



**AOTA Critically Appraised Topics and Papers Series**  
**Traumatic Brain Injury**

*\*A product of the American Occupational Therapy Association's  
Evidence-Based Literature Review Project*

**CRITICALLY APPRAISED PAPER (CAP)**

***Focused Question***

**What is the evidence for the effect of interventions to address cognitive/perceptual functions (attention, memory, executive functions) on the occupational performance for persons with traumatic brain injury (TBI)?**

Tam, S-F., & Man, W-K. (2004). Evaluating computer-assisted memory retraining programmes for people with post-head injury amnesia. *Brain Injury*, 18, 461–470.

**PROBLEM STATEMENT (JUSTIFICATION OF THE NEED FOR THE STUDY)**

State the problem the authors are investigating in this study.

Memory and learning disorders are among the most common deficits after brain damage. Many clinicians have recommended using computers in cognitive rehabilitation. However, it is still not clear whether computer-assisted rehabilitation is more effective than non-computerized methods. The development of the present computer-assisted memory program uses the behavioral approach of Wilson (e.g., shaping, chaining, prompting, modeling). Intervention that improves the subject's self-efficacy will also result in greater persistence and success.

**RESEARCH OBJECTIVE(S)**

List study objectives.

Compare the effectiveness of four different computer-assisted memory training strategies based on the behavioral approach.

Hypothesis: Computer-assisted memory retraining can improve memory skills of persons with brain injury and thus their perceived self-efficacy on memory tasks.

Describe how the research objectives address the focused question.

It tests the effectiveness of four types of computer-assisted therapy for recovery of memory; although occupational performance is not measured, per se, self-efficacy is, which is an important aspect of occupational performance.

**DESIGN TYPE:**

Five group pretest–posttest design. Subjects randomly assigned to one of 4 experimental groups; control group chosen after randomization. Analysis was on pretest to posttest only, not across groups. Pilot study.

**Level of Evidence:**

II

Limitations (appropriateness of study design):

Was the study design type appropriate for the knowledge level about this topic? *If no, explain.*

Yes

No

✓ should have made it a randomized controlled trial by comparing across groups and including the control group in the original randomization.

**SAMPLE SELECTION**

How were subjects selected to participate? Please describe.

Two stage random sampling. 1<sup>st</sup> stage: Clusters of the subjects were identified at 3 different clinical locations and were drawn by lot and invited to join the study. 2<sup>nd</sup> stage: Randomly assigned to 1 of 4 groups. Control group identified separately

**Inclusion Criteria**

Aged 18–45 years; > 3 months post-closed head injury; reported to have post-brain injury short-term semantic memory impairment; score of < 15/24 on Rivermead Behavioural Memory Test

**Exclusion Criteria**

Severe visual defects; impaired physical functioning prohibiting operation of keyboard or mouse; pre-morbid mental retardation or other neurological pathology preceding head injury.

Sample Selection Biases: *If yes, explain.*

Volunteers/Referrals

Yes

✓ invited to participate (volunteers)

No

Attention

Yes

No

Others (list and explain):

### SAMPLE CHARACTERISTICS

$N = 26$  experimental (24), 8 control; experimental mean age = 36.5 years; control mean age = 45

% Dropouts

# (%) Male

# (%) Female

Ethnicity

Disease/disability diagnosis

Check appropriate group:

<20/study group <input checked="" type="checkbox"/>	20–50/study group	51–100/study group	101–149/study group	150–200/study group
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Sample Characteristics Bias: If no, explain.

If there is more than one study group, was there a similarity between the groups?

Yes  researchers said the groups were matched diagnostically and demographically; matched on age and gender

No  not matched on pretraining memory skill level and self-efficacy.

Were the reasons for the dropouts reported?

Yes

No

**INTERVENTION(S)**—Included are only those interventions relevant to answering the evidence-based question.

*Add groups if necessary*

All programs provided an increasing level of difficulty in cognitive tasks and immediately displayed a person's ongoing time and accuracy scores. Level of difficulty challenged the person's ability, but also allowed success. Each program included 4 modules that were similar across programs and that related to important daily functions: remembering people's names and faces, remembering to do something, remembering what people tell them (p. 464), and remembering where something was put.

Group 1: Self-paced practice strategy;  $N = 6$  (also reported to be  $N = 7$ )

Brief Description	Allowed the patient to work at his or her own pace in a nonthreatening environment. Related to self-confidence concept.
Setting	Rehabilitation center
Who Delivered?	NR
Frequency?	20–30 minutes per session
Duration?	10 sessions

Group 2: Visual presentation,  $N = 6$

Brief Description	Visual presentation of attractive, bright, and colorful stimuli. Related to focused attention concept. It was supposed to help clients engage in the activity and improve their attention.
Setting	Rehabilitation center
Who Delivered?	NR
Frequency?	20–30 minutes per session
Duration?	10 sessions

Group 3: Multi-sensory feedback;  $N = 6$  (also reported to be  $N = 7$ )

Brief Description	Immediate feedback in a clear, consistent, non-judgmental fashion. Related to learning process and outcome concepts.
Setting	Rehabilitation center
Who Delivered?	NR
Frequency?	20–30 minutes per session
Duration?	10 sessions

Group 4: Personalized training content;  $N = 6$

Brief Description	Multimedia presentation of the client's actual objects, living environment, and friends/family/coworkers. Related to ecological validity concept
Setting	Rehabilitation center
Who Delivered?	NR
Frequency?	20–30 minutes per session
Duration?	10 sessions

Group 5: Control;  $N = 8$

Brief Description	No treatment
Setting	
Who Delivered?	
Frequency?	
Duration?	

Intervention Biases: Explain, if needed.

Contamination

Yes

No

NR

Co-intervention

Yes

No

NR

Timing

Yes

No

NR

Site

Yes

No

NR

Use of different therapists to provide intervention

Yes

No

NR

NR = Not reported.

**MEASURES AND OUTCOMES**—Included are measures relevant to answering the focused question.

Name of measure:

Self-efficacy rating scale

Outcome(s) measured (what was measured?):

Based on Bandura's definition of self-efficacy as one's belief that one can execute behavior to achieve the desired outcome. Subjects had to indicate, using a 100-point scale, the extent to which they felt capable of executing each of the listed cognitive-behavioral memory tasks that were arranged along a hierarchy of difficulty.

Is the measure reliable (as reported in article)?

Yes

No

NR

Is the measure valid (as reported in article)?

Yes  reported to be, but no information provided

No

NR

How frequently was the measure used for each group in the study?

Before and after the experiment.

Measurement Biases

Were the evaluators blinded to treatment status? *If no, explain.*

Yes

No

NR

Recall or memory bias *If yes, explain.*

Yes

No

NR  Unlikely; clients had memory problems

Others (list and explain):

Name of measure:

Rivermead Behavioural Memory Test (RBMT)—Chinese Version

Outcome(s) measured (what was measured?):

Not reported; presumably various types of memory

Is the measure reliable (as reported in article)?

Yes  100% agreement between the raters for 2 scoring systems. Does not report test-retest reliability as was needed for this study.

No

NR

Is the measure valid (as reported in article)?

Yes

No

NR

How frequently was the measure used for each group in the study?

Before and after the experiment

Measurement Biases

Were the evaluators blinded to treatment status? *If no, explain.*

Yes

No

NR

Recall or memory bias? *If yes, explain.*

Yes

No  They used a parallel version of the test at the posttest.

NR

Others (list and explain):

Insensitive to change, according to authors

Limitations (appropriateness of outcomes and measures) *If no, explain.*

Did the measures adequately measure the outcome(s)?

Yes

No

NR

**RESULTS**

List results of outcomes relevant to answering the focused question

Include statistical significance where appropriate ( $p < 0.05$ )

Include effect size if reported

No significant improvement on the RBMT by any of the groups; the visual presentation group showed the greatest improvement (35%). The feedback group showed a significant ( $P < 0.05$ ) gain in self-efficacy score (12%); no other group improved significantly. All 4 computer groups improved significantly ( $p < 0.05$ ) on the computer quiz scores using their own module as compared to before treatment; the feedback group (31% improvement) and the self-paced group (28% improvement) improved the most.

Was this study adequately powered (large enough to show a difference)? *If no, explain.*

Yes

No  Probably not; no power analysis included. Many nonsignificant findings, despite improvements in some groups, which may have been significant if the sample size were greater.

Were appropriate analytic methods used? *If no, explain.*

Yes

No  The groups were not compared against each other; therefore, it was not a true randomized controlled trial. Repeated t tests without correction reported. Authors state that their failure to include analyses of the effects of confounding variables was a limitation.

Were statistics appropriately reported (in written or table format)? *If no, explain.*

Yes  all information was provided.

No

## CONCLUSIONS

State the authors' conclusions that are applicable to answering the evidence-based question.

The results of the present study evidenced the effectiveness of using computers in patients' cognitive rehabilitation. The feedback group showed the greatest percentage of improvement of self-efficacy; this implies that feedback is a crucial factor to improve self-efficacy.

Were the conclusions appropriate for the study design (level of evidence)? *If no, explain.*

Yes

No  first conclusion was inaccurate; there was no significant improvement on a standardized test of memory

Were the conclusions appropriate for the statistical results? *If no, explain.*

Yes

No  the results do not offer evidence that the computer-assisted therapy was effective with the exception of the feedback group, which improved in self-efficacy, but not on memory skills.

Were the conclusions appropriate given the study limitation and biases? *If no, explain.*

Yes

No

## IMPLICATIONS FOR OCCUPATIONAL THERAPY

This section provides guidance about clinical practice, program development, and other implications of the study findings as they relate to the focused question.

This is a poorly written article; the information was scattered throughout the article rather than presented in an organized way.

The outcome of this study verifies that clear, consistent, nonjudgmental feedback is likely to increase a person's self-efficacy if the tasks being learned are within the person's capabilities even though challenging. It does not support the effectiveness of computer-assisted programs to improve memory.

This work is based on the evidence-based literature review completed by Catherine Trombly, ScD, OTR/L, FAOTA.

CAP Worksheet adapted from: Critical Review Form – Quantitative Studies ©Law, M., Stewart, D., Pollack, N., Letts, L., Bosch, J., & Westmorland, M., 1998, McMaster University. Used with permission.

For more information about the Evidence-Based Literature Review Project, contact the American Occupational Therapy Association, 301-652-6611, x 2052.



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