



# Narrative Review: Multisensory Stimulation in Dementia



Masoome Zaree<sup>1\*</sup>

1. Department of Occupational Therapy, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran.



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## Conflict of interest

The authors declare that they have no competing interests.

## ABSTRACT

**Background & Objectives:** Dementia is a prevalent disorder around the world. However, its chronic and progressive nature mostly affects physical and psychosocial characteristics and public healthcare. Recently, multisensory interventions have been used in people with dementia as one of the nonpharmacological treatment methods. This narrative review intends to explain multisensory stimulation programs or Snoezelen for those affected with dementia.

**Methods:** Keywords such as “sensory-based intervention”, “sensory stimulation”, “sensory processing”, “Snoezelen”, “sensory modulation”, and “dementia” were used in Scopus and PubMed databases with a sensitive search strategy in the articles published between 2000 and 2020.

**Results:** The initial search retrieved 255 articles. After reviewing and rejecting some duplicates, 65 studies remained in the field of multisensory interventions in dementia. However, only 8 articles fulfilled the inclusion criteria.

**Conclusion:** Multisensory stimulations in dementia can be used as an adjunctive strategy alongside other therapies. Sensory diets can be applied in common home environments. For this purpose, it is better to use Dunn’s sensory processing model. So, along with individual components, context and occupations are also considered.

**Keywords:** Nervous system disease, Dementia, Sensory deprivation, Review



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## \* Corresponding Author:

Masoome Zaree, PhD candidate.

Address: Department of Occupational Therapy, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran.

Tel: +98 (912) 0477530

E-mail: [massomezaree@gmail.com](mailto:massomezaree@gmail.com)

↑ *What is “already known” in this topic:*

*Recently, multisensory stimulation has become an alternative first-line approach in the treatment of dementia's behavioral and psychological symptoms.*

→ *What this article adds:*

*Multisensory stimulations in dementia can be used as an adjunctive strategy alongside other therapies. In everyday home environments, sensory diets can be applied; for this purpose, it is better to use Dunn's sensory processing model. In this condition, besides individual components, context and occupations are also considered.*

## 1. Introduction

Ageing is an inevitable physical and physiological phenomenon. Like other nations, the Iranian population is also becoming old. Statistics show that the number of older people in Iran increased 4.4 times from 1957 to 2007. The increase in the elderly population causes economic, social, and health problems [1]. One of the problems that affect people in old age is cognitive impairment, which causes extensive functional limitations. One of the most critical public health problems in our society is dementia. It is widespread in the elderly, without effective treatments, along with a high functional and cognitive dependency [2]. According to a study conducted in Iran in 2016, the prevalence of dementia among people aged 60-64 years was 3.6%, in people aged 65-69 years 6.2%, in people aged 70-74 years 10.4%, in people aged 79-75 years 14.4% and in the age group over 80 years 13%. It also seems that the prevalence of dementia in Iran is higher than in other countries [3].

Dementia is a chronic, complex, progressive, and disabling disorder that affects not only the individual but also the family, caregivers, the health care system, and society and puts an economic strain on them. Dementia has been cited as one of the most challenging issues in the health system [4].

Today, society is struggling to care for patients with dementia. There are currently several treatments to stabilize the daily functioning of these people. Although medication has helped reduce some psychiatric symptoms [5], they have a moderate effect in improving behavioral and cognitive symptoms [6]. Various methods have been proposed for the rehabilitation of these people; focusing on sensory problems is one of the new therapies in dementia.

The destruction of temporolimbic structures in people with dementia leads to inability of integrity of sensory information, thus causing behavioral, cognitive and social problems [7, 8]. Therefore, paying attention to sensory processing problems as an essential component in behavior and participation in daily life activities can help control behavioral problems and functional disabilities [9]. Sensory stimulation is employing various techniques to arouse the senses to raise alertness and reduce agitation. It enhances the quality of life, which is the overall objective of sensory stimulation methods [10].

Two theoretical constructs can explain the multisensory stimulation environment: neurobiological and behavioral. Based on the neurobiological approach, patients in the final stages of dementia may receive too little stimulation or too excessive or inappropriate stimulation (doors slamming or patients screaming).

The Kovach Model of Imbalance in Sensoristasis (MIS) proposes that the disproportions in the sensory stimulation and sensory-calming activities affect instrumental and social functioning. Thus, a multisensory stimulation environment organizes an adequate intervention and delivers a range of activities that can be either sensory-stimulating or calming regarding their effects, depending on the therapeutic needs of the patient. On the other hand, the behavioral position, proposed by the functional analytic multisensory environmental therapy, suggests that the Mini-Mental State Examination (MSSE) delivers the older people with no contingent sensory reinforcement arousing states of reward and the relaxation response [11].

In 2002, Chung and colleagues in a systematic review examined the clinical efficacy of Snoezelen (or multisensory stimulation) for older people with dementia and their caregivers. It was concluded that Snoezelen had become a commonly-used intervention to manage maladaptive behaviors and to promote the positive mood of

older people with dementia. Still, more studies are needed to select the best protocol to present the multisensory interventions [12].

This study aimed to review studies on multisensory interventions in dementia as a narrative review and select the best structure for future studies.

## 2. Materials and Methods

This study was performed to review studies related to multisensory interventions in people with dementia in 2020.

### Search strategy

Keywords such as “sensory-based intervention”, “sensory stimulation”, “sensory processing”, “Snoezelen”, “sensory modulation”, and “dementia” were used in Scopus and PubMed databases with a sensitive search strategy (2000- July 2020).

### Types of study to be included

Randomized controlled trials (RCTs) studied Snoezelen or multisensory stimulation programs as an intervention for people with dementia.

Staff members or researchers should deliver the sensory-based intervention to individuals with dementia (e.g. Snoezelen, music therapy, massage/touch, phototherapy,

physical activity, social interaction, sensory garden, aromatherapy, pet therapy).

By examining 255 articles, 65 articles are found related to sensory processing in dementia. Still, based on this study, 8 articles were chosen to describe the Snoezelen for people with dementia.

## 3. Results

The initial search retrieved 255 articles. After reviewing and rejecting some similar studies, 65 studies were remained in the field of multisensory interventions in dementia. However, only 8 articles fulfilled the inclusion criteria (Figure 1). Table 1 summarized the study results.

### Participants

The study participants were predominantly 65 years and older, with a medical diagnosis of moderate-to-severe dementia. Sample sizes of the articles range from 19 to 136.

### Snoezelen

Eight studies were identified that examined Snoezelen as their intervention procedure. Snoezelen room contains elements like water bubble columns within mirrors, alternating-color fiber-optic cables, water bed, an interactive projecting system, rotating mirror ball with color light projector, video, aromatherapy equipment with fragrant oils,

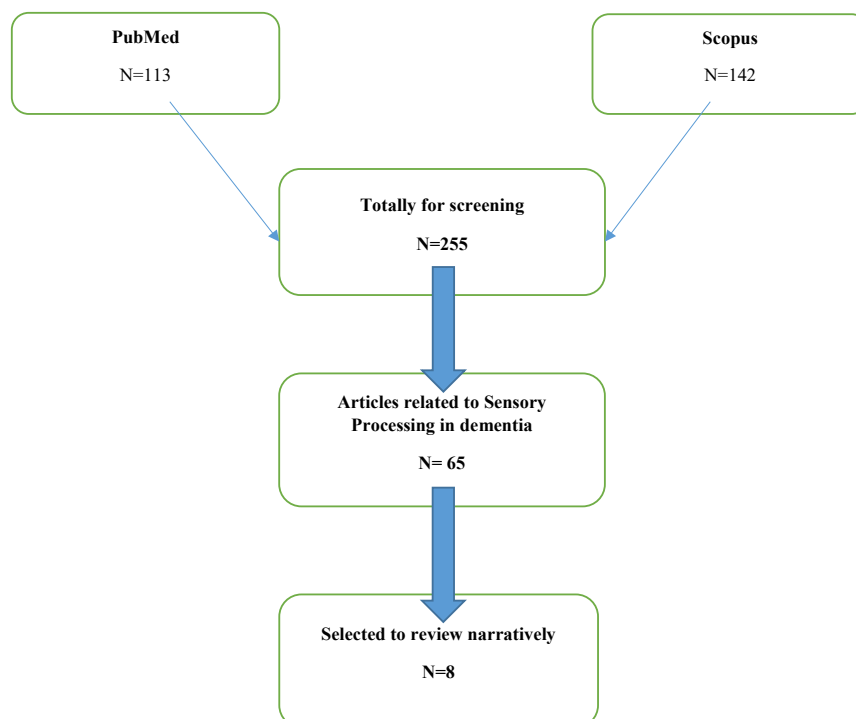


Figure 1. Included studies

**Table 1.** Summary of included studies

Author, year	Sanchez et al. (2016) [11]	Collier et al. (2010) [18]	Klages et al. (2011) [19]	Maseda et al. (2018) [15]	Roumen et al. (2008) [22]	Baillon et al. (2004) [14]	Baker et al. (2001) [16]	Baker, et al., 2003 [17]
N	22	30	19	21	21	20	33	136
intervention	Multisensory stimulation environment (MSSE)	Multisensory environment (MSE)	Snoezelen room	Multisensory stimulation environment (MMSE)	Snoezelen	Snoezelen	Multisensory stimulation	Multisensory stimulation
Control group	Individualized music sessions	Gardening	Control group participants received an equal amount of volunteer visits	Individualized music sessions	Usual care	Reminiscence therapy	Activity	Activity
Duration	Two 30-min weekly sessions over 16 weeks	Three sessions over 4 weeks	Twice a week for 6 weeks	Two-weekly sessions lasted 30 minutes for 12 weeks	Three Snoezelen sessions per week for 12 weeks	Three sessions each of Snoezelen and reminiscence	Eight standardized MSS sessions and activity sessions	Eight 30-minute sessions over 4 weeks
Outcomes	Agitation (Cohen-Mansfield Agitation Inventory, CMAI) mood (Cornell Scale for Depression in Dementia, CSDD) anxiety (Rating Anxiety in Dementia, RAID) Cognitive function (Severe Mini-Mental State Examination, SMMSE) The severity of dementia (Bedford Alzheimer Nursing Severity Scale, BANS-S)	Degree of physical inactivity, intellectual impairment, emotional and cognitive impairment (Gottfries-Brane-Steen scale, GBS) Functional Performance (Assessment of Motor and Process Skills, AMPS)	Functional Reach Test, the eyes-open Sharpened Romberg, Timed Up and Go Test with and without dual-task, Falls frequencies	Mood, Speech, Relating to people, Relating to the environment, Need for prompting, Stimulation level (INTERACT SHORT)	Daily observation scales (DOS), Clinical Global Impression-Improvement	Cognitive impairment (Mini-Mental State Examination, MMSE) Dementia severity (Clinical Dementia Rating Scale (CDRS)) Agitated behavior (Cohen-Mansfield Agitation Inventory-short Form) Heart rate (heart-rate monitor) Mood and behavior (INTERACT Scale)	Behavior (REHAB BMD Scale) Mood (The Behavior and Mood Disturbances Scale (BMD)) Cognition (MMSE)	Behavior (Behavior Rating Scale, REHAB Scale) Cognition (Mini-Mental Status Examination) Mood (The Behavior and Mood Disturbance Scale, BMD)
Result	MSSE could have better effects on anxiety symptoms and dementia severity in comparison with individualized music sessions in elderly patients with severe dementia	Results indicate significant improvement in functional performance in both the MSE and the control activity. Findings support the use of MSEs as a strategy for enhancing functional performance in dementia	There were no significant changes in the balance test scores and falls rates frequency within groups overtime, or between the intervention versus the control group	Both interventions seem to be effective at managing mood and behavioral disturbances in the short term and at improving physiological rates	MSS may be a useful addition to the care of elderly patients with dementia.	This research has not shown that Snoezelen is more beneficial for people with dementia than one-to-one themed reminiscence.	Both MSS and Activity sessions appear to be effective and appropriate therapies for people with dementia.	Overall, MSS was found to be no more effective than an activity in changing the behavior, mood, or cognition of patients with dementia in the short or long-term

musical selections, tactile boards with various textures, eye tracking, and head moving activities, and vibrating shoes and pillows. The patients were offered visual, auditory, tactile, and olfactory stimulation, and the therapists adopted a nondirective, enabling approach, encouraging patients to engage with sensory stimuli of their choice.

### Outcomes

The targets were agitation [13, 14], mood [13-17], cognitive function [13, 14, 16, 17], anxiety [13], emotional impairment [18], intellectual impairment [18], functional performance [18], falls frequencies [19], speech [15], relating to environment, relating to people, stimulation level, need for prompting [15], dementia severity [13, 14], behavior [14, 16, 17] and heart rate [14].

## 4. Discussion

Multisensory stimulation is a nonpharmacological therapy used in older adults with dementia. The treatment is based on a nondirective approach, not focusing on cognitive stimulation, but encouraging older people to engage with sensory stimuli of their choice. In other words, its use is based on the biopsychosocial model, as neuropsychiatric symptoms are affected both by the disease and the physical and psychosocial environment surrounding the elderly [11].

According to the obtained studies, multisensory interventions did not significantly affect behavior, mood, or cognition than the interventions presented to the control group Baker et al. (2003) [17]. But, In the study of Sanchez et al. (2016) [13], which aimed to investigate the effect of multisensory interventions and individualized music sessions, multisensory interventions were found to have a better impact on anxiety symptoms and dementia severity. Also, Collier et al. (2010) [18] recommended using this intervention for improving functional performance. In the study of Klages et al. (2011) [19], no significant changes were seen in balance test scores and falling rates within groups over time or between the intervention versus the control group. Maseda et al. (2018) [15] has also stated that both interventions (multisensory stimulation and music sessions) are effective at managing mood and behavioral disturbances in the short term and improve physiological rates. Baillon et al. (2004) [14] concluded that multisensory stimulations may be a valuable supplementary in treating elderly patients with dementia.

All studies have used almost the same intervention structure to provide sensory stimulation) in the results

section, the structure of the Snoezelen room is mentioned in detail ). Of course, there are differences in the control groups; for example, in Sánchez, Maseda et al. (2016) and Maseda, Cibeira et al. (2018), individualized music sessions, in Baker, Holloway et al. (2003) and Baker, Bell et al. (2001) activity session, and in Baillon, Van Diepen et al. (2004) the reminiscence therapy have been used. Other studies have used the usual care. In most studies, behavior, cognition, and mood are considered the main outcome measures, but in Collier and Klages studies, functional performance, level of physical activity, falling, etc., are considered. The study of Baker, Holloway et al. (2003) has a higher sample size than the other 7 studies and is known as one of the most critical studies in the field of sensory stimulation.

Multisensory environments dominate sensory stimulation practice for people with dementia. These distinct environments with specific equipment stimulate sight, hearing, and touch in time-bound sessions [12]. Currently, limited evidence is available for whole day sensory diets for people with dementia. Studies usually have pragmatically focused on session-based interventions with defined time and location boundaries to control variables for gathering transferable positivist evidence. This method limits the evidence base of sensory stimulation to similarly prescriptive practice. Dunn's Model of sensory processing supports a whole day 'sensory diet' approach [20] and agrees with Ayres' Model of sensory integration (1979). This person-centered and creative approach may be applied to social care contexts worldwide, using local resources as appropriate for people's occupational lives [21].

Previous studies have used multisensory stimulation in a variety of ways, these studies have focused on the functional components of the individual and tried to change and improve them, but the match between the individual, occupation, and context have not been considered. The presented interventions are not adequately structured and formulated according to a specific framework or program. Also, these interventions are session-based (participation in specific treatment sessions during the week), and intervention strategies are not provided to caregivers. The results of previous studies have shown that session-based interventions have a short-term effect on behavior, mood, and cognition; therefore, it has been suggested that in order to have a long-term impact on multisensory interventions, it is better to train interventions to caregivers (not limited to one treatment session) and integrated with daily life activities.

## 5. Conclusion

Multisensory stimulations in dementia can be used as an adjunctive strategy alongside other therapies. Sensory diets can be implemented in everyday home environments. For this purpose, it is better to use Dunn's sensory processing model so that in addition to individual components, context, and occupations are also considered.

## Ethical Considerations

### Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

### Conflict of interest

The author declared no conflict of interest.

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## مداخلات چند حسی در دمانس: مرور حکایتی

معصومه زارعی<sup>1\*</sup>

۱. گروه آموزشی کاردرمانی، دانشکده علوم توانبخشی، دانشگاه علوم پزشکی ایران، تهران، ایران.

### چیکید

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**مقدمه** دمانس یک بیماری بسیار شایع در سراسر جهان است. روند مزمن و پیش رونده‌ی آن، بر خصوصیات جسمی، روانی، و اجتماعی فرد و سیستم سلامت جامعه تاثیر گذار است. اخیراً از مداخلات چند حسی در افراد مبتلا به دمانس به عنوان یکی از روش‌های درمان غیر دارویی استفاده می‌شود. هدف از این مطالعه که به شکل مرور حکایتی انجام گرفته است، مرور و بررسی برنامه‌های تحریک چند حسی و استوزلن در افراد مبتلا به دمانس است.

**مواد و روش‌ها** جستجوی مطالعات در پایگاه‌های اطلاعاتی PubMed و Scopus در قالب یک مرور حکایتی در سال ۲۰۲۰ انجام گرفت. کلید واژه‌های "مداخلات مبتنی بر حس"، "محرک حسی"، "پردازش حسی"، "اسنوزلن"، "تنظیم حسی" و "دمانس" در پایگاه‌های مورد نظر با راهکارهای جستجوی مناسب بین سال‌های ۲۰۰۰ تا ۲۰۲۰ مورد بررسی قرار گرفت.

**یافته‌ها** در جستجوی اولیه ۲۵۵ مطالعه به دست آمد، پس از بررسی و رد برخی از مطالعات مشابه، حدود ۶۵ مطالعه باقی ماند که در زمینه مداخلات چند حسی در دمانس بودند. با این حال، تنها ۸ مقاله دارای معیارهای ورود بودند.

**نتیجه گیری** محرک‌های چند حسی می‌توانند به عنوان یک استراتژی مکمل در کنار سایر درمان‌ها برای افراد مبتلا به دمانس استفاده گردند. رژیم‌های حسی می‌توانند در محیط‌های روزمره منزل اجرا شوند. در این راستا بهتر است از مدل پردازش حسی Dunn استفاده گردد تا علاوه بر اجزای فرد، بافتار و آکوپیشن‌ها نیز مد نظر باشند.

### کلیدواژه‌ها:

بیماری‌های سیستم عصبی، دمانس، محرومیت حسی، مرور



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### \* نویسنده مسئول:

معصومه زارعی

نشانی: تهران، دانشگاه علوم پزشکی ایران، دانشکده علوم توانبخشی، گروه آموزشی کاردرمانی.

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رایانامه: massomezaree@gmail.com

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