How Does Working Memory Capacity Impact Memory Improvement After Traumatic Brain Injury?

Each year, about 1.6 million Americans experience a traumatic brain injury (TBI). A TBI occurs when someone experiences brain damage after a head trauma, such as from a fall or a car accident. Memory problems are common, affecting more than half of people with TBI. People with TBI may have trouble learning and remembering new information, which can cause challenges in school, work, and other settings. Memory training exercises can help people with TBI improve memory. However, it would be helpful to know whether these interventions help some people with TBI more than others.

Working memory capacity (WMC) is one factor that could play a role in how well individuals with TBI improve their memory in response to memory training exercises. WMC refers to a person’s ability to retain and process recently learned information for a short time, such as one’s ability to memorize a telephone number or a list of random words. One recent NIDILRR-funded study looked at the role WMC plays in people’s ability to improve their memory after TBI. Specifically, the researchers wanted to find out whether people with TBI who had high WMC would show better memory improvement following memory strategy training exercises, when compared to those who had low WMC.

To answer this question, researchers from the Northern New Jersey TBI Model System Center analyzed existing data from a study of the modified Story Memory Technique (mSMT), an intervention designed to improve memory for individuals with TBI. In the original study, sixty-nine adults ages 18 to 59 with moderate or severe TBI were included. Of those, about half of the participants received ten sessions with the mSMT, where they learned to use mental imagery and storytelling to remember new information. In the original study, the participants who received the mSMT intervention showed memory improvement on some of the memory outcome measures, while those who did not receive the intervention did not show improvement. For those who received
mSMT intervention, there was an improvement in learning stories but no improvement in learning an unorganized list of words.

For this current study, the researchers further analyzed the data, taking a closer look at the results for learning unorganized lists of words to see whether there was a difference between people with low and high WMC. In this follow-up study, participants were classified as either high or low WMC based on their scores from the initial evaluation. The participants’ WMC was evaluated by having them memorize unorganized sequences of letters and numbers and testing how many letters or numbers they could recall correctly. The researchers found that the participants with high WMC improved in how well they could recall of unorganized word lists. However, the participants with low WMC did not improve in this area.

The authors suggested that people with high WMC may use more effective strategies for remembering unorganized information than people with low WMC, an area which could be explored in future studies. While the mSMT helped both groups with recalling short stories, the participants with high WMC may have been able to apply the strategies from the mSMT to recall unorganized information like word lists. Other strategies may be less challenging or more effective for people with low WMC.

According to the authors, these specific memory strategy training exercises may benefit people with TBI more if they have high WMC. For people whose working memory is impaired, therapists may wish to focus on helping them improve working memory before moving on to more complex memory training exercises. In general, people with TBI may benefit most from treatment programs that are tailored to their individual strengths and challenges. Future research may explore what aspects of WMC contribute to successful cognitive rehabilitation after TBI.

To Learn More

Nancy Chiaravalloti, PhD, principal investigator for the Northern New Jersey TBI Model System Center, presented a TEDx talk on techniques for improving memory after TBI: https://www.youtube.com/watch?v=JbLAGpQ9RXg
Learn more about cognitive and memory issues after TBI with these resources from the Model Systems Knowledge Translation Center:


Memory and Moderate to Severe TBI: [http://www.msktc.org/tbi/factsheets/Memory-And-Traumatic-Brain-Injury#Top](http://www.msktc.org/tbi/factsheets/Memory-And-Traumatic-Brain-Injury#Top)

Visit the National Resource Center for TBI at Virginia Commonwealth University for articles, FAQs, and books for TBI survivors and their families: [http://www.tbinrc.com/store](http://www.tbinrc.com/store)

To Learn More About this Study


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