



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 (published between 2000-2004) to enable persons with traumatic brain injury (TBI) to participate in areas of occupation (activities of daily living [ADL], instrumental activities of daily living [IADL], work, leisure, social participation, and education)?

Hayden, M. E., Moreault, A. M., LeBlanc, J., & Plenger, P. M. (2000). Reducing level of handicap in traumatic brain injury: An environmentally based model of treatment. *Journal of Head Trauma Rehabilitation, 15*, 1000–1021.

PROBLEM STATEMENT (JUSTIFICATION OF THE NEED FOR THE STUDY)

For almost two decades, there have been questions about the ability to generalize skills developed and/or demonstrated by patients with brain injury from one environment to another.

Two injury-related characteristics interfere with generalization: Diminished information processing capacity makes performance highly vulnerable to internal and external distractions, and diminished executive functions make performance vulnerable to the amount of external structure provided.

Neuropsychological testing is structured and distraction-free, but performance demonstrated in testing does not transfer to other situations. The same is true for transferring from a protected treatment environment to everyday life.

No comprehensive rehabilitation model that addresses ecological validity or reduction of handicap has been previously reported.

The model of treatment to decrease handicap focuses on two environmental variables: Degree of distractions tolerated and degree of structure required by each individual to function optimally. The program should increase independence in everyday life and the ability to generalize skills.

State the problem the authors are investigating in this study.

Whether a treatment milieu that gradually changes environmental factors of distractions and structure would result in significant decreases in handicap at discharge and at 6 months after treatment.

RESEARCH OBJECTIVE(S)

List study objectives.

- To present a treatment model with a primary goal of minimizing handicap through treatment that uses carefully simulated environments;
- To present an outcome measurement system that corresponds to the treatment model;
- To present outcome data for a broad group of patients recovering from TBI.

Describe how the research objectives address the focused question.

Treatment focuses on decreasing handicap and increasing participation in areas of occupation.

DESIGN TYPE:

Pretest–posttest. There were 4 separate groups, based on time since injury and severity, but these were tested separately, not compared.

Level of Evidence:

Level III

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.

Method of sample selection is not reported. The sample is comprised of all patients who successfully completed the model treatment program. The authors did not describe how they recruited patients to participate in the program.

Inclusion Criteria

NR

Exclusion Criteria

NR

NR = Not reported.

Sample Selection Biases: If yes, explain.

Volunteers/Referrals

Yes

No

NR

Attention

Yes

No

Others (list and explain):

SAMPLE CHARACTERISTICS

N= 61

% 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?

There was one group in which all patients received the same treatment and were tested at admission and discharge. That group was subdivided into 4 groups on the basis of time since onset and severity. Scores were analyzed only within each group.

Yes

No

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

Group 1: Acute; direct admission from a hospital

Brief Description	Environmental simulation to control and gradually increase the degree of distraction tolerated and gradually decrease the degree of structure required while engaged in individually chosen ADL and IADL (community mobility and productive) tasks that challenge each person's identified deficits
Setting	Clinic
Who Delivered?	Multidisciplinary team headed by a neuropsychologist (8 disciplines, including occupational therapy)
Frequency?	Daily, 5–6 hours/day
Duration?	Treatment days differed with group; range was 35–62 days.

N = 25; mean age = 39 years; mean days postinjury = 45; mean treatment days = 62

Group 2a: Less acute; admitted from home within 1 year of injury; mild TBI

Brief Description	Same as Group 1
Setting	Clinic
Who Delivered?	Multidisciplinary team headed by a neuropsychologist (8 disciplines, including occupational therapy)
Frequency?	Daily, 5–6 hours/day
Duration?	Treatment days differed with group; range was 35–62 days.

N = 13; mean age = 43; mean days post onset = 190; mean treatment days = 35

Group 2b: Less acute; admitted from home within 1 year of injury; moderately severe brain injury

Brief Description	Same as Group 1
Setting	Clinic
Who Delivered?	Multidisciplinary team headed by a neuropsychologist (8 disciplines, including occupational therapy)
Frequency?	Daily, 5–6 hours/day
Duration?	Treatment days differed with group; range was 35–62 days.

N = 14; mean age = 38; mean days postinjury = 142; mean treatment days = 47

Group 3: Chronic; admitted from home after 1 year postinjury

Brief Description	Same as Group 1
Setting	Clinic
Who Delivered?	Multidisciplinary team headed by a neuropsychologist (8 disciplines, including occupational therapy)
Frequency?	Daily, 5–6 hours/day
Duration?	Treatment days differed with group; range was 35–62 days.

N = 9; mean age = 37; mean days post onset = 2,372; mean treatment days = 48

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

✓ Constancy of therapists was part of the distractibility variable and was manipulated over time

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

Name of measure:

PERPOS (Pate Environmentally Relevant Program Outcome System)

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

Amount of distraction tolerated, amount of structure required, and overall functioning

Is the measure reliable (as reported in article)?

Yes

No

NR

Is the measure valid (as reported in article)?

Yes

✓ Scores significantly mirror descriptions of subjects' performance on functional tasks at discharge (done by blind evaluation)

No

NR

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

Measured at admission, biweekly during treatment, and at discharge

Measurement Biases

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

Yes

No

✓ Team generated score

Recall or memory bias *If yes, explain.*

Yes

No

Others (list and explain):

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

Did the measures adequately measure the outcome(s)?

Yes

✓ The PERPOS was insensitive to changes in specific functional domains, which is similar to other measures of handicap whose total score represents performance in any or all domains.

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

All subjects demonstrated significant gains in independence. 46 out of the 61 participants were independent at discharge. Effect sizes not reported.
Group 1: 18/25 (72%) independent at discharge. Wilcoxon $z = -4.332$, $p < .000$
Group 2a: 11/13 (85%) independent at discharge. Wilcoxon $z = -3.464$, $P = .001$
Group 2b: 10/14 (71%) independent at discharge. Wilcoxon $z = -3.317$, $P = .001$
Group 3: 7/9 (78%) independent at discharge. Wilcoxon $z = -2.530$, $p = .011$

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 majority of individuals within this study left treatment much more independent than they were at admission and 92% of them remained so at the 6-month follow-up. Their increased level of independence was bought at the price of considerable energy and effort to maintain.

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.

This program of intensive, carefully designed treatment that varied the amount of distraction to suit the patient's level of information processing within the person's internal and external environments and that varied the amount of structure provided to suit the person's level of executive functioning was successful. Treatment was implemented through engagement in occupational tasks. Although occupational therapists were not in charge of this program and usually lack the power to implement such intensive programs (4–6 hours per day for 35–62 days), the treatment concepts can be incorporated into usual occupational therapy treatment-time allotment. Using occupational tasks to address the patient's specific deficits within environmental (distractions/structure) scaffolding based on activity analysis of the patient's information processing abilities and executive functioning is a treatment easily incorporated into occupational therapy practice.

There is a need for occupational therapy researchers to document the effectiveness of such treatment. This study and program was designed by neuropsychologists even though the treatment easily could be considered occupational therapy.

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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