



## Effects of Music and Dance based art interventions on healthy aging: A scoping literature review

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### Abstract:

By the year 2050, the aging population (more than 65 years old) in OECD countries is projected to be three folds compared to the 1950s (Ageing, 2020). Healthy aging is a social privilege. The concept of successful aging is beyond treating symptoms, rather it is about incorporating a holistic non-pharmacological approach to improve the wellbeing of older adults. As literature suggests, music and dance are two of the key non-pharmacological interventions (NPIs) for improving the quality of life among elderly (Wilson et al., 2019). A scoping review was conducted with the research question: "What empirical evidence exists to support the role of music and dance interventions in promoting healthy aging among individuals aged 65 years and older?" Most prominent outcomes of dance-based interventions were improvement in gait, physical functions, mobility and fall prevention. Music interventions showed cognitive enhancement, and improvement in psychological symptoms like mitigating depression, reduction in anxiety and elevation of mood. A combination of music and dance therapies resulted in enhancement of physical and cognitive function. Future studies should investigate the long-term impact of music and dance-based interventions and explore the effects of other NPIs.

**Keywords:** Healthy aging; Successful aging; Community-based interventions; Music and dance; older adults

### Introduction

Aging is an irreversible process leading to a gradual and significant decline in physical and mental health. Age related health conditions include diabetes, hypertension, osteoporosis, and cognitive disorders for example impaired memory and dementia etc. (Guo et al., 2022).

According to the World Health Organization (WHO), the aging population is expected to grow worldwide by 2030, in both size and proportion. As per this report, it is estimated that one out of every six individuals across the globe will be at or over 60 years of age by 2030. The WHO has raised the concern whether the world is prepared to effectively handle this anticipated increased life expectancy in the coming years (Ageing, 2020). Healthy ageing has been defined by WHO as "the process of developing and maintaining the functional ability that enables wellbeing in older age." They further clarified the concept of functional ability as "having the capabilities that enable all people to be and do what they have reason to value" (WHO

2020, healthy ageing and functional ability).

The UN decade of health aging is a 2020 resolution whereby the World Health Organization (WHO) and United Nations (UN) member states agreed on a 10-year (2021-2030) action plan to take initiatives to improve healthy aging (Thiyagarajan et al., 2022). Nowadays, the focus of Geriatric Medicine is inclined more towards innovating research interventions to promote healthy aging. Previously, pharmacological strategies have been widely implemented to improve the quality of life in older adults (Guo et al., 2022). However, in alignment with the UN decade of healthy ageing declaration, an upward trend has been noticed towards integrating non-pharmacological interventions (NPIs) to improve the quality of life in elderly (Wilson et al., 2019)

NPIs are science-based and non-invasive interventions with an impact on health, quality of life, behavioural and socioeconomic markers (Castellano-Tejedor, 2022). These cover a diverse and broad range of intervention categories, including cognitive training, physical exercise, dietary treatments, art-oriented therapy, and reminiscence therapy. Over the past few years, there has been growing suggestion to involve arts as a non-pharmacologic intervention for preventing cognitive decline and improving the well-being and overall quality of life in the elderly individuals (Fioranelli et al., 2023). As per a World Health Organization (WHO) report from 2019, engaging in art activities provides an extensive array of health benefits, spanning from preventing mental and physical health risk factors, to managing various health conditions including cancer, dementia, schizophrenia, anxiety and depression. (Fancourt & Finn, 2019).

The act of engaging in the arts activities can have profound effects on the elderly including those with mental illness (Galassi et al., 2022). Every individual component of arts activities has the potential to trigger psychological, physiological, social, and behavioral reactions that are inter-linked with health outcomes. For instance, the aesthetic and emotional elements of arts engagements provide a chance for expression and regulation of emotions, and stress reduction (Fancourt & Finn, 2019). Additionally, social interaction through art engagement can serve as a significant means to mitigate loneliness, discrimination, and other risk factors related to increasing mental health issues in elderly population (Galassi et al., 2022).

According to a study conducted at a residential care complex in British Columbia, arts engagement activities increased a sense of belonging and decreased the sense of isolation in elderly patients (Rodrigues et al., 2018). Among art-based interventions, music and dance based interventions are particularly prevalent as more socially connected and culturally relevant activities to shape and control cognitive, emotional, and manifested behaviour. Subsequently, research on the use of music and dance as a NPI for promoting healthy aging among elderly has gained popularity in recent years (Bracco 2023; Castillejos 2021; Davis et al., 2000) Hence, for our study, we did a scoping review with the research inquiry: "What empirical evidence exists to elucidate the supportive role of music and dance interventions in promoting healthy aging among individuals aged 65 years and older from 2017 onwards?" We investigated all the evidence generated over

the last 7 years in terms of experimental and intervention-based studies in various settings including nursing homes, long-term care homes, care centres, and communities. In this study, we refrained from including the articles with the study population based in hospital settings, as the outcome generated in these studies may be confounded by other factors apart from the primary intervention of music and dance. We acknowledge the impact of music and dance interventions in these settings, however, including these articles was beyond the scope of our study.

### Methodology:

Scoping reviews are mainly focused on identifying the gaps in the existing literature and building up on what has already been published in the domain. Arksey & O'Malley's five-stage framework for conducting a scoping review served as the guide for this review, where we summarized the main, overarching outcomes and identified the gaps in the existing literature (Arksey & O'Malley, 2005).

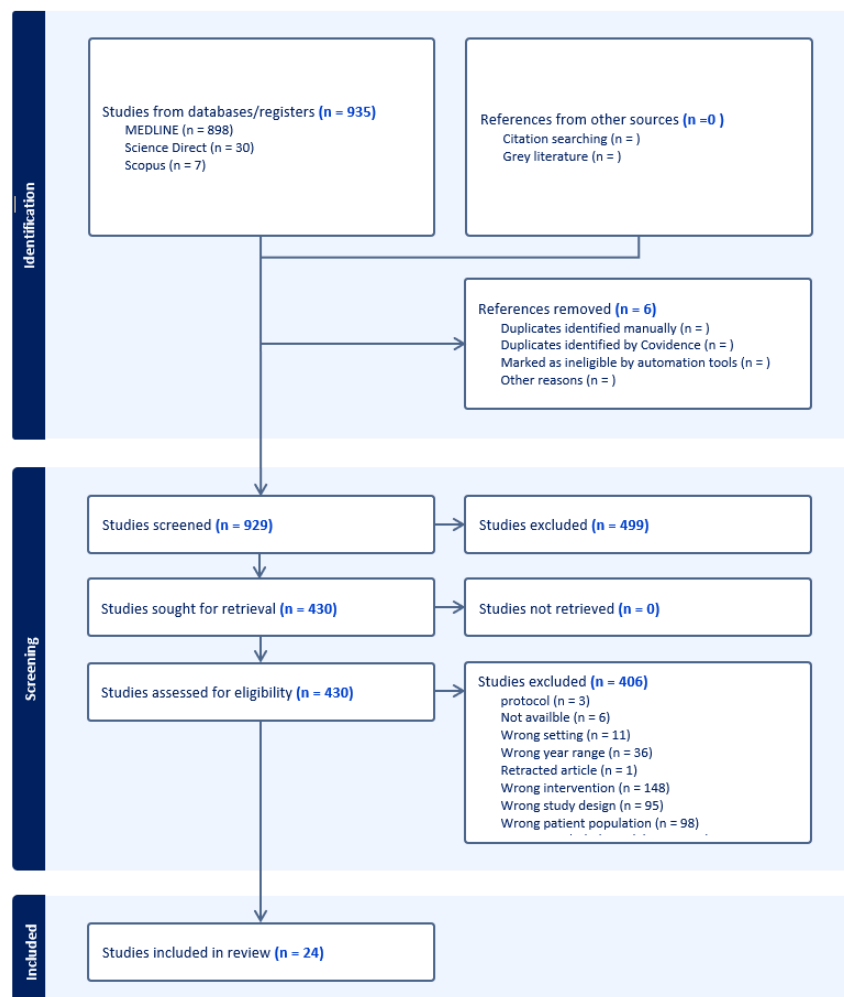
The authors piloted the search criteria with three key phrases, "older adults", "art interventions", and "healthy ageing" and aggregated the data from three prominent scholarly databases: MedLine, Science Direct, and Scopus. After a meticulous examination and the necessary elimination of duplicate entries, an initial collection of 929 relevant articles was acquired. The initial phases of data collection and subsequent extraction procedures were precisely executed using the software tool COVIDENCE. Moving beyond this piloting phase, a more refined inclusion and exclusion criteria was applied in the later screening processes. This refinement aimed to improve the precision of the study by explicitly defining the categories of arts-based interventions under investigation. The focus of the articles was narrowed down to include only the domains of music and dance-based art interventions, aligning with the specific scope of this article. Consequently, this screening strategy resulted in the exclusion of an additional 499 studies, ultimately leading to the inclusion of 430 distinct articles for further analysis. It is essential to acknowledge that, in line with the inherent characteristics of scoping reviews, there are no predefined study designs or strict criteria for the inclusion or exclusion of studies (MacRitchie et al., 2023). Therefore, a collaborative decision endorsed by all contributing authors was taken to further refine the search strategy, with the aim of creating a more cohesive and coherent publication.

To achieve this goal, during the comprehensive assessment of full-text articles, additional selective exclusions were applied, notably narrowing the inclusion criteria to encompass only original research studies while excluding protocols, letters to editors, scoping reviews, and systematic reviews, among others (Table 1). Furthermore, a temporal constraint was imposed, limiting the analysis to publications from the last 7 years. The final number of articles included in the study was 24 (see Figure 1).

Quantitative analysis was conducted on the data extracted from the 24 selected articles, considering research study, participant, and intervention characteristics. Qualitative analysis was performed by thematic analysis of the outcome characteristics of the studies and tabulated and the findings were categorized into broad themes.

Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> <li>• Older population, with or without any diagnosed chronic illness</li> <li>• Age group: 65 and above</li> <li>• Older population in community setting (homebound, long-term care facilities, palliative care)</li> <li>• Selective art intervention (music only, dance with specified/non-specified music)</li> <li>• Randomised Controlled Trials, Non-randomized controlled trials, all analytical/descriptive studies</li> <li>• Direct comparison between the younger age group (e.g. caregivers) and older age group (e.g. post-retirement)</li> </ul>	<ul style="list-style-type: none"> <li>• Older population, with medical/surgical intervention</li> <li>• Older population in any hospital setting (perioperative, post-operative, prolonged hospitalization)</li> <li>• Exercise, video games, martial arts, narrative story-telling/recitation on life experiences, reflective writing, poetry, meditation, yoga, guided/non-guided relaxation, Virtual Reality games, robotics, museum exhibition/tour, painting, drawing, colouring, performing arts and theatre</li> <li>• Protocols, Letters to editors, Commentaries, Editorials, Personal reviews, scoping reviews, systematic reviews, Perceptions, case series and case reports</li> <li>• Studies where the population has been studied/followed from youth to older adults.</li> </ul>

**Table 1:** The inclusion and exclusion criteria for selection of studies.



**Figure 1:** Prisma diagram for the search strategy and data synthesis

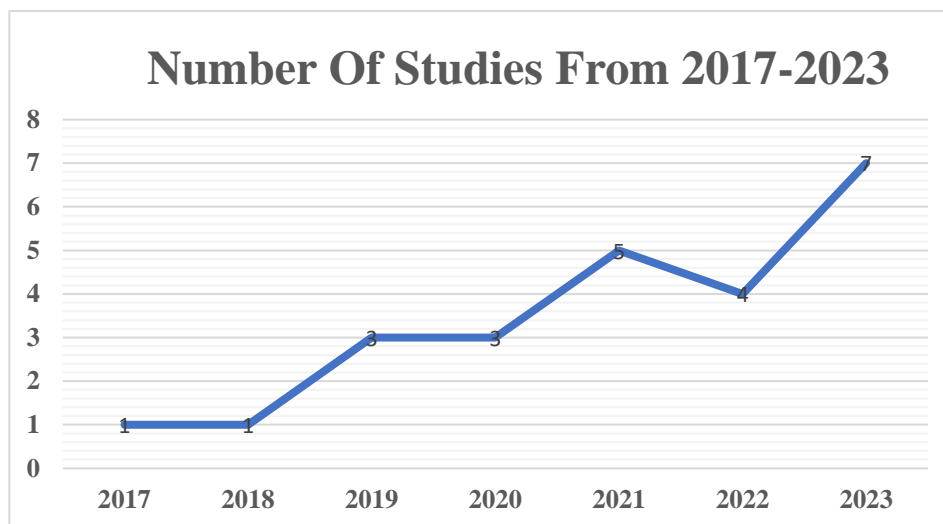
## Results

### Quantitative analysis:

#### Research Study characteristics:

Figure 2 shows the number of the studies from 2017 to 2023 and demonstrates that the number of experimental studies have

significantly increased over the years. The most common setting for the studies were in the community, although there were other settings where interventions were researched, such as nursing homes, institutionalised residential cares, long term cares, and day care centres, as depicted in Table 2.



**Figure 2:** Line graph to show the distribution of the research studies with music and dance based interventions on healthy aging from period 2017 to 2023

Setting Of Intervention	Number Of Studies
Community dwellers/ Residential homes/ Senior social centres	13
Nursing homes	5
Institutionalised residential centre	1
Long term care	1
Day hospital/ Day care centres	3
Not mentioned	1
Total	24

**Table 2:** Frequency of the intervention settings in the research studies.

#### Participants characteristics:

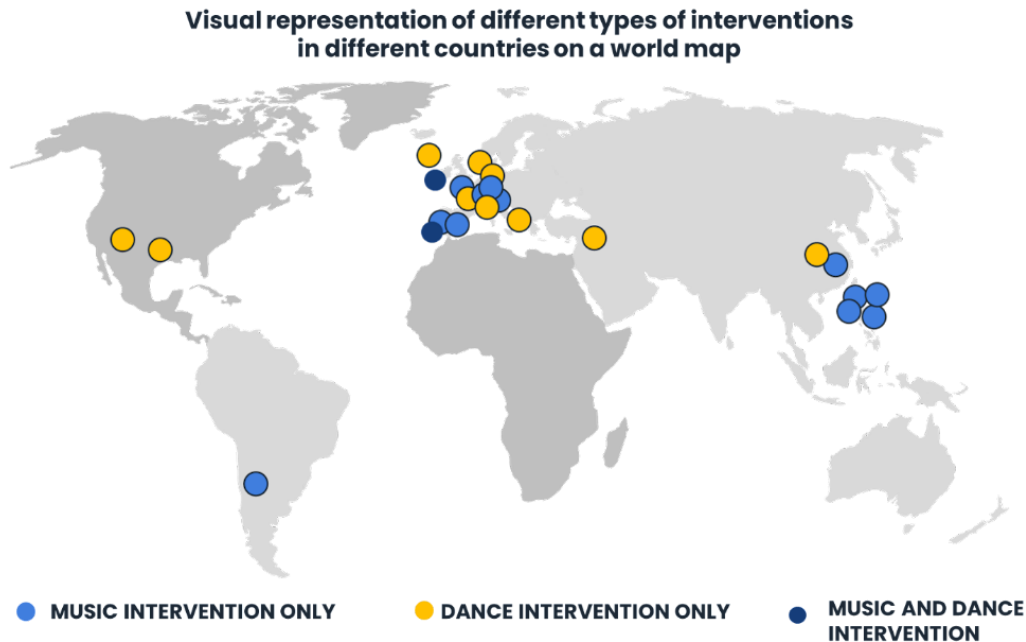
Out of the 24 studies evaluated, participants in 10 studies were healthy older adults, and in an equal number of studies the participants were elderly with varying degrees of cognitive impairment or dementia. One study recruited older adults with Alzheimer's disease (AD) as study participant. Three studies were on older adult participants with co-morbidities like hypertension, metabolic disorders, heart conditions, etc. without any cognitive impairment or dementia or AD.

There were 11 studies having participants less than 50 in number followed by seven studies with participants ranging between 51-100. Another four studies had a participant range between 100-150, and only two studies had more than 151 participants.

The current study focussed on music, dance and combined music

and dance-based interventions. The visual representation (Figure 3) and the frequency distribution (Table 3) of the three types of interventions have been plotted against the country of origin of the studies.

**Figure 3:** Visual representation of distribution of music, dance and combined music and dance interventions in different countries on a world map (Extrapolated from the **present study**).



Countries	Music Intervention	Dance Intervention	Music And Dance Intervention
United States of America	0	2	0
Italy	0	1	0
China	1	1	0
Spain	2	0	0
North Atlantic Ocean	0	1	0
France	2	1	0
Taiwan	4	0	0
Ireland	0	0	1
Poland	0	2	0
Portugal	0	0	1
Iran	0	1	0
Germany	1	0	0
Germany and Switzerland *	1	0	0
Slovenia	0	1	0
Argentina	1	0	0
Total	12	10	2

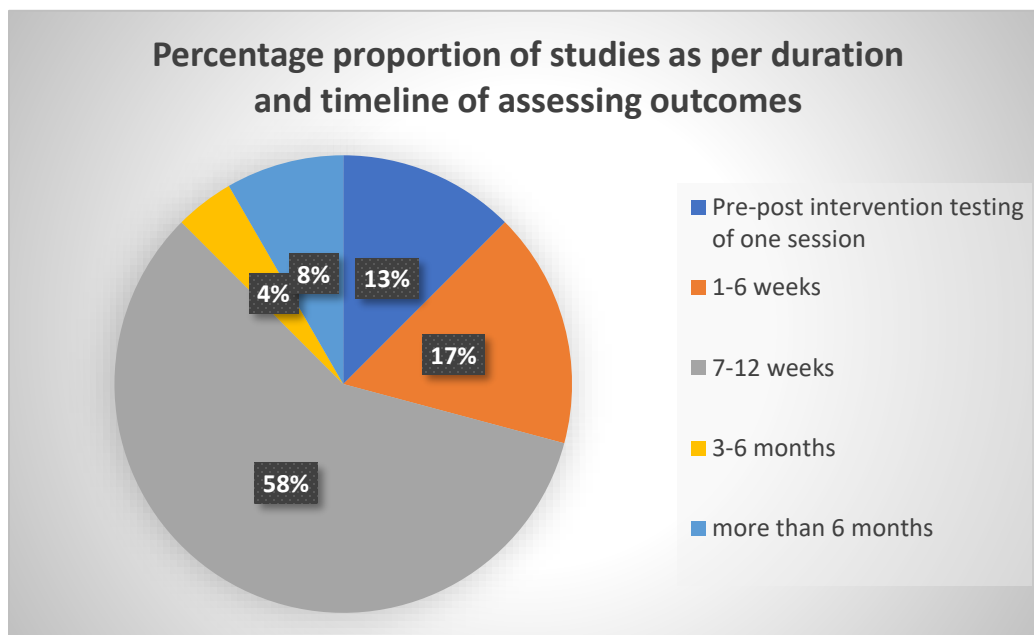
**Table 3:** Frequency table of the three types of interventions: music, dance and combined music and dance plotted against the countries of origin of the study

#### Intervention characteristics:

There were 20 studies that contained a comparison or control group for the interventions, and only four studies were interventional studies without any control or comparison group. Amongst the 20 studies with a comparison group, there were 14 studies with control groups. In these studies, the control group did not receive any music or dance interventions rather continued their routine daily activities, standard care, routine therapies, and prescribed medications. The remaining 6 studies with comparisons groups contained intra and inter group comparative analysis. These comparative groups received various forms of music or dance-

based interventions irrespective of their baseline medical conditions.

Further the proportion of the studies categorised by the duration and timeline of assessing the outcomes of the study is shown in Figure 4. The major number of studies were in the 12-week timeline at 58%. (Figure 4)



**Figure 4:** studies by duration and timeline

#### Qualitative Analysis:

outcomes of the final 24 articles is described in Table 4 with individual study details.

The thematic analysis by inductive content analysis of the reported

Name of Study	Title of Study	Objective/Aim of The Study	Intervention with Population and Settings	Major Themes derived from reported outcomes
Bennett 2018	Effects of line dancing on physical function and perceived limitation in older adults with self-reported mobility limitations.	The purpose of this study was to assess the effects of 8 weeks of line dancing on balance, muscle strength, lower extremity function, endurance, gait speed, and perceived mobility limitations	Dance intervention in healthy older adults	<ul style="list-style-type: none"> <li>• Improvement in physical function - lower extremity function, improved knee muscle strength</li> <li>• Reduction in perceived mobility limitations - gait speed and endurance, reduction in difficulty in climbing stairs - signifying improved balance.</li> </ul>
Brustio 2018	Dancing in the golden age: a study on physical function, quality of life, and social engagement.	The primary aim of this study was to examine the effects of dancing activity on mobility performance, both in single and dual-task activities. The secondary aim was to assess the effects of dancing activity on quality of life and social engagement.	Dance intervention in healthy older adults	<ul style="list-style-type: none"> <li>• Improvement in mobility</li> <li>• Improvement in simultaneous task performance ability</li> <li>• Improvement of quality of life</li> <li>• Improvement in social engagements</li> </ul>
Ho 2019	Managing behavioural and psychological symptoms in Chinese elderly	The purpose of this study was to evaluate the effects of a group music intervention in managing behavioural and	Music intervention in older adults with dementia	<ul style="list-style-type: none"> <li>• Decrease in agitation and dysphoria in older adults with dementia</li> </ul>



Name of Study	Title of Study	Objective/Aim of The Study	Intervention with Population and Settings	Major Themes derived from reported outcomes
Perez-Ros 2019	with dementia via group-based music intervention: A cluster randomized controlled trial.	psychological symptoms in Chinese elderly with dementia.	Music intervention in older adults with dementia and co-morbidities	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> <li>• No improvement in cognitive function in the intervention group.</li> <li>• No improvement in emotional condition in the intervention group</li> <li>• Improvement in activities of daily living, functional condition, and mood state</li> </ul>
	with dementia via group-based music intervention: A cluster randomized controlled trial. Preferred Music Listening Intervention in Nursing Home Residents with Cognitive Impairment: A Randomized Intervention Study.	psychological symptoms in Chinese elderly with dementia. The aim of the study was to determine the impact of a preferred music listening group intervention upon the functional, cognitive, and emotional dimensions in elderly people living in nursing homes.	Music intervention in older adults with dementia and co-morbidities Dance intervention in healthy older adults	
	Effects of a 6-Week Faroese Chain Dance Programme on Postural Balance, Physical Function, and Health Profile in Elderly Subjects: A Pilot Study.	psychological symptoms in Chinese elderly with dementia. The aim of the study was to determine the impact of a preferred music listening group intervention upon the functional, cognitive, and emotional dimensions in elderly people living in nursing homes. The purpose of this study was to test the hypothesis that a 6-week Faroese chain dance programme will improve general health status, postural balance, and physical function in elderly subjects.		
Hofgaard 2019				<ul style="list-style-type: none"> <li>• Improved postural balance and physical function</li> <li>• Augmented health parameters.</li> </ul>
	Mismatch between subjective and objective motor improvements with adapted tango intervention in older adults.	The aim of this study was to determine the relationship between objective and subjective findings of motor function measures in older adults following a 12-week adapted tango intervention.	Dance intervention in older adults with visual impairment and eye disorders	<ul style="list-style-type: none"> <li>•</li> </ul>
Bennett 2020	Does a Live Performance Impact Synchronization to Musical Rhythm in Cognitively	The aim of this study was to evaluate the impact of the social context and of the auditory conditions on SMS abilities in two groups of elderly patients with or without cognitive	Music intervention in older adults with / without Cognitive Impairment (CI) (Synchronised	<ul style="list-style-type: none"> <li>• Improvement in physical quality of life</li> <li>• No significant improvement in depression and mental quality of life.</li> </ul>

Name of Study	Title of Study	Objective/Aim of The Study	Intervention with Population and Settings	Major Themes derived from reported outcomes
				<ul style="list-style-type: none"> <li>Improvement in objective measures of balance, walking ability, strength, endurance, and manual dual tasking.</li> </ul>
Ghilain 2020				<ul style="list-style-type: none"> <li>Improvement at synchronizing taps to metronome than to music, though the social context had no effect on SMS in the musical condition.</li> </ul>
	Impaired Elderly?.			<ul style="list-style-type: none"> <li></li> </ul>
		<p>impairments, at the time of testing. SMS was measured during a hand-tapping task in response to beats in metronomic or musical sequences, with a live or video presence of a musician.</p>	tapping after listening to pre-recorded and live musical performances- CI and NON-CI comparative groups)	<ul style="list-style-type: none"> <li>No differences in rhythmic performances between the CI and the NoCI groups.</li> </ul>
Castillejos 2021	Impaired Elderly?."Music Makes My Old Heart Beat": A Randomised Controlled Study on the Benefits of the Use of Music in Comprehensive Care for Institutionalised Older Adults.	<p>impairments, at the time of testing. SMS was measured during a hand-tapping task in response to beats in metronomic or musical sequences, with a live or video presence of a musician.</p>	tapping after listening to pre-recorded and live musical performances- CI and NON-CI comparative groups) Music intervention in older adults with / without Cognitive Impairment	<ul style="list-style-type: none"> <li>No differences in rhythmic performances between the CI and the NoCI groups.</li> <li>Improvements including: <ul style="list-style-type: none"> <li>enhanced functional status and autonomy, increased hand grip,</li> </ul> </li> <li>enhanced cognitive functioning; improved overall mood; reduced pain; increased happiness</li> </ul>
		<p>impairments, at the time of testing. SMS was measured during a hand-tapping task in response to beats in metronomic or musical sequences, with a live or video presence of a musician. The purpose of this study was to explore the benefits derived from the application of an evidence-based musical intervention in institutionalised older people by analysing its effect on several indicators of physical, cognitive, and emotional functioning, pain, and subjective well-being.</p>	tapping after listening to pre-recorded and live musical performances- CI and NON-CI comparative groups) Music intervention in older adults with / without Cognitive Impairment	
		<p>impairments, at the time of testing. SMS was measured during a hand-tapping task in response to beats in metronomic or musical sequences, with a live or video presence of a musician.</p>		



Name of Study	Title of Study	Objective/Aim of The Study	Intervention with Population and Settings	Major Themes derived from reported outcomes
		presence of a musician. The purpose of this study was to explore the benefits derived from the application of an evidence-based musical intervention in institutionalised older people by analysing its effect on several indicators of physical, cognitive, and emotional functioning, pain, and subjective well-being.		
	Impact of music-based intervention on verbal memory: an experimental behavioral study with older adults.	The goal of this work was two-fold: (1) To investigate the effect of free musical improvisation, as a focal music-based intervention, on the verbal memory of older adults (2) To determine whether musical expertise protects the aging brain from deterioration of verbal memory.	Music intervention in musician and non-musician healthy older community dwelling adults	•
DiazAbrahan 2021	Group Music Intervention Using Percussion Instruments to Reduce Anxiety Among Elderly Male Veterans	The purpose of this study was to assess the impact of a group music intervention on anxiety and depression of elderly male veterans with Alzheimer Disease.	Music intervention with elderly male veterans with Alzheimer's Disease	<ul style="list-style-type: none"> <li>• Musicians remembered and recognised more words than non-musicians</li> <li>• Musical improvisation groups remembered more words than controls</li> </ul>
Liu 2021				<ul style="list-style-type: none"> <li>• Reduction in anxiety and depression at both 6 week and 12 weeks</li> <li>• Improvements in anxiety in patients with high musical aptitudes than lower</li> </ul>
				•
				•

Name of Study	Title of Study	Objective/Aim of The Study	Intervention with Population and Settings	Major Themes derived from reported outcomes
	with Alzheimer Disease.	The aim of this early development study was to determine the feasibility and acceptability of the study design and arts-based interventions (a modified dance and singing programme) for older adults recently discharged from hospital.	Music and dance intervention in older adults with co-morbidities	<ul style="list-style-type: none"> <li>•</li> <li>•</li> </ul>
Clifford 2021	Insights from an early-stage development mixed methods study on arts-based interventions for older adults following hospitalisation.	The aim of this early development study was to determine the feasibility and acceptability of the study design and arts-based interventions (a modified dance and singing programme) for older adults recently discharged from hospital.	Music and dance intervention in older adults with co-morbidities	<ul style="list-style-type: none"> <li>•</li> <li>• <u>Participant interviews</u> <ul style="list-style-type: none"> <li>• Facilitated a sense of wellbeing.</li> <li>• Both physical and psychological health benefits from participating in the session</li> <li>• Participants stated that the content suited their age and physical abilities.</li> <li>• The songs and personalised music choices-initiated conversation and storytelling about earlier life experiences.</li> </ul> </li> <li>• <u>Stakeholders interviews</u></li> </ul>
				<ul style="list-style-type: none"> <li>• Stakeholders agreed that music and dance sessions can benefit older people following discharge from hospital in multiple ways - related to creative expression and forming new relationships, the artistic and social elements of the intervention may be more enjoyable and act as catalysts for storytelling and reflection.</li> <li>• Interpersonal relationships as driving forces behind the success of music and dance interventions for older populations.</li> <li>• Supports necessary for participants and healthcare professionals involved in social prescription</li> </ul>

Name of Study	Title of Study	Objective/Aim of The Study	Intervention with Population and Settings	Major Themes derived from reported outcomes
	Socio-emotional and motor engagement during musical activities in older adults with major neurocognitive impairment.	The purpose of this study was to evaluate the respective impacts of social presence and auditory context on the socio-emotional and motor engagement of elderly patients with major Cognitive impairment vs. matched participants without Cognitive impairment during musical activities.	Music intervention in older adults with / without cognitive impairment	
Hobeika 2021	The Effect of Group Music Therapy with Physical Activities to Prevent Frailty in Older People	This study aimed to investigate the intervention effect of music therapy with physical activities (MTPA) on frail elderly in the community.	Music intervention in healthy older adults	<ul style="list-style-type: none"> <li>• Participants' socio-emotional and motor engagement in musical activities depended on the social context</li> <li>• Participants' motor and socio-emotional behaviours were influenced by cognitive impairment.</li> <li>• Patients with mild-to-moderate dementia still react positively to music and move with the rhythm, they engage less than participants without cognitive impairment</li> </ul>
Sun 2021				<ul style="list-style-type: none"> <li>• Physical activity improved</li> <li>• Depression in elderly significantly reduced after intervention</li> <li>• Cognitive function improved</li> <li>• Marked improvement in frailty in elderly</li> </ul>
	Living in the Community.		Dance intervention in healthy older women	<ul style="list-style-type: none"> <li>•</li> </ul>
	The positive impact of 12 weeks of dance and balance training on the circulating amyloid precursor protein and serotonin concentration as well as physical and cognitive abilities in elderly women.	The purpose of this study was to compare the effectiveness of 12-weeks dance training with balance training on fall risk, physical and cognitive functions, and to evaluate the association between physical and cognitive functions with circulating markers of neurodegeneration and cognitive impairments in elders.	Dance intervention in healthy older women Music and dance intervention in healthy older adults	<ul style="list-style-type: none"> <li>• Improving physical and cognitive functions in older women.</li> <li>• Beneficial effect on elders' physical performance and cognitive abilities and may contribute to healthy aging.</li> <li>• Decrease in serum serotonin and an increase in amyloid precursor</li> </ul>

Name of Study	Title of Study	Objective/Aim of The Study	Intervention with Population and Settings	Major Themes derived from reported outcomes
				protein (APP) plasma concentrations
Rodziewicz-Flis 2022	Creative dance associated with traditional Portuguese singing as a strategy for	This study aims to compare these health indicators among older adults participating in multimodal exercise (creative dance combined	Dance intervention in healthy older women	<ul style="list-style-type: none"> <li>• Improving physical and cognitive functions in older women.</li> </ul>
Coelho 2022	active aging: a comparative cross-sectional study.	with traditional Portuguese singing), those participating in traditional physical exercise, and those not actively engaged in physical exercise.	Music and dance intervention in healthy older adults	<ul style="list-style-type: none"> <li>• Beneficial effect on elders' physical performance and cognitive abilities and may contribute to healthy aging.</li> <li>• Decrease in serum serotonin and an increase in amyloid precursor protein (APP) plasma concentrations</li> <li>• Better agility, flexibility in lower limbs and dynamic behaviour than no exercise groups</li> <li>• Better overall cognition though not significant</li> </ul>
	Effects of fundamental movement skills based dual-task and dance training on single- and dual-task walking performance in older women with dementia.	The purpose of this study was to compare the effects of fundamental movement skills (FMS)-based dual-task training and dance training on spatio-temporal characteristics of gait performance under single- and dual-task walking conditions among older women with dementia	Dance and dual task of walking and counting numbers in older women with dementia	<ul style="list-style-type: none"> <li>• Lower strength I upper and lower limbs when compared with traditional exercise</li> </ul>
Ghadiri 2022	Effects of Group Music Intervention on Depression for Elderly People in Nursing Homes.	The aim of this study was to examine the effects of group music intervention on depression for elderly people in nursing homes.	Music intervention in older adults with Cognitive Impairment	<ul style="list-style-type: none"> <li>• Walking speed increased post-intervention.</li> <li>• Improvement in stride lengths in both interventions.</li> <li>• Improvement in gait cadence in both tasks.</li> </ul>

Name of Study	Title of Study	Objective/Aim of The Study	Intervention with Population and Settings	Major Themes derived from reported outcomes
Yu 2022				<ul style="list-style-type: none"> <li>• Reduction in depression (Statistically significant)</li> <li>• Though salivary cortisol biological marker of change in depression level in response to the intervention showed no significant difference in</li> </ul>
	Reminiscence music intervention on cognitive, depressive, and behavioural symptoms in older adults with dementia.	The purpose of this study was to examine the efficacy and feasibility of reminiscence music therapy based on cultural festival music and activities to improve cognitive functions and reduce depressive and behavioural symptoms of community-dwelling older adults with dementia.	Music intervention in older adults with dementia	<ul style="list-style-type: none"> <li>• salivary cortisol concentration between the two groups.</li> </ul>
Tz-Han 2023	Tango-Therapy Intervention for Older Adults with Cognitive Impairment Living in Nursing Homes: Effects on Quality of Life, Physical	This study sought to analyze the feasibility and effectiveness of tango therapy on QoL, physical abilities and gait in older people living in nursing homes, with and without CI	Dance intervention in older adults with Cognitive Impairment	<ul style="list-style-type: none"> <li>• Reduction in depressive symptoms but no significant improvement in cognition and behavioural symptoms.</li> </ul>
Bracco 2023	Abilities and Gait.			<ul style="list-style-type: none"> <li>• Significant improvement to quality of life</li> <li>• No significant improvement in performing activities of daily living.</li> <li>• Small improvement in physical performances.</li> <li>• Improvement in the balance and gait speed.</li> </ul>
	Immediate effects of individualized music listening on behavioural and psychological symptoms of dementia: A randomized controlled trial.	The purpose of this study was to test the hypothesis that Interactive Music Learning (IML) would reduce Behavioural and Psychological Symptoms of Dementia (BPSD) in nursing home residents with mainly advanced dementia using an adequately powered random controlled trial (RCT) and a psychometrically evaluated observational measure.	Music intervention in older adults with dementia	<ul style="list-style-type: none"> <li>•</li> </ul>

Name of Study	Title of Study	Objective/Aim of The Study	Intervention with Population and Settings	Major Themes derived from reported outcomes
Hillebrand 2023	Changes in selected exerkinases concentration post folk-dance training are accompanied by glucose	The study aimed to evaluate the impact of selected exerkinases concentration induced by folk-dance and balance training on physical performance, insulin	Dance intervention in healthy older adults	<ul style="list-style-type: none"> <li>• Interactive Music learning has a positive influence on reducing the behavioural and psychological symptoms of dementia</li> </ul>
Rodziewicz-Flis 2023				<ul style="list-style-type: none"> <li>• Effectiveness of both folk-dance and balance training in enhancing physical performance, dynamic balance, and reducing inflammation and high blood pressure.</li> </ul>
				<ul style="list-style-type: none"> <li>•</li> </ul>
	homeostasis and physical performance improvement in older adults.	resistance, and blood pressure in older adults.		<ul style="list-style-type: none"> <li>•</li> </ul>
	Pilot testing of a simplified dance intervention for cardiorespiratory fitness and blood lipids in obese older women.	This study examined the efficacy of lumbo-pelvic coordination exercises on body composition, cardiorespiratory fitness, and blood lipids across a 12-week supervised training programme.	Dance intervention in obese older women	<ul style="list-style-type: none"> <li>• Folk dance stands out as a more advantageous approach for addressing insulin resistance</li> </ul>
Wang 2023				<ul style="list-style-type: none"> <li>• Positively impact blood composition and cardiorespiratory fitness but no significant improvement in body and fat mass</li> <li>• Reduction in triglycerides and LDL-Cholesterol and higher HDL Cholesterol</li> </ul>
	Fine motor control improves in older adults after 1 year of piano lessons: Analysis of individual development and its coupling with cognition and brain structure.	The purpose of the study was to examine behavioural and psychological differences between piano training and music-listening group at 6 months and 12 months post-intervention.	Music intervention in healthy older adults	<ul style="list-style-type: none"> <li>•</li> </ul>



Name of Study	Title of Study	Objective/Aim of The Study	Intervention with Population and Settings	Major Themes derived from reported outcomes
Worschech 2023				<ul style="list-style-type: none"> <li>• Compared with music listening, practicing piano resulted in greater improvement in fine motor skills and probably working memory.</li> <li>• Only in the piano group, unimanual fine motor skills and grey matter volume of the contralateral M1 changed together during the 6–12-month period.</li> <li>• Playing piano induced more prevalent coupling between the motor and cognitive domains. However, there is little evidence that fine motor control develops concurrently with cognitive functions.</li> <li>• Playing an instrument promotes motor, cognitive and neural development into older age.</li> </ul>
	Improving Postural Stability in Active Older Adults: Argentine Tango Dance as an Alternative Fall-prevention strategy.	The study intended to determine the impact of dancing the Argentine tango on postural stability in active older adults	Dance intervention in healthy older adults	<ul style="list-style-type: none"> <li>• 12-week dancing Argentine tango biweekly improved postural stability in active older adults.</li> </ul>

**Table 4:** Thematic analysis of the reported outcomes of the interventions

### Discussion:

The distinctive aspect of this research lies in its exclusive focus on elucidating the effects of music and dance interventions on healthy aging. According to OECD data from 2023, nations such as Japan, Italy, Portugal, Finland, and Greece exhibit the highest proportions of aging populations (OECD, 2023). Notably, our analysis resonates with the OECD data where the studies are also concentrated in Europe, Asia and America. These data imply that countries with a significant aging demographic are progressively advocating for non-invasive strategies as preventive measures to foster healthy aging. Furthermore, our investigation indicates a rising trajectory of related studies from the period of 2017 to 2023.

Our analysis indicates that the majority of the selected studies focused on healthy older adults and those with varying levels of cognitive impairment. Notably, one study specifically targeted older adults diagnosed with Alzheimer's disease (AD). Additionally, three studies centered on older participants who had co-existing medical conditions such as hypertension, metabolic disorders, and heart-related ailments, but these participants did not

exhibit signs of cognitive impairment, dementia, or AD.

In our research, we identified 12 interventions related to music and 10 pertaining to dance. Notably, two interventions (Clifford, 2021; Coelho, 2022) integrated both musical and dance elements.

### Outcome of Combined Music and Dance Interventions:

Clifford et al.(2021) observed heightened well-being among participants, encompassing both physical and psychological advantages. Moreover, this research underscored the feasibility and acceptability of a refined arts-based intervention, specifically a modified dance and singing program, among its participants. Conversely, Coelho et al. (2021) reported enhancements in participants' agility and flexibility, particularly in the lower limbs. In addition, there was a notable improvement in cognitive function among participants post-intervention.

### Outcome of only Dance interventions:

Ghadiri et al. (2022) explored the effects of a dance intervention that was concurrently combined with a dual-task activity,

specifically walking while counting numbers. The findings revealed notable improvements in walking speed, stride length, and gait cadence among the participants. In a review of related dance interventions, six studies (Bennett et al., 2020; Bennett & Hackney, 2018; Bracco et al., 2023; Hofgaard et al., 2019; Rodziewicz-Flis et al., 2022, 2023) evidenced enhancements in participants' physical function and strength. Meanwhile, three studies (Bracco et al., 2023; Purkart et al., 2023; Rodziewicz-Flis et al., 2023) indicated progress in balance and gait. A trio of studies (Bennett et al., 2020; Bracco et al., 2023; Brustio et al., 2018) observed improvements in quality of life metrics, while another set of three researches (Bennett et al., 2020; Bennett & Hackney, 2018; Brustio et al., 2018) documented advancements in participant mobility.

In a 2023 study by Rodziewicz-Flis, it was determined that folk dance interventions serve as a beneficial strategy in addressing insulin resistance. Similarly, Wang et al. (2023) discerned enhancements in cardiorespiratory fitness and the regulation of elevated cholesterol levels through dance interventions. Brustio's 2018 research highlighted the augmentative effect of dance interventions on social engagement, while another study by Rodziewicz-Flis in 2022 documented cognitive advancements subsequent to the dance intervention.

#### **Outcome of only Music interventions:**

Within the domain of music interventions, a body of research underscores its varied therapeutic benefits. Four studies (Liu et al., 2021; Sun & Li, 2021; Tz-Han et al., 2023; Yu et al., 2022) have collectively ascertained that music interventions contribute to the mitigation of depressive symptoms. Cognitive enhancements were reported in two distinct studies (Pérez-Ros et al., 2019; Tz-Han et al., 2023). Additionally, both Pérez-Ros et al. (2019) and Castillejos & Godoy-Izquierdo (2021) delineated the role of music interventions in elevating mood and enhancing functional states. Furthermore, Castillejos & Godoy-Izquierdo (2021) identified a surge in participants' happiness levels as a result of music interventions, along with an improvement in hand grip strength. Worschech et al. (2023) elucidated that engaging in instrument playing, particularly the piano, bolsters fine motor abilities and contributes to comprehensive advancements in motor coordination, cognitive processing, and neural development in the elderly population. Diaz Abrahan et al. (2021) posited that older musician individuals exhibit superior word recall and recognition capacities in contrast to their non-musician counterparts. Sun & Li (2021) emphasized the synergistic benefits of combining music interventions with physical activities, leading to enhanced overall physical activity levels and decreased frailty. Castillejos & Godoy-Izquierdo (2021) also found that music interventions are efficacious in ameliorating pain. Lastly, Hillebrand et al. (2023) spotlighted the positive impact of interactive music learning in attenuating the behavioural and psychological manifestations associated with dementia. However, it is interesting to see that Pérez-Ros et al. (2019) found no improvement in cognitive function and emotional condition in music listening intervention.

#### **Strengths and Limitations:**

Our research uniquely collates and synthesises the evidence from

dance and music-based interventions as non-pharmacological approaches. Our study focuses on the effects of these specific therapies on improvement of the quality of life metrics including the physical, psychological and behavioural aspects of healthy aging.

However, this study is not without its limitations. Firstly, our research narrowly focuses on the effects of music and dance interventions on the quality of life in older adults, examining both modalities individually and in combination. During the screening phase, we identified several interventions that incorporated various forms of physical exercises, such as Zumba and Tai Chi among others, that utilized music as an integral component. However, these interventions were outside our study's purview. Thus, future research would benefit from evaluating the influence of exercise-based interventions on the quality of life in the elderly population. Secondly, the articles incorporated in our study predominantly featured small sample sizes, which curtails the generalizability of the interventions' outcomes.

Thirdly, the dance interventions predominantly encompassed participants with mild to moderate mobility challenges. Consequently, the applicability and replicability of these interventions may be limited for individuals with more severe mobility constraints.

Lastly, a noticeable gap in the selected studies was the absence of follow-up assessments to determine the enduring impacts of these interventions. Subsequent studies should prioritize the design of long-term interventions and conduct post-intervention evaluations to ascertain the persistence of observed changes over time.

#### **Conclusion:**

This scoping review highlighted the growing interest in dance and music interventions for ageing populations. Although a multitude of NPIs have been studied on the ageing population, dance and music were the interventions that could not be separated from each other. Hence, the authors collated articles studying these two interventions in a community setting to avoid unnecessary bias. Nevertheless, there remains a pressing need to investigate other NPIs such as physical exercise, reminiscence therapy, painting, poetry, gardening, theatre among others, since their effects on healthy ageing are largely unexplored. In context to the UN Decade of Healthy Ageing, it's vital for policymakers and international agencies to support holistic, multidimensional studies examining a range of NPIs in diverse settings. This will allow for alignment of comprehensive and collaborative research efforts with the goals of the UN Decade of Healthy Ageing.

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