



**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)?**

Hart, T., Hawkey, K., & Whyte, J. (2002). Use of a portable voice organizer to remember therapy goals in traumatic brain injury rehabilitation: A within-subjects trial. *Journal of Head Trauma Rehabilitation, 17*, 556–570.

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

State the problem the authors are investigating in this study.

Deficits in memory and organization that typically follow moderate and severe traumatic brain injury (TBI) include difficulties with prospective memory, recall of everyday events, and learning new information. Restorative approaches, such as memory exercises and drills, appear to have limited effectiveness. However, strategies based on compensatory techniques such as use of notebooks, planners, and other paper-based materials are a staple of most rehabilitation programs for TBI. There have been disadvantages noted for such methods, however. The very deficits that a notebook is designed to remediate may make it hard for the user to implement the strategy. The revolution in computer technology has great potential for helping people with TBI to compensate for cognitive limitation. Devices such as personal digital assistants (PDAs), pocket-sized personal computers, software-driven paging systems, and programmable watches are gaining clinical use in TBI rehabilitation programs and have been studied in controlled investigations. As part of a larger project intended to address the problems and potentials of emerging technologies in TBI rehabilitation, the authors wished to explore whether portable electronic devices could enable behaviors other than those relating to performance of time-linked tasks.

## RESEARCH OBJECTIVE(S)

List study objectives.

Determine whether use of an electronic device (a voice organizer) could help clients with TBI remember and articulate therapy goals.

Describe how the research objectives address the focused question.

The study examines an intervention that aims to improve occupational performance of persons with TBI by influencing their behavior by reminders throughout the day.

## DESIGN TYPE

One group, repeated measures with conditions randomized

## 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  exploratory

No

## SAMPLE SELECTION

How were subjects selected to participate? Please describe.

Recruited from community reentry program and clubhouse day program

## Inclusion Criteria

- 1) Documentation that memory impairment had been observed during functional evaluation that preceded the treatment program
- 2) Confirmation from case manager that the subject exhibited significant memory impairments, including difficulty remembering therapy goals
- 3) Absence of severe expressive or receptive language deficits
- 4) Involvement in a comprehensive treatment program 2 to 5 days per week (to ensure enough treatment goals)
- 5) Severe clinical memory deficits that affect functioning in therapies and other aspects of daily living

## Exclusion Criteria

NR

NR = Not reported.

Sample Selection Biases: If yes, explain.

Volunteers/Referrals

Yes  recruited and paid

No

Attention

Yes

No  Probably not; each participant used the PDA for several days prior to the start of the trial to get used to carrying it around and used to responding to its beeps. The messages on it during the trial were not related to the trial.

Others (list and explain):

**SAMPLE CHARACTERISTICS**

$N = 10$ ; mean age = 31.5 years (range = 19–45); 9 > 1 year postinjury, 1 at 3 months postinjury; had been engaged in post-acute therapies for 1–43 months (mean = 11.8).

% 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  N/A; repeated measures design

Were the reasons for the dropouts reported?

Yes

No  N/A

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

*Add groups if necessary*

The purpose of the treatment is to remember goals. Goals were defined as both broad statements of purpose about the reasons for treatment and more specific assignments that the client had agreed to keep in mind, accomplish during the week, or work on in an ongoing way. Each participant’s case manager was asked to choose and articulate in one sentence a list of six current therapy goals that were likely to be included in case management sessions, familiar to the client from previous discussions, known to have been forgotten or not followed, and agreed to be important by the client and family. These goals were meant to help effect behavioral changes. One time, time-linked goals were not included. Goals that involved doing things at certain times during the day were included (e.g., taking medications). The case manager also provided one or two “key words” to be used in the cued recall situation. Random assignment of goals to be recorded or unrecorded was done by blind selection of identical slips of paper. All six were recorded onto a separate sheet of paper in random order, with the stipulation that the three chosen to be recorded were listed consecutively. Before the trial, participants received individualized training so they would be able to operate the PDA to replay the goals at prearranged times. The three steps needed operate the device were written on a small slip of paper and attached to the PDA. Training continued to criterion performance. Research and clinical staff monitored participants’ use of the devices to circumvent technical problems and to check compliance. During the weekend, the monitoring was done by phone.

Condition 1: (Control) Remember

Brief Description	Remember 3 randomly chosen goals. These goals were considered equally important as the experimental target goals, but were not recorded or repeated in any systematic fashion.
Setting	Community reentry program or clubhouse day program
Who Delivered?	Case manager listed the 6 goals to the client
Frequency?	NA
Duration?	1 week (7 days)

Condition 2: (Experimental) Use PDA to remind

Brief Description	The PDA (Parrot Voice Mate III) reminded the client several times a day about 3 of the 6 goals, randomly chosen. The device was 3" x 5" and weighed 5 ounces. Participants were issued a Parrot with carrying case that attached to a belt or purse strap. They were instructed to wear or carry it each day during the training period and during the 1 week trial. Two functions of the device were used: the memo function that recorded and played back messages, and the appointment function that sounded an alarm at three consistent times per day (chosen by the participant). The participant was instructed, when it beeped, to play the recording of the goals.
Setting	Community reentry program or clubhouse day program
Who Delivered?	Case manager listed the 6 goals to the client and the 3 chosen to be recorded were recorded onto the PDA at the same time
Frequency?	NA
Duration?	1 week (7 days)

Intervention Biases: *Explain, if needed.*

Contamination

Yes

No

Co-intervention

Yes

No

Timing

Yes

No

Site

Yes

No

Use of different therapists to provide intervention

Yes

No  case manager was consistent from week 1 to week 2

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

Name of measure:

Recall of the 6 goals

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

Recall of 6 goals under 2 conditions: Free recall and cued recall. In each case, the tester read from a script to lead up to the participant's response. The recalled goals were recorded on a Dictaphone for transcription. Each goal on the transcription was scored on a scale of 0 (don't know responses) to 3 (closely captured the original goal statement). One of two trained scorers (neuropsychology graduate students) who were blind to experimental procedure scored the verbatim transcription on content rather than verbatim accuracy.

Is the measure reliable (as reported in article)?

Yes  Of the 120 values generated by the 2 scorers (10 subjects, 6 goals, 2 cueing conditions), 85 (71%) were in perfect agreement and 115 (96%) agreed within 1 point. Discrepancies were resolved by discussion between the scorers and the first author (also blind to which goals had been recorded).

No

NR

Is the measure valid (as reported in article)?

Yes

No

NR  but obviously has face validity

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

Once; before the case management meeting 7 days after the last case management meeting when the participant was told the 6 goals to remember and given the recorded goals in the PDA

Measurement Biases

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

Yes

No

Recall or memory bias *If yes, explain.*

Yes

No  memory was the participants' problem

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

There was no resistance to use of the device. No participant missed a full day's worth of listening episodes. Friedman nonparametric repeated measures analysis of variance by ranks to compare the 4 sets of scores (2 conditions x 2 cueing conditions) = 18.0,  $p < .001$ . The recorded goals were better recalled than the unrecorded goals, and the cued recall was better than free recall for both conditions. Wilcoxon Signed Ranks Test used to compare recall for recorded vs unrecorded in free recall condition ( $z = -2.53$ ,  $p < .005$ ) and cued recall condition ( $z = -2.66$ ,  $p < .01$ ). All 10 participants liked using the device.

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.

The results showed that using a voice organizer to listen to recorded goals at multiple, consistent times each day was effective in enhancing recall of goals at the verbal level, with and without the addition of brief reminder cues. Future research needs to evaluate whether this intervention affects actual goal-related behaviors. The current study demonstrated the efficacy of this intervention, but we cannot make conclusions about the clinical effectiveness of voice organizers in TBI rehabilitation without further research.

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

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

Occupational therapists can join in the continued research of this promising intervention to evaluate what effect, if any, recall of goals, as supported by a PDA, has on behavior of persons with moderate to severe TBI, and whether such a device can be used to influence important behaviors more directly through reminders throughout the day. The design of the research reported in this study offers occupational therapists a good model to use in clinical research where participants are few and heterogeneous.

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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