



# Multisensory Environments and the Patient with Alzheimer's Disease: An Evidence-based Review



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## Abstract

**Background:** Effects of environment on behavior have been studied. Manipulations of environmental sensory stimulation and environmental modifications have been used to enhance functional performance for patients with dementia.

**Objectives:** this study was conducted to examine and review the evidence available regarding the effectiveness of environmental modifications and multisensory stimulation on functional performance and ability to engage in activities of daily living (ADLs) for patients with dementia.

**Results:** our review revealed that environmental modifications and multisensory stimulation for patients with dementia can improve functional performance and may increase engagement in meaningful ADLs.

**Conclusion:** environmental modifications and multisensory stimulation are effective and can improve functional performance and increase engagement in meaningful ADLs for patients with dementia.

**Keywords:** Multisensory; Environment; Modification; Behavior; Functional performance and engagement; Activities of daily living (ADLs); Dementia alzheimer type (DAT); Occupational therapy (OT)

## Introduction

Dementia is a group of disturbances of memory associated with multiple cognitive deficits, such as aphasia, apraxia, agnosia, and disturbance of executive function. Alzheimer's is the most common type of dementia (Dementia Alzheimer Type; DAT). The signs of dementia generally include, but are not limited to, decreased short term memory, decreased problem solving skills, decreased perceptual skills, and personality changes. The onset of dementia is gradual, and the course of the disease spans several years or more. In Alzheimer's disease, the person progresses through several stages with those in the final stages being completely dependent on others. Cognitive losses in DAT can lead to inability to process stimuli accurately [1]. Occupational therapists (OTs) evaluate persons with dementia to determine their strengths, impairments, and performance areas needing intervention. Although remediation of cognitive performance is not likely, the person may demonstrate improved function through compensation or adaptation. Occupational therapy (OT) practitioners also assist caregivers to help them cope with difficulties associated with dementia to ensure safe and supportive environment. Effects of environment on behavior have been widely studied. Effects of environment can be neutral, facilitative, or restrictive. Manipulation of environmental sensory stimulation has been used since the 1960s to promote increased function with patients with dementia [2]. The purpose

of this study was to examine the evidence available regarding the effectiveness of environmental and sensory modifications on functional performance and ability to engage in meaningful activities of daily living (ADLs) for patients and older adults with dementia. For the purpose of this study, we created a clinical/research PICO question (Population, Intervention, Comparison, and Outcome), a key to evidence-based decision [3]. The PICO formed for our study is as follows:

- (P) In patients with dementia
- (I) Does environmental/sensory modification
- (C) Compared to no environmental/sensory modification
- (O) Increase/improve/result in ability to engage in activities?

## Methods

### Review of literature and search strategy

A research has been made in the following databases: Ovid (MEDLINE, PsychINFO, and Global Health), and PubMed. Keywords and Search items used to search articles for our study were multisensory, environment, modification, behavior, functional performance and engagement, activities of daily living (ADLs), dementia Alzheimer type (DAT), and occupational therapy (OT).

## Results

By combining the search results we found articles on Tai Chi that discuss the relationship between Tai Chi and fear of falling among older adults. Based on the format of PICO question, four most relevant articles were selected for our study. Studies cited in the reference of the four articles along with other articles were also used to collect important information. The four selected articles were related to the effect of environmental modifications and multisensory stimulation on functional performance and engagement in ADLs for patients with dementia.

Yamadera et al. [4] examined the effect of bright light therapy on sleep/wake cycles. Based on the hierarchy of levels of evidence in evidence based practice, this study was a level III pre- post-comparison of cohort/ diagnostic groups [5]. This study measured level of dementia, cognition, number of naps and nap time during the day, sleep time and number of awakenings at night. Holmes et al. [6], studied the effect of live music versus pre-recorded music

versus silence on apathy. Subjects had moderate to severe dementia with apathy. This was a level III, randomized placebo controlled trial with blinded observer rating. In this study, they used the Dementia Care Mapping tool median scores to measure engagement. Also they measured the percentage of subjects showing positive engagement. In Baker et al. [2], they investigated the effects of Multi-Sensory Stimulation (MSS) on behavior, mood, and cognition. This was a level II, randomized control. They used MSS as treatment group and activity intervention as control group. Multiple time points, including baseline, before, during, after each session, after 4 sessions, after 8 sessions and then one month after the last session were conducted. In Staal et al. [7], they studied the effects of Multisensory Behavior Therapy (MBST) on agitation, apathy, and ADL performance. It was a level II, randomized attention controlled single blinded study. Multiple time points were applied at baseline, and after each of 6 treatment sessions. All articles were related to our PICO question. A summary of the four articles in relation to our PICO is as follows (Table 1).

**Table 1:** A summary of Reviewed Articles in Relation to our PICO.

Article	Our PICO	Relate to PICO (Article Summary)
Yamadera et al. [4]		<p>P: Alzheimer's type dementia</p> <p>I: Bright light therapy</p> <p>C: Compared to none</p> <p>O: Improved cognition, decreased napping during the day and increased sleeping at night</p>
Holmes et al. [6]	<p>P: In patients with dementia</p> <p>I: Does environmental/sensory modification</p>	<p>P: Moderate to severe dementia</p> <p>I: Live music</p> <p>C: Compared to silence/pre-recorded music</p> <p>O: Improved ability to engage</p>
Baker et al. [2]	<p>C: Compared to no environmental/sensory modification</p> <p>O: Increase/improve/result in ability to engage in activities?</p>	<p>P: In patients with dementia</p> <p>I: Environmental/sensory modifications</p> <p>C: Compared to traditional activity environment</p> <p>O: Increased attention to the environment &amp; improved behavior at home</p>
Staal et al. [7]		<p>P: Moderate to severe dementia with behavioral disturbance</p> <p>I: Multisensory Behavior Therapy</p> <p>C: Compared to recreational therapy activity</p> <p>O: Decreased agitation, and apathy and increased ADL scores</p>

## Discussion

In all reviewed studies, environmental modifications and multisensory stimulation for patients with dementia improved functional performance, enhanced cognition and attention,

and increased engagement in ADLs. Thus clinical guidelines, recommendations, a plan and audit tool have been developed in our study to implement environmental modifications and multisensory stimulation in clinics (Table 2).

**Table 2:** A summary of Recommendations, Plan, and Audit Tool.

Recommendation	Implementation Plan	Criteria	Audit Method	Compliance Plan
An ADL-Sensory program will be initiated for each resident appropriately.	OT staff will complete training based upon Staal's model of individualized sensory assessment. Training will be taught by primary OT who will contact Staal for program specifics and arrange additional training, which may include formal continuing education opportunities or training by STAAL, or informal peer-reviewed program development specifics based upon a literature review.	Pre-and post-testing will be completed with all staff as they undergo initial didactic training. A passing score must be obtained on the post test prior to moving to the clinical phase. In the clinical phase, OT staff will demonstrate clinical competency via peer review of first 5 initial assessments and plans of care. The primary OT and the trainee will compare observations & plans of care for consistency.	Competency and didactic testing results will be tracked by therapist. Clinicians not passing will be retested using a new written tool until passing scores are obtained. Clinical skills not at level of competence will undergo additional primary OT co- evaluation and co-treatment for all patients until competence is achieved.	Will be included in annual review and as part of annual performance plan with ongoing education and peer support as needed.  Staff non-compliant will be partnered with senior/primary staff until compliance is achieved.
Treatment will include both the sensory portion and the ADL portion.	OT will provide intervention based upon individual sensory assessment.	Treatment will occur in a quiet, private area and be incrementally increased to a 30 minute sensory session.	Monthly medical record reviews. This will also be done indirectly on a daily basis via efficiency requirements.	Supervisor will monitor quality and documentation of treatment via yearly reviews. Peer reviews conducted quarterly will also address documentation quality.
Unit staff education will occur with each OT visit and increase in caregiver active involvement until OT services are discontinued.	OT will provide training to on-unit caregivers to assure carryover of positive changes.	Caregivers will provide intervention as designed by OT after correct return demonstration of approaches and interventions.	A nursing-rehab program will be designed and in writing with nursing assistant documentation of completion.	Nursing rehab program will be audited weekly by nursing staff with non-compliance reported to nursing supervisor for disciplinary action/ further education as deemed appropriate by nursing administration.

## Conclusion

Our review confirmed that environmental modifications and multisensory stimulation are effective and can improve functional performance and increase engagement in meaningful ADLs for patients with dementia. Thus clinical guidelines, recommendations, a plan and audit tool have been created in our study to implement environmental modifications and multisensory stimulation in clinics. The clinical guidelines for recommended intervention, the plan, and the audit tool recommend therapists (i.e., OT) to apply environmental modifications and multisensory stimulation with patients and older adults with dementia.

## Conflict of Interest

Author declares that there is no conflict of interest.

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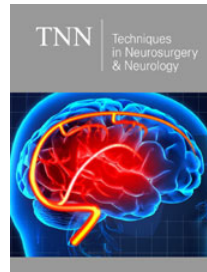
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