [memory performance](#)," says postdoctoral fellow Michael Scullin, who is the first author of the paper. The senior author is Donald Bliwise, professor of neurology at Emory University School of Medicine.

The performance boost from sleep was linked with the amount of [slow wave sleep](#), or the deepest stage of sleep. Several research groups have reported that slow wave sleep is important for synaptic plasticity, the ability of [brain cells](#) to reorganize and make new connections.

Sleep apnea, the disruption of sleep caused by obstruction of the airway, interfered with sleep's effects on memory. Study participants who showed signs of sleep apnea, if it was severe enough to lower their [blood oxygen levels](#) for more than five minutes, did not see a working [memory test](#) boost.

In this study, participants took a "digit span test," in which they had to repeat a list of numbers forward and backward. The test was conducted in an escalating fashion: the list grows incrementally until someone makes a mistake. Participants took the digit span test eight times during a 48-hour period, four during the first day and four during the second. In between, they slept.

Repeating numbers in the original order is a test of short-term memory,

while repeating the numbers in reverse order is a test of working memory.

"Repeating the list in reverse order requires some effort to manipulate the numbers, not just spit them back out again," Scullin says. "It's also a purely verbal test, which is important when working with a population that may have motor impairments."

54 [study participants](#) had Parkinson's disease, and 10 had dementia with Lewy bodies: a more advanced condition, where patients may have hallucinations or fluctuating cognition as well as motor symptoms. Those who had dementia with Lewy bodies saw no working memory boost from the night's rest. As expected, their baseline level of performance was lower than the Parkinson's group.

Participants with Parkinson's who were taking dopamine-enhancing medications saw their performance on the digit span test jump up between the fourth and fifth test. On average, they could remember one more number backwards. The ability to repeat numbers backward improved, even though the ability to repeat numbers forward did not.

Patients needed to be taking dopamine-enhancing medications to see the most performance benefit from sleep. Patients not taking dopamine medications, even though they had generally had Parkinson's for less time, did not experience as much of a performance benefit. This may reflect a role for dopamine, an important neurotransmitter, in memory.

Scullin and Bliwise are planning an expanded study of sleep and working memory, in healthy elderly people as well as patients with neurodegenerative diseases.

"Many elderly people go through a decline in how much slow wave [sleep](#) they experience, and this may be a significant contributor to [working](#)

[memory](#) difficulties," Scullin says.

More information: M.K. Scullin, L.M. Trotti, A.G. Wilson, S.A. Greer and D.L. Bliwise. Nocturnal sleep enhances working memory training in Parkinson's disease but not Lewy body dementia. *Brain* (2012) [doi: 10.1093/brain/aws192](https://doi.org/10.1093/brain/aws192)

Provided by Emory University

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