**Clinical Implementation Model**

Here, we highlight the intervention evaluated in one treatment article to illustrate clinical implementation of internal memory strategies as a memory management approach. We selected the paper by O’Neil-Pirozzi and colleagues20 because it received one of the highest methodology quality ratings out of the 46 studies reviewed in this paper and embodied a key practice guideline supported by the literature, the use of systematic instruction to teach internal memory strategies. The study also evaluated the effects of the training with participants who had a range of severity of injuries and cognitive impairments. What was lacking in this article was the use of patient-centered functional outcomes to measure efficacy. Suggestions were drawn from other articles that employed less robust experimental methodology but utilized functional outcomes measures to demonstrate how clinicians might quantify meaningful changes.

***Overview***

Our model study evaluated the effects of participation in a memory group intervention that trained 54 adults with traumatic brain injury to utilize internal memory strategies. These individuals participated in 12 weekly 90 minutes sessions in groups of 3-6 participants. The results of pre and post memory testing on two standardized measures, a list learning test (Hopkins Verbal Learning Test80) and an “everyday memory battery” (Rivermead Behavioral Memory Test74) were compared to the results of a control group who did not receive the intervention. Participation in the memory group intervention was associated with improved performance immediately post-intervention, and improvements were maintained at one month. While severe injuries were associated with less improvement, changes were still significant and findings indicated that people with a range of injuries benefit from internal memory strategy training. Age and pre-injury education were not related to improvement.

***Intervention description***

The group treatment began with memory education and a specific review of how internal memory strategies can improve encoding, storage, and retrieval. Internal memory strategies were presented as complimentary to any external aids that participants may have been using. Content of the memory group included: (1) education regarding memory function and strategies; (2) participants’ reflection regarding their memory function and use of strategies; (3) education about and practice with (via structured and functional activities) internal memory strategies and their use to facilitate encoding, storage, and retrieval; and (4) education and practice regarding influences on memory function and when things go wrong.

Thus, content of the memory groups thus included specific factual content about memory and strategies, as well as procedural information and practice. Semantic association (i.e., categorization and clustering) was emphasized the most, followed by semantic elaboration/chaining, and imagery.

The instructional approach in this study consisted of three specific phases and moved from an emphasis on *acquisition* (understanding definition and type of strategies), to *application* (practice using strategies with peer and facilitator feedback) and *adaptation* (strategy use in functional settings with discussion of strategy use). Error free learning occurred that minimized errors when first learning the strategies by fading the cues only after the person was able to do the strategy accurately. Instruction also included a metacognitive emphasis in which participants evaluated both task-specific memory demands and their memory ability and then used these strategies to maximize their performance.

An example of the instructional phases and specific instructional techniques applied to an actual participant illustrates the principles. Julia was an interior decorator who was motivated to return to work post-injury. During meta-memory education, Julia identified that she was having difficulty encoding job-related information. Group instruction on defining semantic association facilitated Julia’s understanding of this strategy. For example, to help Julia encode her ongoing list of job tasks across multiple clients, she used the semantic category “rooms” and mastered associating job tasks per client by room (e.g., kitchen: appliances for Brown and tile for Smith; bathroom: fixtures for Williams). Her completion of semantic association tasks, initially without memory demands and using work-related stimuli, facilitated her errorless acquisition of the semantic association strategy. Errorless learning was then introduced to gradually increase the memory-based encoding demands associated with continued completion of these tasks by successfully applying strategy use. Julia completed related homework assignments that she helped develop to further acquire, apply, and adapt strategy use. She reflected on her homework experience in subsequent sessions and further refined her ongoing use of the strategy.

***Measurement of treatment effects***

The participants in the memory strategy training group performed significantly better on standardized tests of list learning and a functional battery than those in the control group. To measure everyday functioning, researchers used the RBMT74 which contains some functional memory subtests. However, this standardized test is de-contextualized; thus, there was not a measure of community or applied functioning.

The cognitive rehabilitation field has shifted in its recognition of patient-centered outcomes as the most important determiner of efficacy of an intervention approach. Examples of patient-centered outcomes include questionnaires and surveys that capture participant perceptions of memory function such as the Memory Compensation Questionnaire,76 the Prospective-Retrospective Memory Questionnaire,77 the Satisfaction With Life Scale,78 and the Subjective Memory Questionnaire.79 A number of the studies in the evidence-based used functional questionnaires as outcome measures. e.g., 25,40,44 Patient-centered outcomes may also be measured by assessing changes in the learning of the material that was directly targeted. For example, if a reading comprehension and retention strategy is evaluated, a meaningful outcome measurement might be the delayed recall of text.e.g., 59 Zencius and colleagues67 evaluated the number of job lead components recalled the next day in an attempt to compare the functional outcomes between different types of memory strategies, providing a model of outcome measure with personal and clinical significance. To assess the impact of internal memory strategy training, it is critical to evaluate outcomes with personal relevance to the participants.