



**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)?**

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Sohlberg, M. M., McLaughlin, K. A., Pavese, A., Heidrich, A., & Posner, M. I. (2000). Evaluation of attention process training and brain injury education in persons with acquired brain injury. *Journal of Clinical and Experimental Neuropsychology*, 22, 656–676.

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

State the problem the authors are investigating in this study.

Acquired brain injuries frequently produce difficulties in attention and short-term memory. Patients report problems with concentration distractibility, forgetfulness, and difficulty doing more than one thing at a time. Most rehabilitation relies on some combination of education and social support, practice, and process training. Attention Process Therapy (APT) has been found to be effective in some ways and ineffective in others. A recent study concluded that APT resulted in learning of new skills rather than improved processing.

**RESEARCH OBJECTIVE(S)**

List study objectives.

Research questions were:

- Are there quantitative and/or qualitative differences in the changes reported by participants after APT compared to an educational and support method?
- Which brain networks will benefit the most from APT and/or education?
- Will responses to APT and the information reveal insights about the effects of practice?
- Will patients' responses to practice and/or APT differ based on their vigilance ability?

This review is interested in the first and third questions.

Describe how the research objectives address the focused question.

The authors intend to investigate the effects of two different treatments on performance in naturalistic settings (occupational performance).

**DESIGN TYPE:**

Two group crossover design with random assignment to group

**Level of Evidence:**

I

Limitations (appropriateness of study design):

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

Yes

No

**SAMPLE SELECTION**

How were subjects selected to participate? Please describe.

**Inclusion Criteria**

Between 18 and 60 years; acquired brain injury with evidence on imaging studies at time of diagnosis; > 1 year post-onset; absence from preinjury of any neurological disability, psychiatric history, or learning disability; significant other available to take measures of everyday function; attention deficits as determined via neuropsychological evaluation and subjective report from participant and/or significant other.

**Exclusion Criteria**

NR

NR = Not reported.

Sample Selection Biases: *If yes, explain.*

Volunteers/Referrals

Yes  referred by local service providers

No

Attention

Yes

No

Others (list and explain):

### SAMPLE CHARACTERISTICS

$N = 14$ ; mean age: group 1 = 33.1 years, group 2 = 38.1 years; time postinjury: group 1 range = 1–22 years, group 2 range = 1–2.8 years; education: group 1 mean = 11 years, group 2 mean = 12 years.

% 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

No  in spite of random assignment, group 2 performed better on the neuropsychological tests compared to group 1 at start of study.

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

Group 1: Condition A, APT

Brief Description	A cognitive intervention designed to improve a wide range of tasks involving attention. The APT materials consist of a group of hierarchically organized tasks that exercise different components of attention: sustained, selective, alternating, and divided. The program tasks place increasing demands on complex attentional control and working memory systems (e.g., auditory tapes listening for descending number sequences; alphabetizing words; detecting targets with increasing distracters). APT tasks individualized to each patient. Test tasks differed from therapy tasks. Individual therapy.
Setting	Speech and hearing clinic
Who Delivered?	Therapist (certified speech/language pathologist or speech/language pathology graduate student )
Frequency?	3 1-hour sessions/week
Duration?	24 hours over 10 weeks

Group 2: Condition B, placebo; brain injury education, supportive listening, and relaxation training

Brief Description	Education (30 minutes): Participants selected their own education topics. Materials were designed for this study. Written materials for each topic, designed for this study, were modified to match each participant’s level of education and comprehension.  Supportive listening (15 minutes): “How are things going?”, listening and paraphrasing answers.  Relaxation (15 minutes): Progressive relaxation. Time allocation not imposed if participants wanted a different amount. Whether individual or not is not reported, but alludes to group therapy.
Setting	NR
Who Delivered?	Same as Condition A
Frequency?	1 hour/week
Duration?	10 hours over 10 weeks

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

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

Name of measure:

3 questionnaires to assess perceptions of daily living; specifically developed for use with individuals with brain injury: Attention Questionnaire (AQ), Brock Adaptive Functioning Questionnaire (BAFQ), Dysexecutive Questionnaire (DQ)

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

Adaptive functioning or the impact of attention deficits on day-to-day living:

AQ: Rate frequency of occurrence for different attention problems

BAFQ: 68 items to measure adaptive functioning (planning, initiation, attention/memory, arousal/inhibition, social monitoring, and an index of awareness

DQ: 20 questions describing problems related to decreased attention and executive control; the respondent rates frequency of occurrence scale

Is the measure reliable (as reported in article)?

Yes

No

NR

Is the measure valid (as reported in article)?

Yes  BAFQ correlated well with electrophysiological responses during a simple attention task

No

NR  for others

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

3 times: prior to start of study, at end of first condition, at end of second condition; administered to participant and significant other independently

Name of measure:

1-hour structured interview

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

Four questions:

- Have you noticed anything in your day-to-day life that you feel has been affected by participating in the treatment at the clinic?
- Is there anything that you feel has been particularly helpful about coming to treatment?
- Is there anything that has been disappointing about coming to treatment?
- If you think specifically about changes in your thinking ability, how do you feel this treatment helped or did not help?

Is the measure reliable (as reported in article)?

Yes

The coding of the responses was evaluated by a noninterested community practitioner and a researcher. Point by point agreement ratios ranged from 73% to 85 %, indicating adequate reliability.

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?

Twice, at end of each condition

Name of measure:

Neuropsychological attention battery of 9 tests (4 hours; not the focus of this review)

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

Attention impairments following brain injury.

Is the measure reliable (as reported in article)?

Yes

All are reported to be reliable

No

NR

Is the measure valid (as reported in article)?

Yes

All are reported to be diagnostic of attention impairment or associated with the areas of brain function identified by PET scan to be involved in attention processing

No

NR

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

3 times: prior to start of study, at end of first condition, at end of second condition

### Measurement Biases

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

Yes  Probably; testing was done by neuropsychologists, not the speech/language pathologists who did the treatment

No

Recall or memory bias *If yes, explain.*

Yes  Possibly; the interview required the participant to think about changes in thinking ability. Tests repeated three times and recall could have been a factor.

No

Others (list and explain):

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

Did the measures adequately measure the outcome(s)?

Yes

No

## **RESULTS**

List results of outcomes relevant to answering the focused question

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

Include effect size if reported

NR; calculated by reviewer using available data.

- There was a strong dissociation between cognitive performance (objective: neuropsychological tests) and psychosocial function (subjective: interview).
- Number of changes in cognitive performance—everyday functions, memory/attention, and psychosocial functions—reported in interview were significantly greater after APT than education ( $F_{(1,10)} = 5, P < 0.05, r = .58$ ).

- Type of changes: More changes in memory and attention (1.59) reported than in psychosocial functions (.59). Smallest number of changes reported was in everyday functions (.05). More memory and attention changes reported after APT training than education. More psychosocial changes reported after education than APT.
- Patients who reported a total of >2 cognitive changes in the structured interviews had a greater change on the PASAT (a neuropsychological test) than those who reported < 2 change. This was a significant difference ( $t_{(12)} = -2.36, p < 0.05, r = .56$ ), indicating that perceived cognitive improvement corresponds to greater improvement in the PASAT, an objective measure of cognitive function.
- The analysis of the questionnaires indicated significant improvements reported over time (practice;  $F_{(6,50)} = 3.36, p < 0.01$ ) that were not associated with type of treatment ( $F_{(3,8)} < 1, p > .65$ ).

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

Yes

No

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

Yes

No

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

Yes

No

**CONCLUSIONS**

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

All aspects of the study suggest that practice, whether by repeating the assessment tasks or from participating in the training of general processes using APT, improves performance. In addition, teaching about brain injury issues appears to improve attitude of patients. The significant finding of this study was that for low-vigilance participants, APT resulted in improved attentional skills, which generalized to measures that were different from training tasks.

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

Yes

No

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

Yes

No

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

Yes

No

### **IMPLICATIONS FOR OCCUPATIONAL THERAPY**

Occupational therapists use structured interviews as an assessment measure. In this study, the structured interview was found to be a valuable evaluation procedure to ascertain how attention was employed in day-to-day life and the nature of the impact of attentional deficits in daily life. Structured interviews imply prior thought of the questions to be asked to obtain particular information, rather than informal interviews that may or may not yield important information.

The use of cognitive tasks as described for the APT did not change daily life very much for these participants. Practice was important to improve performance within the cognitive realm, but the changes did not transfer to daily life.

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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