OXFORD JOURNAL
OF STUDENT
SCHOLARSHIP

The Effect of Music-Based Interventions on Alzheimer's Disease Patients: A Literature Review

Elizabeth Wang
lxwang837@gmail.com

ABSTRACT

Alzheimer's disease (AD) is a progressive neurodegenerative disease and the leading cause of dementia worldwide. Music-based interventions have been proposed as a low-cost, non-pharmacological approach to managing its symptoms, and music has been shown to influence mood and cognitive processing speed (Orpella et al., 2025). This article synthesizes the findings of three published reviews that examine music-based interventions in people with AD or in broader dementia populations that include AD. Its primary aim is to assess the extent to which music-based interventions improve cognitive function in individuals with AD; behavioral, psychological, and quality-of-life outcomes are examined separately as a secondary aim. Overall, music-based interventions appear to be a promising non-pharmacological approach that may improve selected symptoms of AD, but larger, higher-quality AD-specific trials are needed before firm conclusions can be drawn.

INTRODUCTION

Alzheimer's disease (AD), a progressive neurodegenerative disease, is the most common cause of dementia. It is characterized by loss of memory and cognitive skills, which significantly diminishes quality of life. The number of people living with dementia worldwide has risen substantially in recent years (Alzheimer's Disease International, 2020), highlighting the need for additional treatment options, especially non-pharmacological options. One commonly proposed approach is music-based intervention. These interventions are usually divided into two types: active music therapy, in which patients make music themselves (for example, by singing, clapping rhythms, or playing instruments), and receptive music therapy, in which patients listen to live or recorded music (Bleibel et al., 2023). Past research has shown that music can affect listeners' moods and cognitive processing speed (Orpella et al., 2025). In addition, music is more accessible and less expensive than many other treatments, which makes it a practical option to investigate. The goal of this review is to synthesize the findings from reviews published within the last decade that examine the effects of music-based interventions on patients with AD. The primary research question is: to what extent do music-based interventions improve cognitive function in patients with AD? A secondary question is whether they improve behavioral and psychological symptoms of dementia (BPSD), such as anxiety, depression, and agitation, and quality of

life. Throughout this review, evidence drawn specifically from AD populations is distinguished from evidence drawn from broader or mixed dementia populations.

METHODS

This article serves as a literature review: rather than analyzing individual trials directly, it summarizes and compares published studies of music-based interventions. The literature search was conducted on Google Scholar, using combinations of the following search terms: ("music therapy" OR "music intervention") AND ("Alzheimer's disease" OR "dementia") AND ("systematic review") AND ("cognitive function").

Articles were included if they (1) were reviews published from 2014 onward in a peer-reviewed journal; (2) reported the effects of a music-based intervention on people with AD, or on a dementia population that includes people with AD, either as the main focus or in a dedicated dementia section; and (3) reported at least one cognitive, behavioral, psychological, or quality-of-life outcome. Reviews of non-music interventions only were excluded.

The search returned ten potentially relevant articles. Their titles and abstracts were screened against these criteria, and seven were excluded (n = 3 were focused on background listening and not active or receptive therapy; n = 2 addressed cognition and memory in non AD or dementia patients; n = 2 were qualitative studies and lacked quantitative methods to support their conclusions). Three reviews were included: Bleibel et al. (2023), a systematic review of randomized controlled trials (RCTs) conducted exclusively in patients with AD, which addresses the primary (cognitive) question most directly; Abraha et al. (2017), a systematic review of systematic reviews of non-pharmacological interventions for BPSD in older adults with dementia, which provides the broadest summary of behavioral and psychological outcomes; and Sihvonen et al. (2017), a structured narrative review of music-based interventions across neurological disorders, which was included for its dementia-specific RCT evidence and its discussion of possible neural mechanisms. Because only Bleibel et al. (2023) is restricted to AD, findings from the other two reviews are treated as indirect evidence for AD.

OVERVIEW OF INCLUDED REVIEWS

Bleibel et al. (2023)

The first article that was examined was "The effect of music therapy on cognitive functions in patients with Alzheimer's disease: a systematic review of randomized controlled trials," by Malak Bleibel, Ali El Cheikh, Najwane Said Sadier, and Linda Abou-Abbas. It was published in *Alzheimer's Research & Therapy* in 2023. It is the only one of the three included reviews restricted to patients with AD.

The main goal of this article was to compile the evidence of the effect of music therapy on cognitive functions in patients with AD and assess the effectiveness of music therapy as a treatment tool. The

researchers used the PICO (Patient, Intervention, Comparison, and Outcome) framework to design their study, with the P being Alzheimer's patients, I being music therapy, C being Alzheimer's patients with and without intervention, and O being cognitive functions. Using keywords like "Alzheimer's Disease", "AD", "Music Therapy", "Music Intervention", "Cognitive functions", and "Cognition", the authors searched PubMed, Cochrane, and HINARI for studies published between January 2012 and June 2022. In order to be considered eligible for the study, the articles had to meet certain criteria. They had to be randomized controlled trials, originally written in English, and report quantitative measures of cognitive outcomes. They also determined the quality of each study using the Jadad scale, a system where studies are assigned points based on randomization, blinding, and withdrawals. A study was considered to be "high quality" if it scored at least 3 points on the scale. Of 144 records identified, 57 were retained for full-text review, and 49 of these did not meet the inclusion criteria. Music therapy methods were not consistent across studies, with two of them testing receptive music therapy, one testing active music therapy, and the remaining five testing both receptive and active music therapy. Active music therapy refers to music therapy in which the patients are creating music through instruments, singing, clapping, etc., while receptive music therapy refers to music therapy in which patients listen to music. The focus was mainly on music therapy's effect on global cognition, memory, language, speed of information processing, verbal fluency, and attention.

In the first study, by Sakamoto et al., music therapy brought positive emotions in the short term and helped reduce behavioral and psychological symptoms of dementia in the long term. The second study, by Narme et al., found that the interventions led to improved emotional state and reduced behavioral disorders and caregiver stress, but found no change in the cognitive status of patients. The third study, by Gómez Gallego and García, showed an increase in orientation, language, and memory as a result of music therapy treatment. Additionally, a later study by the same authors provided data that showed active music intervention helping with cognitive deficits and behavioral symptoms. Another study, by Pongan et al., found that the music treatment helped with depression, anxiety, and pain while also helping to stabilize verbal memory, which was measured using a Free and Cued Recall Test. A study by Lyu et al. found that music therapy helped subjects improve memory and language ability, as well as reducing psychiatric symptoms. Wang et al. found that music therapy used alongside medication led to significant improvements in global cognition, measured with the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA). Finally, the study by Innes et al. found that the therapy improved memory function, psychological status, and cognitive performance (e.g., executive functions, working memory, processing speed, and attention).

In summary, Bleibel et al. report that seven of the eight trials found a significant positive effect of music therapy on cognitive function. However, the evidence is not uniform: Narme et al. found no change in cognitive status, the trials were small (39 to 298 participants), and cognitive measures, intervention formats, and follow-up periods (one to six months) varied between trials. The authors also report that active music therapy appeared more effective than receptive music therapy. The authors point out that active music intervention activates brain regions involved in auditory processing, motor control, and emotional regulation. Furthermore, they also theorized that the rhythmic and repetitive elements of drums activated neural networks that are involved in memory and language processing. The authors conclude

that music therapy has potential benefits as a complementary non-pharmacological treatment for individuals with AD.

Abraha et al. (2017)

The second article that was chosen was "Systematic review of systematic reviews of non-pharmacological interventions to treat behavioural disturbances in older patients with dementia," by Iosief Abraha, Joseph M. Rimland, Fabiana Mirella Trotta, Giuseppina Dell'Aquila, Alfonso Cruz-Jentoft, Mirko Petrovic, Adalsteinn Gudmundsson, Roy Soiza, Denis O'Mahony, Antonio Guaita, and Antonio Cherubini. It was published in *BMJ Open* in 2017. The goal of this study was to examine the evidence of the effectiveness of various non-pharmacological interventions for behavioral and psychological symptoms of dementia (BPSD) so that they could put together a collection of effective treatments. Unlike Bleibel et al. (2023), this review is not specific to AD: the included reviews covered older adults with several types of dementia, including AD, vascular dementia, and mixed dementia.

The researchers first searched for systematic reviews using the Cochrane Database of Systematic Reviews, PubMed, PsycINFO, and CINAHL. There were two initial criteria for the systematic reviews, determined based on the text's abstract: it had to be a paper defined as a review or as a meta-analysis, and it had to use a non-pharmacological intervention to treat behavioral disturbances in patients with dementia. Studies whose abstracts met the previous criteria were then read in full and checked to see if they complied with three additional criteria: the use of at least one medical literature database, the inclusion of at least one primary study, and the use of at least one non-pharmacological intervention to treat behavioral disturbances in people older than 60 years old. The methodological quality of each systematic review was assessed by two reviewers using the AMSTAR tool, which is a set of eleven questions that assesses different aspects of a systematic review (for example, prospective design, conflicts of interest, and duplicate data extraction). A score of 8 or higher indicated high quality, a score of 4–7 indicated medium quality, and a score of 3 or lower indicated low quality.

The following data were collected for each systematic review: the publication year, the database searched, the study population, the non-pharmacological intervention used, the number of primary studies included, the outcome measures, and the AMSTAR score. Reviewers read through titles, abstracts, and entire texts in pairs. For outcome measures, they looked to include articles where BPSD was a primary outcome and it was measured by either multidomain scales, scales specific to agitation, or scales specific to depression and anxiety. Any experimental comparative study that investigated any non-pharmacological intervention to treat BPSD in older patients was kept, while observational studies or before-after studies were excluded.

Finally, the interventions were classified into four categories: sensory stimulation interventions, cognitive/emotion-oriented interventions, behavioral management techniques, and other interventions. Music therapy was classified as sensory stimulation. While some studies tested music on its own, others combined music with other treatments. For example, one trial found that massage combined with music was associated with reduced agitation.

Of the 38 systematic reviews included, six evaluated music therapy and one evaluated live singing. In the first review, by Ueda et al., the music therapy consisted of listening, dancing, singing, playing musical instruments, and occasionally exercising; it found that music therapy reduced behavioral symptoms, depression, and anxiety. In the second review, by Whear et al., playing music at mealtimes was associated with reductions in physical, verbal, aggressive, and non-aggressive agitated behavior. The third review, by Seitz et al., reported a difference between treatment and control groups, but the underlying trials carried a risk of randomization bias and unclear bias due to incomplete data. A fourth review, by McDermott et al., found evidence to support a positive effect of music therapy in people with dementia, but little high-quality research on its long-term effects. A fifth review, by Vasionytė and Madison, analyzed many different forms of music intervention, for example active music therapy, live music, and popular or native music. They found little change in behavior but a significant effect on cognition and physiology. Other reviews, such as that by Chatterton et al., received low AMSTAR scores, so their conclusions should be interpreted with caution. Abraha et al. concluded that music therapy was effective in reducing behavioral symptoms and anxiety and was among the most promising of the interventions reviewed, while noting moderate heterogeneity between studies, probably related to variability in how the intervention was delivered. Most of this evidence concerns behavioral and psychological outcomes rather than cognition.

Sihvonen et al. (2017)

The third article chosen was "Music-based interventions in neurological rehabilitation," by Aleksi J. Sihvonen, Teppo Särkämö, Vera Leo, Mari Tervaniemi, Eckart Altenmüller, and Seppo Soinila. It was published in *The Lancet Neurology* in 2017. The purpose of this review was to provide "a comprehensive overview of music-related interventions in the rehabilitation of the major neurological diseases." The authors examined the effect of music interventions on stroke, dementia, Parkinson's disease, epilepsy, and multiple sclerosis. It is a structured narrative review rather than a formal systematic review: it describes its search strategy but does not report a formal quality appraisal of the included studies. Only its dementia-related findings are considered here.

To find studies, the authors searched PubMed using the Medical Subject Headings "stroke", "brain injuries", "dementia", "parkinsonian disorders", "epilepsy", "multiple sclerosis", "music", and "music therapy", as well as other keywords such as "melodic intonation therapy", "rhythmic auditory stimulation", "rhythmic auditory cueing", and "music supported therapy". To be included, a study had to be an RCT that applied at least one week of intervention, was written in English, and had been published within the previous 10 years. There were two exceptions where studies from outside of 10 years were included, as they were deemed "landmark" studies.

Seventeen RCTs were found that evaluated the effect of music on dementia. These trials were conducted in dementia populations rather than exclusively in AD. The studies mainly assessed the effects of music intervention on symptoms like anxiety, agitation, depression, cognitive status, and quality of life. All studies used music that was familiar to the patients, such as pop music or common children's songs. Listening to music while participating in physical or cognitive exercises improved overall cognitive

performance. However, group-based music interventions showed no significant change in cognitive performance for people with moderate to severe dementia. Among the trials reporting neuropsychiatric outcomes, six found that music therapy improved these symptoms (for example, depression, anxiety, and agitation), while two found no effect. Music therapy was also associated with improved well-being of patients and better interactions between patients and caregivers and listening to music generally improved mood. The authors suggested that the familiarity of the music may provide comfort and reduce the confusion and disorientation experienced by patients with dementia.

Several explanations were proposed by the researchers as to why music had a positive impact on these diseases. One potential explanation was that music leads to widespread activation in the brain, which increases blood flow and may aid the recovery process. Another potential explanation was that music increases dopamine release (a chemical messenger involved in pleasure, motivation, and memory) and improves patients' moods, which may aid the recovery of cognitive functions. Finally, they theorized that AD patients were able to respond to familiar songs because the medial prefrontal cortex, one of the brain regions activated by familiar music, degenerates at a slower rate than other regions. Sihvonen et al. concluded that music is a useful rehabilitation resource, particularly because of its wide availability.

COMPARATIVE SYNTHESIS

Scope and Population

The three included reviews differ primarily in scope and purpose: Bleibel et al. (2023) focus narrowly on music interventions for cognitive outcomes in Alzheimer's patients, Abraha et al. (2017) synthesize systematic reviews of various non-pharmacological treatments for dementia, and Sihvonen et al. (2017) examine music-based interventions across a variety of neurological diseases. Bleibel et al. (2023) concentrate exclusively on music interventions in AD, looking at randomized controlled trials to evaluate effects on cognition. Abraha et al. (2017) consider music alongside other types of interventions and include studies that analyzed both behavioral and cognitive impacts in mixed dementia populations. Sihvonen et al. (2017) provide a cross-disorder synthesis that is broader in scope but still relevant because it highlights mechanisms and intervention types that are applied in dementia care. Table 1 compares the three reviews by review type, population, intervention, outcome measures, duration, and quality appraisal.

Table 1. Characteristics of the three included reviews

	Bleibel et al. (2023)	**Abraha et al. (2017)**	**Sihvonen et al. (2017)**
Review type	Systematic review of RCTs	Systematic review of systematic reviews	Structured narrative review
Population	Patients with AD only	Older adults (>60 years) with dementia, including AD, vascular, and mixed dementia	Several neurological disorders; dementia subset (not AD-specific)

	Bleibel et al. (2023)	**Abraha et al. (2017)**	**Sihvonen et al. (2017)**
Music interventions	Receptive (2 trials), active (1), both (5)	Music therapy (often listening, singing, dancing, instruments), live singing, music combined with other treatments	Mainly familiar music: listening, singing, music during exercise; individual and group
Primary outcomes	Cognitive function	BPSD (agitation, depression, anxiety)	Mood, BPSD, cognition, quality of life
Cognitive measures	Global cognition (e.g., MMSE, MoCA), memory, language, processing speed, verbal fluency, attention	Rarely reported	Overall cognitive performance (subset of trials)
Evidence base	8 RCTs; 689 participants (2012–2022)	38 reviews; 6 on music therapy, 1 on live singing	17 RCTs in dementia
Intervention duration	Varied; effects lasted 1–6 months at follow-up	Varied; not summarized	At least 1 week (inclusion criterion)
Quality appraisal	Jadad scale	AMSTAR	None reported
Main finding	7 of 8 trials reported cognitive improvement; 1 found no change	Music therapy reduced behavioral symptoms and anxiety	Mood and neuropsychiatric symptoms improved in most trials; cognitive effects mixed

Methods and Quality of the Reviews

Despite these differences in goals, all three used similar methods. All three reviews applied documented search strategies (searching PubMed and other biomedical databases) and specific inclusion criteria (for example, RCTs in Bleibel and Sihvonen, versus a broader design for Abraha). A shared limitation noted across the reviews was variation in study quality and small sample sizes (the smallest trial in Bleibel et al. (2023) included 39 participants), which constrains the strength of conclusions.

Each review also varied in quality. Bleibel et al. (2023) used the Jadad scale to assess the quality of each study they analyzed. Similarly, Abraha et al. (2017) assessed the quality of each review they included using the AMSTAR tool, allowing them to determine which reviews were high, medium, and low quality. Several reviews received low scores. Unlike Bleibel et al. (2023) and Abraha et al. (2017), Sihvonen et al. (2017) did not report any established method for assessing the quality of the studies they included. However, because all of the studies they included were RCTs, a basic level of methodological control was ensured, although trial quality was not formally assessed. In addition, Bleibel et al. (2023) and Sihvonen et al. (2017) limited inclusion to studies published in the previous ten years, so their findings reflect more recent research; however, recency alone does not determine methodological quality.

Cognitive Outcomes

Evidence on cognitive outcomes in AD comes mainly from Bleibel et al. (2023), the only review restricted to patients with AD. Seven of its eight RCTs reported improvement in cognitive function, most often memory, language, or orientation, and active interventions appeared more effective than receptive ones. However, these trials were small, used different cognitive measures, and delivered different types and amounts of music therapy, and one trial (Narme et al.) found no change in cognitive status. Sihvonen et al. (2017) found that music listening combined with physical or cognitive exercise improved overall cognitive performance, whereas group-based music interventions did not significantly change cognition in people with moderate to severe dementia; because these trials were conducted in mixed dementia populations, they provide only indirect evidence for AD. Abraha et al. (2017) focused on behavioral outcomes and reported little cognitive evidence, although one included review (Vasionytė and Madison) found a significant effect on cognition. Taken together, the evidence for cognitive benefit in AD is promising but limited and inconsistent.

Behavioral, Psychological, and Quality-of-Life Outcomes

Evidence for behavioral and psychological outcomes is more consistent across the three reviews, but it comes mostly from mixed dementia populations. Abraha et al. (2017) concluded that music therapy reduced behavioral symptoms and anxiety, and Sihvonen et al. (2017) reported that six trials found improvements in neuropsychiatric symptoms such as depression, anxiety, and agitation (two found no effect), along with improved mood and better patient–caregiver interaction. Within AD specifically, several trials in Bleibel et al. (2023) also reported improved emotional state, reduced depression and anxiety, and reduced caregiver stress, although the positive emotional effects only seemed to last for up to three weeks after the music intervention. Bleibel et al. also noted that many cognitive abilities are influenced by emotions, which may link the two outcome types. Overall, the evidence is stronger for symptom management, particularly mood and behavior, than for cognitive improvement. While these interventions show improvements in symptoms; none of the reviews provides evidence that music-based interventions slow the progression of AD.

Proposed Mechanisms

Two of the reviews proposed explanations for the effects of music-based interventions on AD. Bleibel et al. (2023) theorized that the rhythms and repetition in drumming lead to activation of neural networks that are responsible for memory and language processing. In addition, they also noted that active music intervention activates areas of the brain responsible for auditory processing, motor control, and emotional regulation, which may help to counter some symptoms of AD. Similarly, Sihvonen et al. (2017) proposed several explanations for the connection between music and AD symptoms. They first noted that the general recovery process of diseases can be aided by music because it leads to activation throughout the brain, especially within the dopaminergic mesolimbic system, which is involved in reward, motivation, and learning. They suggested that the increased dopamine that resulted from listening to music could have aided the recovery process. It was also theorized that the rhythmic structure of music helped patients

stabilize themselves when working to execute motor tasks. Finally, they suggested that the reason the patients were able to recognize familiar songs was because one of the brain regions activated by familiar music, the medial prefrontal cortex, degenerates at a slower rate than other regions of the brain. It is worth noting that Sihvonen et al. (2017) provide more support for their theories, dedicating a section of the paper to discussing the possible causes for the effects of music intervention, whereas Bleibel et al. (2023) only briefly mention possible reasons. Unlike Bleibel et al. (2023) and Sihvonen et al. (2017), Abraha et al. (2017) did not discuss possible mechanisms, which limits its usefulness for understanding why music-based interventions may work.

CONCLUSION

This review examined whether music-based interventions improve cognitive function in patients with AD. Among the three reviews included, the evidence for cognitive benefit is promising but mixed. The only AD-specific review (Bleibel et al., 2023) found that seven of eight small RCTs reported cognitive improvement, but one trial found no cognitive change, and outcome measures and intervention designs varied widely. Evidence for improvements in behavioral and psychological symptoms, such as anxiety, depression, agitation, mood and quality of life is more consistent, but it comes largely from mixed dementia populations and concerns symptom management rather than slowing disease progression. Music-based interventions may therefore be best described as a promising, low-cost non-pharmacological approach that may improve selected symptoms of AD, rather than as an established treatment.

Several gaps remain. Few studies have examined the long-term effects of music therapy, and the relative benefits of active music therapy (making music) and receptive music therapy (listening to music) have not been compared in enough high-quality trials. In the future, larger, well-designed RCTs conducted specifically in patients with AD, using standardized cognitive measures and longer follow-up periods, should be conducted in order to determine more conclusively the effectiveness of music-based treatments on AD.

REFERENCES

Abraha, Iosief, et al. "Systematic Review of Systematic Reviews of Non-Pharmacological Interventions to Treat Behavioural Disturbances in Older Patients with Dementia. The SENATOR-OnTop Series." *BMJ Open*, vol. 7, no. 3, Mar. 2017, p. e012759, https://doi.org/10.1136/bmjopen-2016-012759.

Alzheimer's Disease International. "Dementia Statistics." *Alzheimer's Disease International*, 2020, https://www.alzint.org/about/dementia-facts-figures/dementia-statistics/.

Bleibel, Malak, et al. "The Effect of Music Therapy on Cognitive Functions in Patients with Alzheimer's Disease: A Systematic Review of Randomized Controlled Trials." *Alzheimer's Research & Therapy*, vol. 15, article 65, Mar. 2023, https://doi.org/10.1186/s13195-023-01214-9.

Orpella, Joan, et al. "Effects of Music Advertised to Support Focus on Mood and Processing Speed." *PLoS ONE*, vol. 20, no. 2, Public Library of Science, Feb. 2025, p. e0316047, https://doi.org/10.1371/journal.pone.0316047.

Sihvonen, Aleksi J., et al. "Music-Based Interventions in Neurological Rehabilitation." *The Lancet Neurology*, vol. 16, no. 8, Aug. 2017, pp. 648–60, https://doi.org/10.1016/s1474-4422(17)30168-0.