Getting enough sleep may help brain store, recall memories

13 December 2019

Credit: CC0 Public Domain

A review of more than 130 studies explains how sleep helps people learn new information and plays an important role in storing learned content for future use. The review is published in the January 2020 issue of Physiology.

Forming memories consists of learning new information, consolidating it in areas of the brain for long-term storage and the ability to recall the learned content later. The reviewers looked at studies in humans and animals that suggested that sleep helps the brain consolidate information stored in long-term memory. Earlier findings were based on the concept that different stages of sleep strengthened different types of memory retention. While brain activity during certain sleep states, such as slow wave activity, may be more beneficial for storing specific types of memory, it is now clear that consolidation in sleep has many facets.

Examining electrical activity in the brain can define various stages of sleep and the patterns of sleep architecture (structural organization of sleep). Looking at research that explores these patterns helps scientists understand how the brain consolidates memories during sleep and while awake. Several studies in the review found that learning a task increases subsequent slow-wave activity and sleep spindles—neural movements (oscillations) that are abundant during sleep—in the brain. The increase in these activities has been associated with improved performance of the task after sleeping. Other studies showed that enhancing slow-wave activity and spindles during sleep boosted retention of certain types of memories.

More recent research also investigates processes of forming false memories and generalizing previously learned content. "Overall, the specific modulation of brain oscillations of sleep to impact memory consolidation is a relatively new area, but provides substantial potential in unravelling the role of neural oscillations in the process of memory consolidation," the review's authors wrote.

Scientific research continues to develop tools that link neural activity to sleep behavior, the authors explained. "Future research should utilize these tools to scrutinize present and newly evolving concepts of memory consolidation," they wrote.

"Brain rhythms during sleep and memory consolidation: Neurobiological insights" is published in the journal *Physiology*.

More information: Lisa Marshall et al. Brain Rhythms During Sleep and Memory Consolidation: Neurobiological Insights, *Physiology* (2019). DOI: 10.1152/physiol.00004.2019

Provided by American Physiological Society