Glossos
Issue 19, Fall 2023
http://seelrc.org/glossos/
glossos@seelrc.org

Symphonies of support: A meta-analysis of group music interventions for dementia patients in care facilities

Amitesh Verma

Dr. Edna Andrews

Duke University

Abstract

With the global older adult population on the rise, there has been a parallel increase in the prevalence of dementia and other neurodegenerative diseases. As the cost and burden of care for dementia patients escalates, there has been increasing reliance on care facilities, including nursing homes, assisted living facilities, and care homes to support the needs of this population. However, given the scarcity of successful pharmacological interventions for dementia and the prevalence of psychosocial conditions such as isolation and depression in nursing home populations, new and more effective care practices are needed. Group music interventions are a promising and potentially cost-effective non-pharmacological approach for individuals with dementia living in care facilities. To further understand current trends in this growing field of therapy, 12 studies highlighting group music interventions for individuals with dementia living in care facilities were analyzed. With a purpose of summarizing current trends in intervention models and outcomes in both the dementia and care-giver population, this meta-analysis aims to assess how such group music interventions can be optimized for future implementation.

Background

Dementia is a general term used to describe a family of progressive neurodegenerative conditions that adversely affect an aging person's memory, cognition, and social abilities in everyday activities. According to the Global Status Report released by the World Health Organization, 55.2 million individuals worldwide were estimated to be living with dementia in 2019, a figure that is expected to increase to roughly 140 million by 2050 as the elderly population continues to grow (World Health Organization 2021). Despite the escalating prevalence of dementia and ongoing scientific research, effective clinical treatments remain limited with more than 99% of pharmacological trials for Alzheimer's Disease showing no drug-placebo difference (Cummings et al. 2019: 1). As a result, dementia presents a unique challenge and burden for healthcare systems.

Care facilities, such as nursing homes, assisted living facilities, and residential care facilities, are common care options for individuals affected by dementia. With nearly half of nursing home residents affected by Alzheimer's Disease or other forms of dementia, care facilities can offer attentive and immediate care overseen by medical and recreational staff (Alzheimer's Association 2020: 52). However, these care facilities are often understaffed and structured in ways through which providing excellent care can be challenging (Grabowski 2022: 2). As a result, individuals with dementia are vulnerable to developing depression, anxiety, and social isolation which can further diminish quality of life (Matos Queirós et al. 2021: 40; Koszalinski et al. 2022: 2741). Therefore, with a scarcity of treatment options and a care facility system that is

often inadequate, more innovative care practices are needed to support individuals with dementia.

Music-based interventions, given their non-pharmacological nature and ability to engage various neural functions, are particularly appealing to support individuals with dementia in care facilities (Schlaug 2009: 372). In recent years, several studies have demonstrated potential benefits of music interventions for individuals with dementia, including improved cognitive function, social interaction, and overall quality of life (Särkämö 2018: 414). These music interventions can take on various forms, including personalized music therapy sessions or group music activities alongside credentialed music therapists, musicians, or care facility staff. Group music interventions have been targeted for individuals living in care facilities, as they can help to promote a sense of community and connectedness while combating social isolation among individuals with dementia (Veal et al. 2022: 1528). Moreover, group interventions may be particularly well-suited for care facilities as they require fewer resources and funds to implement than personalized interventions (Veal et al. 2022: 1535). Nevertheless, further investigation into group music interventions for individuals with dementia is needed to distinguish the most effective models and optimize implementation in the care facility setting. This meta-analysis will analyze recent group interventions for individuals with dementia living in care facilities with two core objectives: (1) assess the impact of group music interventions for individuals with dementia in care facilities and (2) evaluate which models of group music interventions maximize success.

Methods

Data Sources, Search Strategy, and Selection Criteria

The studies included in the present meta-analysis fulfilled the following criteria: they detailed group music interventions (facilitated by either credentialed music therapists or other care facility related staff), included a study population of people with dementia aged 65 years old or above, and were conducted in a care facility setting (including nursing homes, assisted living facilities, and adult day centers). Studies highlighting individualized or personalized music interventions were excluded along with studies which included care facility residents who were not diagnosed with dementia in the participant population. Additionally, studies which assessed music interventions in the personal homes of individuals with dementia were excluded as this meta-analysis sought to solely evaluate interventions in the care facility setting. Furthermore, with the purpose of highlighting current trends in group music interventions for care facility residents with dementia, only studies published in the last six years were included.

The relevant studies were identified through a comprehensive literature search using two main electronic databases, namely PubMed Central and Medline. Searches were further aided using Google Scholar and the journal article search engine provided by Duke University Libraries. Specific keyword entries for searches to meet inclusion and exclusion criteria were conducted as follows: (“group music intervention” OR “group music therapy”) AND (“dementia” OR “Alzheimer’s Disease”) AND (“nursing home” OR “assisted living facility” OR “adult day center” OR “residential care home”) NOT (“individualized” OR “personalized”). Searches were also filtered to only include studies published between 2017 and 2023.

Data Collection and Quality Assessment

Search results were further analyzed through a full text evaluation to ensure fulfillment of study inclusion and exclusion criteria. General characteristics of the study interventions, including participant population, type of musical activity, and duration of activity were compiled in table form along with qualitative and quantitative outcome measures used to assess intervention success.

Results

Study Characteristics

A total of 12 studies on group music interventions for individuals with dementia living in care facilities were identified from electronic searches and included for further analyses. 9 studies followed randomized-controlled trial study designs, 1 study followed an observational design, 1 study followed a single-arm mixed methods design, and 1 study followed a prospective exploratory within-subjects design. Table 1 summarizes general characteristics of the 12 included studies. Study publication dates ranged from February 2017 to March 2022, with a total of 1150 subjects included across all studies. Study populations ranged from 8 to 318 subjects with mild to severe dementia assigned to either intervention or control groups. Two studies further narrowed their study population, for example, including individuals with mild to severe depressive symptoms (Baker et al. 2022: 153) and clinical diagnoses of apathy (Tang et al. 2018: 471).

Group Intervention Characteristics

The group music interventions reviewed were diverse in activity type and structure, including group song singing, music-stimulated improvisation, music-with-movement, and music-assisted

reminiscence therapy. Though most studies included credentialed music therapists to facilitate group interventions, a few studies solicited the help of nursing home activity staff (Cho 2018: 1), community music professionals without music therapy training (Baker et al. 2022: 153; Werner et al. 2017: 147), and certified nursing assistants (Ray and Götell 2018: 1). Interventions varied in group sizes, with most studies maintaining a group size between 4 and 10 older adults. However, some studies included larger group sizes depending on the type of activity; for example, one recreational choir singing intervention included groups of 15-20 adults (Baker et al. 2022: 156) and another large-scale music singing and dancing activity included a group of 47 adults (Pérez-Ros et al. 2019: 433). Furthermore, study interventions tended to follow a similar schedule with most interventions lasting between 30 to 60 minutes and held once, twice, three times, or five times a week. One intervention, which included musical performances and instrument-playing sessions for participants, followed a considerably longer duration of 8 hours once a week (Clare et al. 2020: 1115).

Efficacy of Group Music Interventions

The 12 studies generally evaluated the impact of the group music interventions across three overarching categories: severity of dementia symptoms and cognitive function (as assessed by the Neuropsychiatric Inventory Questionnaire, Mini-Mental State Examination, Fuld's Object Memory Evaluation, Fuld's Verbal Fluency Test, Digit Span Test, Barthel Index, and Tinetti Scale), participant wellbeing (as assessed by the Montgomery-Åsberg Depression Rating Scale, Hospital Anxiety and Depression Scale, Positive and Negative Affect Scale, Rating Anxiety in Dementia Scale, Hamilton Anxiety Rating Scale, Geriatric Depression Scale, Cornell Scale for Depression in Dementia, Yesavage Geriatric Depression Scale, Apathy Evaluation Scale, Cohen-

Mansfield Agitation Inventory-Short Form, Quality of Life in Alzheimer's Disease Scale, and Visual Analog Mood Scale), and effects on caregivers (as assessed by the Professional Care Team Burden Scale and qualitative staff interviews).

Of the studies assessing intervention-related effects on the severity of dementia symptoms and cognitive function, all reported, in some sense, a reduction or stabilization in dementia-related impairments. For example, Baker et al. 2022, Gómez-Gallego et al. 2021, and Ho et al. 2018, all of which used the Neuropsychiatric Inventory Questionnaire, found improvements in cognition and behavior. Furthermore, Cheung et al. 2018, Tang et al. 2018, Pérez-Ros et al. 2019, and Gómez-Gallego et al. 2021, studies which used the Mini-Mental State Examination, observed stability to improvements in cognitive function, memory, orientation, and verbal fluency. Studies assessing intervention effects on patient functional state, including Pérez-Ros et al. 2019 and Cheung et al. 2018 which both used the Barthel Index and Tinetti Scale, found improvements in individual ability to perform daily living activities and rigidity and motor ability for interventions which promoted some type of movement.

Of the most significant outcomes were improvements in the wellbeing and quality of life of individuals with dementia. 6 of the 7 studies assessing the depressive states of participants found some reduction in depressive symptoms. Most notable of these studies, Baker et al. 2021, which assessed the impact of a large-group recreational choir singing intervention, found a clinically meaningful reduction in depressive symptoms as measured by the Montgomery-Åsberg Depression Rating Scale. Additionally, all studies evaluating anxiety levels of participants, including Cheung et al. 2018 and Liu et al. 2021, found significant reductions in anxiety levels.

Tang et al. 2018, Veal et al. 2022, and Ho et al. 2018, studies which evaluated participant apathy and agitation, found reductions in neuropsychiatric symptoms as well. Moreover, Clare et al. 2020, which featured 8-hour long weekly live music sessions, described the group intervention's ability to foster a multisensory environment which allowed individuals with dementia to communicate both verbally and nonverbally which promoted agency and social interaction.

A couple studies also detailed the effects of the group interventions on care facility staff and caregivers. For example, Baker et al. 2022 reported a reduction in neuropsychiatric symptoms with respect to distress for caregivers, although there was a higher perceived burden on caregiver staff from the addition of the intervention as measured using the Professional Care Team Burden Scale. Additionally, Veal et al. 2022, which conducted qualitative interviews with care staff, reported the overall feasibility of the gentle movement and reminiscence group music intervention in the assisted living facility setting. Care staff in this study also reported that the intervention allowed them to see positive changes in residents while gaining a more nuanced understanding of their residents, such as their song preferences (Veal et al. 2022: 1533).

Most intriguing, a few studies found greater improvements in cognitive function and emotional wellbeing for certain structures and activity models of group music interventions over others. For example, Cheung et al. 2018 and Ray and Götell 2018 both compared music-with-movement interventions with music listening or music singing interventions for participants and found improvements in memory, depression, and wellbeing to be more significant for music-with-movement participants. Similar successes for music interventions which included elements of movement were observed in Veal et al. 2022 and Werner et al. 2017. Additionally, Gómez-

Gallego et al. 2021, which compared an active music intervention involving rhythmic and dance exercises to a receptive music intervention which only involved group music listening, found these effects to be larger for active music intervention participants. Baker et al., 2022, which compared a recreational choir singing intervention led by a community musician to a more traditional music therapy group led by a credentialed music therapist, found greater reductions in depressive symptoms and improvements in generic quality of life for recreational choir participants.

Discussion

The focus of this meta-analysis was to analyze a series of studies that investigated the effectiveness of group music interventions as a potential means of reducing this strain and identifying alternative care strategies for individuals with dementia living in care facilities. In the following, key findings from this analysis with respect to intervention outcomes, general models, and limitations will be discussed.

Unique Outcomes of Group Music Interventions

Individuals with dementia experience a wide range of neuropsychological challenges with memory, cognition, and social abilities. The 12 studies analyzed in this meta-analysis evaluated the potential of group music interventions in care facilities to improve these conditions for individuals with dementia. Most notable were findings related to improvements in dementia-related cognitive impairments (Baker et al. 2022, Cheung et al. 2018, Tang et al. 2018, Pérez-Ros et al. 2019, Gómez-Gallego et al. 2021), depressive symptoms (Baker et al. 2022, Cheung et al. 2018, Ray and Götell 2018, Werner et al. 2017), and anxiety and apathy (Tang et al. 2018,

Liu et al. 2021). Furthermore, these studies indicate that these positive effects are potentially due to the characteristic nature of group music interventions which not only encompasses the beneficial neurological stimulation associated with music engagement but also the social sphere formed for older adults in the group setting. For example, as noted in Liu et al. 2021, music-based interventions can stimulate intellectual function and trigger emotion. Particularly, if the preferred music of the population is chosen for the intervention, as demonstrated by the study, the intervention can bolster autobiographical memory and foster an invigorating environment (Liu et al. 2021: 2). Additionally, given estimates that roughly 40% of nursing home residents exhibit a sense of loneliness which can diminish quality of life, participant-facilitator, and participant-participant social interactions provided by group music interventions can be effective in promoting social agency and community building among care facility residents with dementia (Trybusińska and Saracen 2019: 354). For example, Cho 2018 notes that active group singing has the potential of improving self-worth, belonging, and accomplishment for individuals with dementia in long-term care facilities (Cho 2018: 11). Hence, group music interventions have the potential to enhance cognitive function and emotional wellbeing for care facility residents with dementia.

Current Trends in Intervention Models

The studies analyzed featured a wide variety of group music interventions, including activities such as singing, instrument-playing, and listening with diverse group sizes and session durations. Nevertheless, certain trends in successful group music interventions were observed.

Group music interventions may not require facilitation by a credentialed music therapist to demonstrate beneficial effects on participants. Given typical music therapies are led by credentialed music therapists who are nationally board-certified and have extensive training in providing music therapy, the implementation of group music interventions may be limited by the availability and funding to accommodate licensed facilitators (American Music Therapy Association 2023). However, a handful of studies featuring interventions facilitated by individuals without music therapy accreditation yielded positive and sometimes more significant effects on intervention participants including improvements in depressive symptoms (Baker et al. 2022: 164). Though the recreational choir singing intervention was designed by music therapists, community musicians were able to appropriately carry out the intervention under the supervision of music therapists who assisted them in considering repertoire decisions and understanding positive and negative responses to music (Baker et al. 2022: 164). A similar outcome was observed in Ray and Götell 2018 which included a music-with-movement and singing activity developed by music therapists but carried out by certified nursing assistants (Ray and Götell 2018: 1). Given this evidence, future group music interventions could possibly be led by staff without music therapy licensure while maintaining effectiveness and participant engagement. These interventions could be implemented for large numbers of residents at relatively low cost as they are not limited by the availability of specialized and trained music therapists.

Moreover, studies featuring group music interventions which promoted more active participant engagement seemed to be even more effective. For example, Cheung et al. 2018, which included a music-with-movement intervention for adults with moderate dementia, found greater improvements in memory and depressive symptoms for the music-with-movement group

compared to an intervention which solely focused on music listening. These enhanced effects are due to the engaging nature of music-with-movement activities which can reactivate archaic expressive and relational abilities as participants move their gross body muscles to preferred music (Cheung et al. 2018: 307). Additionally, active music intervention participants showed improvements in cognitive deficits, behavioral symptoms, and functional state compared to receptive music intervention participants, possibly due to the more cognitively demanding nature of active interventions which utilize more hands-on activities like singing or playing instruments (Gómez-Gallego et al. 2021: 9). Gómez-Gallego et al. also note that these types of interventions may also have a structure that further promotes beneficial social interactions as facilitators encourage participants to express their emotions by creating musical rhythms which can build stronger interpersonal relationships between participants and facilitators (Gómez-Gallego et al. 2021: 2).

Another intriguing finding is that although most studies included smaller group intervention sizes, some studies still showed beneficial effects for much larger groups. For example, the recreational choir singing intervention in Baker et al. 2022 included 15-20 adults, the music intervention in Liu et al. 2021 included 25 adults, and the preferred music intervention in Pérez-Ros et al. 2019 included 47 adults. These studies, regardless of the larger group size, were able to show positive effects for individuals with dementia, including cognitive function, depressive symptoms, and anxiety. However, it is important to note that a key limitation of larger group sizes is increasing burden on caregivers. For example, Veal et al. 2022, which featured groups of up to 11 individuals reported that caregivers had a higher perceived burden with one staff member stating, “The group was a little too big and hard to control” (Veal et al. 2022: 1533).

Additionally, larger group sizes may not be well-suited for individuals with more severe dementia diagnoses who require a greater level of care and attention from caregivers. Thus, although larger group sizes are appealing for their ability to maintain beneficial effects for participants at a scalable and cost-effective level, further research is required to optimize larger interventions to reduce strain on caregivers and facilitators.

Lastly, the use of preferred or familiar music in the interventions seemed to promote further engagement from participants (Cho 2018, Cheung et al, 2018, Pérez-Ros et al. 2019, Liu et al. 2021, Baker et al. 2022). The use of preferred music has the ability to not only stimulate the auditory cortex but also evoke autobiographical memories associated with positive affections in individuals with dementia (Cheung et al. 2018: 312).

Limitations and Future Implications

The studies reviewed in this meta-analysis have several limitations. Many studies had relatively small sample sizes which could limit the generalizability of the results. Although the included studies showed beneficial effects of group music interventions, larger studies with more diverse populations are necessary to confirm these findings. Additionally, many studies used self-reported measures of outcomes such as mood and quality of life which are subject to biases and are not as objective as clinical assessments or biomarkers. Moreover, studies included in this meta-analysis used a variety of group music interventions, making it challenging to compare results across studies and draw conclusions about the most effective types of interventions. Future research could use more standardized types of interventions to better understand the mechanisms by which group music interventions influence health outcomes.

In conclusion, the 12 studies reviewed in this meta-analysis support the use and implementation of group music interventions in care facilities for individuals with dementia. The studies indicated that group music interventions have the potential to improve outcomes in cognitive function, emotional wellbeing, and quality of life. Moreover, the success of group music interventions seems to be associated with several structural factors, such as choice of intervention model, promotion of active engagement in the interventions, and the use of preferred or familiar music. Although these results are promising, further research is needed to better understand the long-term effects of these interventions and optimize their cost of implementation in care facilities.

Bibliography

Alzheimer's Association. 2020. "On the Front Lines: Primary Care Physicians and Alzheimer's Care in America." Alzheimer's Association.

American Music Therapy Association. "Educational Requirements for Music Therapists." American Music Therapy Association.

Baker, F., Lee, Y., Sousa, T., Stretton-Smith, P., Tamplin, J., Sveinsdottir, V., Geretsegger, M., Wake, J., Assmus, J., & Gold, C. 2022. Clinical effectiveness of music interventions for dementia and depression in elderly care (MIDDEL): Australian cohort of an international pragmatic cluster-randomized controlled trial. The Lancet Healthy Longevity, 3(3):153-165.

Cheung, D., Lai, C., Wong, F., & Leung, M. 2018. The effects of the music-with-movement intervention on the cognitive functions of people with moderate dementia: a randomized controlled trial. Aging & Mental Health, 22(3):306-315.

Cho, H. 2018. The Effects of Music Therapy-Singing Group on Quality of Life and Affect of Persons With Dementia: A Randomized Controlled Trial. Frontiers in Medicine, 5:279.

Clare, A., Carnic, P., Crutch, S., West, J., Harding, E., & Brotherhood, E. 2020. Using Music to Develop a Multisensory Communicative Environment for People with Late-Stage Dementia. Gerontologist, 60(6):1115-1125.

Cummings, J., Feldman, H., & Scheltens, P. 2019. The "rights" of precision drug development for Alzheimer's disease. Alzheimer's Research & Therapy, 11(1):76.

Gómez-Gallego, M., Gómez-Gallego, J., Gallego-Mellado, M., & García-García, J. 2021. Comparative Efficacy of Active Group Music Intervention versus Group Music Listening in Alzheimer's Disease. International Journal of Environmental Research and Public Health, 18(15):8067.

Grabowski, D. 2022. Putting the Nursing and Home in Nursing Homes. Innovation in Aging, 6(4):igac029.

Ho, R., Fong, T., Sing, C., Lee, P., Leung, A., Chung, K., & Kwok, J. Managing behavioral and psychological symptoms in Chinese elderly with dementia via group-based music intervention: A cluster randomized controlled trial. Dementia, 18(7-8):2785-2798.

Koszalinski, R. & Olmos, B. 2022. Communication challenges in social isolation, subjective decline, and mental health status in older adults: A scoping review (2019-2021). Perspectives in Psychiatric Care, 58(4):2741-2755.

Liu, M., Liou, Y., Wang, W., Su, K., Yeh, H., Lau, C., Hu, L., Tsai, S., & Chen, H. 2021. Group Music Intervention Using Percussion Instruments to Reduce Anxiety Among Elderly

Male Veterans with Alzheimer's Disease. Medical Science Monitor, 27:e928714-1-e928714-7.

Matos Queirós, A., von Gunten, A., Martins, M., Wellens, N., & Verloo, H. 2021. The Forgotten Psychopathology of Depressed Long-Term Care Facility Residents: A Call for Evidence-Based Practice. Dementia and Geriatric Cognitive Disorders Extra, 11(1):38-44.

Pérez-Ros, P., Cubero-Plazas, L., Meijías-Serrano, T., Cunha, C., & Martínez-Arnau, F. 2019. Preferred Music Listening Intervention in Nursing Home Residents with Cognitive Impairment: A Randomized Intervention Study. Journal of Alzheimer's Disease, 70(2):433-442.

Ray, K. & Götell, E. 2018. The Use of Music and Music Therapy in Ameliorating Depression Symptoms and Improving Well-Being in Nursing Home Residents With Dementia. Frontiers in Medicine, 5:287.

Särkämö, T. 2018. Cognitive, emotional, and neural benefits of musical leisure activities in aging and neurological rehabilitation: A critical review. Annals of Physical and Rehabilitation Medicine, 61(6):414-418.

Schlaug, G. 2009. Part VI: Listening to and Making Music Facilitates Brain Recovery Processes. Annals of the New York Academy of Sciences, 1169:372-3.

Tang, Q., Zhou, Y., Yang, S., Thomas, W., Smith, G., Yang, Z., Yuan, L. & Chung, J. 2018. Effect of music intervention on apathy in nursing home residents with dementia. Geriatric Nursing, 39(4):471-476.

Trybusińska, D. & Saracen, A. 2019. Loneliness in the Context of Quality of Life in Nursing Home Residents. Open Medicine, 14:354-361.

Veal, B., Dobbs, D., Lee, S., Bugos, J., Pyfrom, M., Boddupalli, S., Lengacher, C., & Meng, H. 2022. Feasibility and Acceptability of a Group Music Intervention in Memory Care Communities. Journal of Applied Gerontology, 41(6):1528-1538.

Werner, J., Wosch, T., & Gold, C. 2017. Effectiveness of group music therapy versus recreational group singing for depressive symptoms of elderly nursing home residents: pragmatic trial. Aging & Mental Health, 21(2):147-155.

World Health Organization. 2021. "Global status report on the public health response to dementia." World Health Organization

Table 1: Detailed characteristics of group music interventions meeting search criteria.

Study	Participants	Participant Characteristics	Group Music Intervention Characteristics	Outcome Measurement	Outcome Results
Clare et al., 2020 *The Gerontologist* Qualitative, longitudinal, observational design	8 adults (mean age of 90.1); 50% female	Older adults with advanced dementia living in a residential care home.	8-hour-long weekly live music sessions involving musical pieces performed by musicians (on an oboe, flute, and harp) and improvised groups and music sessions which allowed participants to play a range of instruments (from shakers and maracas to claves and drums).	Fly 360-degree camera recording observation	Live music group facilitated a multisensory communicative environment allowing for verbal and nonverbal communicative actions, social interactional components, and a sense of agency. Weekly time scale of the intervention helped orient participants, one-to-one interaction in the group setting bolstered communication of participants through eye contact and physical closeness, and characteristics of music promoted body movement and facial expression.
Baker et al., 2022 *The Lancet Healthy Longevity* Pragmatic cluster-randomized, longitudinal controlled design	318 adults (mean age of 86.5); 69% female	Older adults with dementia and mild to severe depressive symptoms in 5 care home units.	Recreational Choir Singing Group: 45-minute weekly recreational choir singing sessions in groups of 15-20 adults facilitated by community musicians with experience leading ensembles. Sessions were structured around song singing with familiar repertoire with lyrics displayed on a screen. Group Music Therapy Group: 45-minute weekly group music therapy sessions in groups of 8-10 participants facilitated by a credentialed music therapist. Activities included familiar song singing, music-stimulated, improvising on percussion instruments, and spontaneous or directed movement to music.	Montgomery-Åsberg Depression Rating Scale, Neuropsychiatric Inventory Questionnaire, Quality of Life in Alzheimer's Disease Scale, and the Professional Care Team Burden Scale	Recreational choir singing led to a clinically meaningful reduction in depressive symptoms in addition to a reduction in the severity of neuropsychiatric symptoms and associated caregiver distress.
Cho 2018 *Frontiers in Medicine*	52 adults (mean age of 86.6), 17% female	Older adults living with dementia from a long-term care	Music Therapy-Singing Group: Lists of songs in accordance with adult song and genre preferences were made and sessions of 15 adults included	The Quality of Life-Alzheimer's Disease and the Positive and Negative Affect	Significant improvements in quality of life and increased positive affect and decreased negative affect scores were observed for the music therapy-singing group. No significant changes in

Randomized-controlled trial with a pretest-posttest design		skilled nursing facility.	group singing facilitated by a therapist on a keyboard with song sheets including lyrics provided to participants. Music Medicine-Listening Group: Nursing home activity staff engaged a group of 14 participants in listening to a CD including preferred songs. Discussions included emotions, thoughts, and memories. Sessions were 40-minutes for twice a week each.	Schedule	variables were observed for the music medicine-listening group.
Cheung et al., 2018 *Aging & Mental Health* Multi-center randomized controlled design	165 adults (mean age of 82.2); 75.8% female	Older adults with moderate dementia in 12 residential care facilities.	Music-with-Movement Group: Groups of 4-6 participants engaged in 30-minute movement sessions twice a week as they listened to their preferred music. Activities included batting balloons, waving ribbons, foot tapping, and playing percussion instruments. Music-Listening Group: Groups of 4-6 participants engaged in 30-minute preferred music listening sessions twice a week. Sessions were led by a trained interventionist.	Rating Anxiety in Dementia Scale, Geriatric Depression Scale, Mini-Mental State Examination, Fuld's Object Memory Evaluation, Modified Fuld Verbal Fluency Test, and the Digit Span Test	Greater improvements in memory and depressive symptoms for the music-with-movement group were observed in comparison to the music-listening intervention. However, a mixed multivariate analysis of variance indicated no significant interactions of group by time effect.
Ray and Götell 2018 *Frontiers in Medicine* Exploratory within-subjects	62 adults (mean age of 85.54); 85.5% female	Older adults with moderate dementia from a nursing home.	Credentialed Music Therapist Phase: Groups of 4-6 people engaged in 30 to 60-minute sessions 3 times a week led by music therapists. Activities included singing, music and movement, and instruments such as guitar, keyboard, and simple rhythm and tonal instruments.	Cornell Scale for Depression and the Music in Dementia Assessment Scale	Residents' baseline depressive symptoms declined following 2 weeks of music therapy, increased during the wash-out period, and stabilized following 2 additional weeks of music activity. Significant improvement in wellbeing was observed for residents who engaged in the music with movement intervention but not for those who participated in the singing

with a 2-week washout design			Certified Nursing Assistant Phase: Following a 2-week washout, the intervention was conducted under certified nursing assistants who were instructed to include either singing or movement activities twice a week for 10-15 minutes. Colorful scarves, ribbons, and instruments were also provided.		intervention.
Werner et al., 2017 *Aging & Mental Health* Pragmatic, two-armed, cluster, randomized controlled design	117 adults (mean age of 84.4); 68% female.	Older adults living with dementia in 2 nursing homes.	Interactive Group Music Therapy Group: Participants engaged in 40-minute sessions twice a week in interactive therapies based on Muthesius and Hamberger. Activities included group singing, receptive music therapy, instrumental improvisation, and dance/movement while reflecting on their individual biographies and milieu-orientation. Verbal reflections after each musical action or reception were also conducted. Qualified music therapists conducted these sessions. Recreational Group Singing Group: Participants engaged in recreational group singing during 90-minute sessions once a week. Musical professionals without qualifications in music therapy led these sessions.	Montgomery-Åsberg Depression Rating Scale and Geropsychiatric Specialist Evaluation	The level of depressive symptoms improved significantly in music therapy adults than in recreational singing. Concentration difficulties, lassitude, pessimistic thoughts, and inner tension decreased in music therapy adults.
Tang et al., 2018 *Geriatric Nursing* Randomized,	77 nursing home residents (mean age of 75.8); 49%	Older adults with mild to moderate dementia and a clinical diagnosis of	Groups of 9 adults assisted by a trained therapist engaged in 50-minute music interventions three times a week. A variety of activities were included such as sensory stimulation with music, singing nostalgic songs, and playing	Apathy Evaluation Scale, Mini-Mental State Examination, and the Holden Communication Scale	The music intervention group maintained cognitive function in comparison to the control group in which scores declined. Symptoms of apathy decreased in the intervention group. Verbal communication ability was also improved.

controlled, parallel, partially masked, interventional design	female.	apathy as defined by the Apathy Evaluation Scale.	musical percussion instruments.		
Pérez-Ros et al., 2019 *Journal of Alzheimer's Disease* Randomized intervention design	119 adults (mean age of 80.5); 51.2% female	Older adults with dementia living in a nursing home.	60-minute musical stimulation sessions were held 5 times a week. Patients and relatives were asked about types of music and songs that pleased them and a playlist of songs was made. In a large room, the music was played using an MP3 player on loudspeakers and the group of 47 adults were allowed to interact, sing, dance, and clap. Sessions were facilitated by qualified music therapists.	Barthel Index, Tinetti Balance and Gait Scale, Mini-Mental State Examination, Geriatric Depression Scale, and the Cornell Scale	The preferred music intervention improved activities of daily living with a medium effect size. Emotional state improved significantly with a large effect size. Gait improvement was observed in participants. Cognitive function remained stable in the intervention group with a large effect size when compared to the control group.
Veal et al., 2022 *Journal of Applied Gerontology* Single-arm mixed methods design	19 adults (mean of 82.7); 73.7% female.	Older adults with dementia in one assisted living community and one adult day center.	50-minute sessions 3 times a week were conducted in 3 separate cohorts (cohort 1: n = 5; cohort 2: n = 11; and cohort 3: n = 6). Sessions followed a general structure with guided gentle movement and breathing exercises and music videos with prompts for reminiscence. Sessions were facilitated by credentialed music therapists.	Functional Assessment Staging Test, Cohen-Mansfield Agitation Inventory-Short Form, and qualitative staff interviews	The intervention reduced agitation among participants. The intervention was found to be feasible and acceptable as assessed by quantitative data on attrition and attendance and qualitative interviews with staff post-intervention.
Gómez-Gallego et al., 2021 *International Journal of Environmental Research and Public Health*	90 adults (mean age of 80.87); 61.1% female.	Older adults with mild or moderate dementia living in 6 nursing homes.	Active Music Intervention: Groups of 6, 7, 8, and 9 residents engaged in an active music intervention with a structure consisting of a welcome song, rhythmic exercises, dance exercises, music quiz, and a goodbye song.	Mini-Mental State Examination, Barthel Index, Tinetti Scale, Geriatric Depression Scale, and the Neuropsychiatric Inventory Questionnaire	Active music intervention improved cognition, behavior, and functional state to a larger extent than receptive music intervention. Receptive music intervention had a stabilizing effect on behavioral symptoms.

Randomized, controlled, clinical design			Receptive Music Intervention: Groups of 6, 7, and 8 residents listened to songs chosen by a facilitator and were invited to share feelings or memories following each song. Both interventions were 45-minute sessions held twice a week and conducted by trained music therapists.		
Liu et al., 2021 *Medical Science Monitor* Randomized, controlled, clinical design	50 adults (mean of age 86.7); 100% male	Older men with Alzheimer's Disease living in long-term stay veterans' homes.	The group of 25 participants engaged in a weekly 60-minute group music intervention led by a trained music facilitator. The session included a 10-minute warm-up session of fingers, upper-extremities, and breathing exercises, a 40-minute session of playing percussion instruments in simple rhythmic patterns to familiar music, and a 10-minute review session of rhythmic patterns.	Hamilton Anxiety Rating Scale, Geriatric Depression Scale, and Primary Measures of Music Audiation	A significant reduction in anxiety level was observed for intervention participants while there was no significant change in depressive symptoms. Patients with higher musical aptitude scores had significantly reduced anxiety symptoms compared to participants with lower musical aptitude scores.
Ho et al., 2018 *Dementia* Cluster, randomized, controlled design	73 adults (mean age of 85.3); 70% female)	Older adults with moderate dementia from 10 elderly residential homes.	In groups of 8 participants, a registered social worker and arts therapy trainee facilitated 2-hour sessions twice a week which included familiar songs and opportunities for participants to sing along or dance to the music. Participants were individually greeted by name and the session started with a breathing exercise and musical relaxation/massage to stimulate a sense of touch.	Neuropsychiatric Inventory Questionnaire and the Visual Analog Mood Scale	Intervention participants showed significant improvements in agitation, aberrant motor behavior, and dysphoria in comparison to the control group. There were no significant effects observed for irritability and subjective mood. A reduction in behavioral and psychological symptoms of dementia was observed.