



**AOTA Critically Appraised Topics and Papers Series**  
**Alzheimer's Disease**

*\*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 designed to modify and maintain perceptual abilities on the occupational performance of persons with dementia?**

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Koss, E., & Gilmore, G. C. (1998). Environmental interventions and functional ability of AD patients. In B. Vellas, J. Fitten, & G. Frisoni (Eds.), *Research and Practice in Alzheimer's Disease* (pp. 185–193). New York: Springer.

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

State the problem the authors are investigating in this study.

Even in the early stages of Alzheimer's disease (AD), the literature demonstrates the presence of marked visual impairment in the domains of contrast sensitivity, color and depth perception, and motion detection. In the moderate stage of AD, the contrast sensitivity loss may play an important role in limiting performance in higher order visual processing tasks. This may account for some of the distorted processing of environmental cues and behavioral symptoms noted in patients in this stage of the disease. Agitated behaviors, including restlessness, confusion, wandering, and screaming, have been reported to worsen at night or near sunset. This is known as the sundowning hypothesis. One explanation for this behavior is that agitation may be triggered by a decrease in the amount of ambient light available as opposed to other explanations that are based on a dysfunction in the person's circadian timing system.

**RESEARCH OBJECTIVE(S)**

List study objectives.

The purpose of this study was to test the hypothesis that in sundowning, agitation may be triggered by a decrease in the amount of ambient light available rather than by changes to an internal clock.

Describe how the research objectives address the focused question.

The intervention of increasing the amount of light available and enhancing visual contrast was designed to optimize the use of remaining perceptual abilities of the resident with AD, resulting in improved food intake and decreased agitated behaviors.

**DESIGN TYPE:**

Non-randomized before and after

**Level of Evidence:**

III

Limitations (appropriateness of study design):

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

Yes  Preliminary study

No

**SAMPLE SELECTION**

How were subjects selected to participate? Please describe.

High functioning residents on a dementia unit of Manor Care at Willoughby (OH) whose caregivers consented to participate in the study.

**Inclusion Criteria**

Only residents who ate independently were included in the analysis.

**Exclusion Criteria**

Recurring illness, precluding full participation and agitated behavior over 3 standard deviations above the group mean.

Sample Selection Biases: *If yes, explain.*

Volunteers/Referrals

Yes  Convenience sample

No

Attention

Yes

No

Others (list and explain):

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**SAMPLE CHARACTERISTICS**

N = 18

% Dropouts	5/18 (28%)		
# (%) Male	NR	# (%) Female	NR
Ethnicity	NR		
Disease/disability diagnosis	NR; however, all residents were from a highly functioning dementia unit		

NR = Not reported

Check appropriate group:

<20/study group	20–50/study group	51–100/study group	101–149/study group	150–200/study group
✓				

Sample Characteristics Bias: If no, explain.

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

Yes

No

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

Brief Description	The intervention consisted of increasing light intensity and enhancing visual stimulation during evening meals. Before each evening meal, tables were positioned directly under existing ceiling lights to allow for maximal light exposure. Tables were set with settings using maximal visual contrast. Regular nursing home table settings were used at breakfast and lunch.
Setting	High functioning dementia unit of Manor Care at Willoughby (OH)

Who Delivered?	NR
Frequency?	Daily during evening meals
Duration?	3 consecutive periods of 21 days each

**Intervention Biases:** *Explain, if needed.*

Contamination

Yes

No

Co-intervention

Yes  Other interventions such as medication use, providing the resident with a snack prior to meals, or behavioral management strategies may have influenced the results.

No

Timing

Yes

No

Site

Yes

No

Use of different therapists to provide intervention

Yes

No

NR

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

Name of measure:

Food Intake Record (developed for the study)

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

Amount of food intake by the resident

Is the measure reliable (as reported in article)?

Yes

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?

After each meal the staff recorded the amount of food intake by the resident, with 0 = Nothing eaten and 10 = Everything eaten.

Name of measure:

Agitation record (developed for the study)

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

Total number of agitated episodes per time period

Is the measure reliable (as reported in article)?

Yes

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?

Recorded daily by nursing staff for 3 time periods (day, evening, night)

Measurement Biases

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

Yes

No

Recall or memory bias *If yes, explain.*

Yes

No

Others (list and explain):

The outcome measures both rely on more than one staff member making a judgment regarding the amount of food intake after each meal using a 10-point scale, as well as judging whether residents' action would be considered a behavior. There was a lack of standardized behavioral categorizations, leaving room for error in staff interpretation of behavior.

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

Did the measures adequately measure the outcome(s)?

Yes

No  There are standardized assessment tools available for categorizing and measuring behaviors, as well as dietary food intake measures.

**RESULTS**

List results of outcomes relevant to answering the focused question

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

Include effect size if reported

The amount of food eaten at dinner was significantly different across baseline, intervention, and post-intervention. Follow-up analyses using paired t-tests determined that the mean amount of food ingested at dinner was significantly higher during intervention than post-intervention [ $t(12)=2.46$ ,  $p<0.03$ ]. No other paired comparison reached significance. The frequency of agitated behaviors decreased dramatically during the intervention phase [ $F(12,2)=4.92$ ,  $p=0.01$ ]. Post hoc analysis showed significant differences in agitation between baseline and intervention [ $t(12)=3.04$ ,  $p<0.05$ ] and between baseline and post-intervention [ $t(12)=3.04$ ,  $p<0.05$ ]. Further analyses showed that a decrease in agitation occurred in the evening [ $F(12,2)=3.89$ ,  $p<0.05$ ] and during the day [ $F(12,2)=8.31$ ,  $p<0.1$ ].

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.

Preliminary findings indicate that a simple and easy to implement environmental intervention may have an effect in increasing the amount of food ingested and in decreasing disruptive behaviors in a long-term-care setting.

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  This is a preliminary study and although the findings are encouraging, further study controlling individual differences and other variables such as carry over or seasonal differences need to be explored. In addition, it would be beneficial to measure the optimal amount of ambient light that produces the improved food intake and reduced behaviors.

## 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.

The interventions described in this study, which include manipulation of the environment to maximize light exposure and visual contrast, are strategies familiar to occupational therapists, especially in rehabilitative settings. By recognizing that these same strategies may be beneficial for persons with AD, even in the early stages of the disease, occupational therapists can utilize these strategies to positively affect the perceptual abilities of this patient population. Although this is a preliminary study, it is worth consideration as it is easy to employ, non-invasive, inexpensive, and poses no risk of harm. If there is any decrease in the level of agitation and improvement of intake, then this intervention would have a positive influence on the person with AD. A more rigorous study design would be beneficial as the results may influence environmental designs in terms of lighting and the setup of the dining room tables.

This work is based on the evidence-based literature review completed in August 2005 by Lori Letts, PhD, OT Reg. (Ont.); Jacqueline Minezes, BSc (OT), OT Reg. (Ont.); Julie Berenyi, BHSc (OT) OT Reg. (Ont.); Mary Edwards, MHSc, OT Reg. (Ont.); Kathy Moros, BHSc (OT), OT Reg. (Ont.); Colleen O'Neill, BSc (OT), OT Reg. (Ont.); and Colleen O'Toole, MSc (OT), OT Reg. (Ont.).

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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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