Do Sleep-Deprived College Students Have A Higher Tendency For False Memories?

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Introduction

The phenomenon that sleep deprivation obstructs your memory has been studied for a multitude of years. The Deese Roediger McDermott Paradigm is a research experiment first done by John Deese which did not receive adequate results until further experimentation by Kathleen McDermott and Henry L. Roediger in 1995. The research of these three individuals made a significant impact in regards to the science behind false memories. The Paradigm itself is a systemic way to accurately replicate the brain's ability to curate fake memories to the point where they seem real. Participants are given a list of words, all corresponding to a critical "lure" word that is not mentioned in the list (McDermott & Roediger, 1995). The Deese Roediger McDermott Paradigm is an experiment I recreated within a classroom setting in the hopes to see how it intertwines with the amount of sleep college students get. A multitude of studies conclude that there is a higher risk of fake memories, or remembering the unmentioned lure word as well as many of the listed words, when the participants get an adequate amount of sleep. According to the National Library of Medicine, "Sleep is known to benefit memory consolidation through an active reorganization of representations whereas acute sleep deprivation impairs retrieval functions" (Diekelmann et al., 2010). This claims that adequate sleep benefits memory consolidation, or a gist effect. As a form of adaptation, the human brain creates fake related memories to allow us to absorb more information from the original. Such as remembering sleep from a list of words related to sleep, such as "pillow", "bed", "yawn" or "snooze". On the contrary, when participants do not sleep enough then they have no fake memories of the lure word, and on average remember less of the corresponding words within the list. The objective of this classroom study is to observe if college students have a tendency of having fake memories even when sleep deprived.

Method

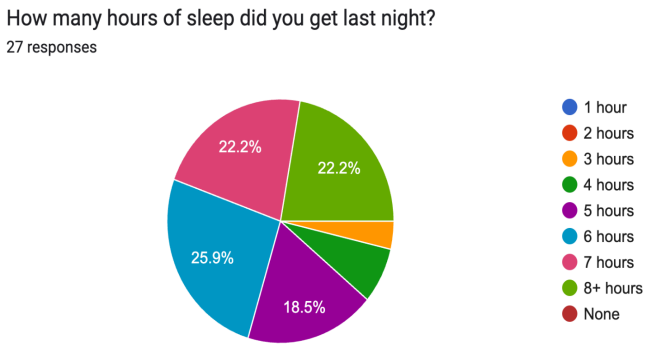
My experiment was conducted within the classroom in a specific way that replicated the original one. First, I created a google slideshow with a single slide full of fifteen words that all related to the lure word “sleep”. The list of the 15 included words: night, bed, rest. tired, dream, exhausted, blanket, fatigued, nap, yawn, snore, pillow, slumber, relax, and drowsy. The participants were informed to pay attention to the words and they were viewed for exactly 30 seconds, and then the words were taken off the screen. Afterwards, math worksheets were distributed to all participants and they had two minutes to complete them. The math worksheet's purpose was to hinder the participants’ short term memory. Once the two minutes were completed for them to do the math worksheet, then the participants were instructed to write down all the words on the same paper that they remembered from the respective list of words for two minutes.

Once the two minutes passed by, the experiment officially came to an end and it was time to gather the intel from it based on the google form at the end of the slideshow which all participants filled out. First question on the form asked if the participant wrote down “sleep” within their list of remembered words, to which their response would be either yes or no. The second question asked how many words did the participant end up remembering from the provided list. The third question asked how many hours of sleep did the participant get that night. The fourth and final question asked if the amount of sleep they got the night prior was an accurate depiction of how long they typically sleep every night. The answers to these questions allow for finding a relationship between those who slept more, and if they were the main ones who remembered the lure word of sleep, despite it not being present within the list.

Results

There were 27 students participating in this experiment. Of the 27 students, 63% remembered sleep within their list of remembered words, and 37% did not. As for how many words participants remembered, they ranged between 4 to 12. As for the results, 2 participants (7.4%) remembered 4 words, 3 participants (11.1%) remembered 5 words, another 3 participants (11.1%) remembered 6 words, 5 participants (18.5%) remembered 7 words, 4 participants (14.8%) remembered 8 words, 3 (11.1%) remembered 9 words, 4 participants (14.8%) remembered 10 words, 2 participants (7.4%) remembered 11 words, 1 participant (3.7%) remembered 12 words which is all demonstrated in the chart below.

As for how many hours each participant slept on the night prior, results were nearly evenly distributed. 1 participant slept for 3 hours, 2 participants slept for 4 hours, 5 participants slept for 5 hours, 7 participants slept for 6 hours, 6 participants slept for 7 hours, and the last 6 participants slept for 8+ hours as demonstrated by the chart. The data for the final question is if participants typically get this amount of sleep every night to which 42.2 percent noted they sometimes do, 34.6% noted they usually do not, and finally 23.1% noted they do usually do get this amount of sleep every night.



Although the paradigm reflected predicted results, there were some outliers that stood out within the experiment and were out of bounds from what was predicted. For example, a participant that slept for 3 hours

ended up guessing 9 words, in addition to the lure word. This contradicts the original hypothesis as it states that usually the participants who get more sleep (7 or more hours) are those who fall victim to false memories and remembering the lure word. There is also the presence of outliers in a vice-versa situation, such as how one participant ended up getting 7 hours of sleep and only remembered 4 words, including the lure word.

Discussion

The majority (63%) of the class writing down sleep as a remembered word his is one of the most general and vital statistics for this experiment. A majority of the classroom fell victim to having false memories and writing down the lure word. This coincides with past studies such as a registered paradigm experiment published by the Open Science Royal Society. This article states “sleep may have had the effect of increasing … false memories … Another way of describing this pattern is that sleep appears to benefit both (i) the accuracy of participants' memory for the word lists, plus (ii) the gist-like nature of the errors”. A majority of the students felt as though sleep was on the list because they heavily associated the concept of sleep with the words provided on the list. With that being said, those who ended up with fake memories ended up remembering the most words from the list as well. Those who did not have as much sleep did end up not having as many remembered words, let alone fake memories. Despite this data, there are multitudes of other factors to scope out and take into consideration. According to the University of Oregon’s Scholar Bank, there is not an adequate amount of research in regard to the relationship between sleep and fake memory creation. Not to mention other individual traits a participant may have which can interfere with the experiment. Many participants have different memory abilities, with some having better memory than others. In addition, some participants can have sleep disorders which inhibit R.E.M (rapid eye movement) sleep, making it so despite

the “adequate” sleep the memories coming out of it may not be as efficient. There are also individual differences in memory consolidation. Although sleep plays a factor into it, there are much more cognitive factors. Many participants may have stronger ideas about certain words and concepts than others do, this can make them more susceptible to the gist effect, or having fake memories. In order to combat these possible experimental interferences when it comes to re-enacting the experiment, a bigger participant group and broaden the results to help better rule out majority results. In addition, having some prior knowledge on individual characteristics, and perhaps doing separate tests in regards to memory ability and observing how much of a difference that makes within results .