

Take a Nap, or Have a cup of Coffee?

“Comparing the benefits of caffeine, naps and placebo on verbal, motor and perceptual memory”.

Research Article Reviewed by Dr. Megan Kimberley, BSc., N.D.

This study tested memory after subjects either had a two hour nap, two cups of coffee's worth of caffeine in a pill, or a placebo pill. Verbal, Motor, and Perceptual tasks were used to communicate consolidated memory in subjects at 20 minute and 7 hour intervals. The nap improved performances across the board, but most significantly in direct comparison to caffeine with the motor skills test.

Stepping Out of the Hippocampus with New Findings

Four researchers from the University of California in 2008¹ sought to compare the benefits of caffeine and naps on memory consolidation. No previous study had measured caffeine's effects on this type of declarative memory specifically. Also new is their finding that naps improve use of a different part of the brain, the rhinal cortices of the parahippocampal gyrus.

Methods

Their three measures of memory included a verbal word list recall, a repetitive finger tapping test reflecting motor skills, and a texture discrimination test, measuring perception memory. The variables were a 200mg tablet of caffeine (one grande Starbucks, two cups of diner coffee, or three demi-tasse of espresso), a placebo pill, or a nap. The sleep time was capped at 90 minutes, as measured with a polysomnography (PSG), with a max of 2 hours allowed to linger in bed.

They used 61 adults, average age being in the early 20's, who were self reported as “moderate” caffeine drinkers. Here we come up against the first flaw of the study. No blood tests were performed to confirm caffeine levels at any point during the day of testing, or in the 7 days prior. That week before, efforts were made to mitigate confounding variables such as sleep hours and caffeine intake journaling, and requests for 8 hours of sleep a night. The morning baseline pretest of subjects did level the playing field, ensuring each test group had an even chance of failing.

Results are Good News for Nappers

The most robust finding resulted from the group that were given a word list, given a nap, then asked to recall that list, landing the test 7 hours after the presentation of the tested words. They did great compared to the caffeinated bunch ($p=.003$). This adds to previous study results pointing to a sleep-dependant memory consolidation process. The past studies used word pairs (associative declarative

memory) reliant on the hippocampus area of the brain. This method challenged the parahippocampal and rhinal cortices areas, by using memory consolidation (non-associative declarative memory). Now we know the sleep benefits are not limited to within the hippocampus, but surrounding areas as well. It was fun to see also that after a nap, subjects did better on learning a new list of words. Caffeinators, not so much.

Bad News About Caffeine

The worst outcome, in so many ways, was the caffeine group's dismal performance in the motor memory test. This led the authors to contemplate prior studies showing worse performance after higher doses of caffeine (250-400mgs), and better motor and memory performance after smaller amounts (60-70mg). The tremors the drug can elicit may also play a role in the motor control and worse aim on target tests, in cited studies on Navy Seals. Caffeine did decrease subjective sleepiness, but this did not transfer to improved motor learning and verbal memory. In some comparisons in this research, they did worse than the placebo poppers.

Conclusion: Do We Know for Sure?

There are so many variables, statistical significance was certainly not achieved in all group comparisons. One way analysis of variance (ANOVA) methods were used to tease out mean variances. Confounding factors included Rapid Eye Movement Sleep (REM) compared to Slow wave sleep (SWS), many memory measure methods, caffeine sensitivities, and drug habituation and withdrawal effects. What is needed is intimate control of test subjects over days. Regular serum draws and Electroencephalograph's on an isolated weeklong spiritual retreat would work.

It is interesting to note that naps win. As the researchers say "...no complete pharmacological alternative to a good night's rest has been discovered." (p.9). It would have been nice to see greater differences between larger groups, even though enough subjects were used to gain some statistical significance. There are so many confounding human variances that affect memory, sleep, and caffeine metabolism, robust numbers in this brilliantly designed study could elicit dramatic graphs. This may be suppressed by the coffee industry.

1. Mednick SC, Cai DJ, Kanady J, Drummond SPA. Comparing the benefits of caffeine, naps and placebo on verbal, motor and perceptual memory. *Behavioural Brain Research*. 2008;193(1):79-86. doi:10.1016/j.bbr.2008.04.028