

**Music Therapy for Older Adults Living with Physical and Cognitive  
Impairment: A Systematic Review**

By

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MUSIC THERAPY FOR OLDER ADULTS LIVING WITH PHYSICAL AND  
COGNITIVE IMPAIRMENT: A SYSTEMATIC REVIEW

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Systematic Review

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Abstract

Music therapy is considered as an effective intervention for older adults. However, there are few studies that summarize and evaluate the effect of music therapy intervention on older adults living with physical or cognitive impairment. Physical impairments include Parkinson's disease, stroke, and traumatic brain injury (TBI). Cognitive impairments include dementia, Alzheimer's disease, and mild cognitive impairments. The purpose of this systematic review was to explore the role of music therapy for older adults living with the mentioned physical and cognitive impairments. This includes examining common music therapy goals and activities, comparing the most effective music therapy activities; and summarize the effects of music therapy interventions. This systematic review was conducted in the following databases: MEDLINE, PsycINFO, and Academic Search Complete. After searching from these three databases, 7 studies out of 166 studies met the inclusion criteria. The results showed that music therapy intervention has positive effects on physical and cognitive functioning of older adults.

*Keywords:* music therapy, older adults, physical impairments, cognitive impairments, systematic review

## Music Therapy for Older Adults with Physical or Cognitive Impairment: A Systematic Review

Population aging is a global phenomenon. The United States of America is one of the world's aging countries. The number of older adults aged 65 and older is the fastest growing segment according to the U.S. population (Gatz, Smyer, & DiGilio, 2016). Older adults are willing to accept and participate in new things in order to prolong and entertain their life (Osmanovic & Pecchioni, 2016).

Music has been used as a therapeutic healing force since the beginning of documented human history (Gouk, 2000). An increasing amount of research and literature has promulgated understanding of mechanisms by which music therapy can be effective. Music therapy has been used with older adults. For example, group music therapy intervention has proved to be effective in improving the quality of life of older adults (Ahessy, 2016). Using rhythmic music intervention in the exercise activities can effectively improve the participation and social ability of older adults (Mathews, Clair, & Kosloski, 2001).

Systematic review can be helpful for both the researchers and the clients. In the process of systematic review, researchers collect relevant research, compare data results and draw conclusions. All of these give readers a clear understanding the use of music therapy in related areas (Xu et al., 2017). Therefore, the purpose of this study is to examine the results of studies on the use of music therapy and older adults in order to more fully understand this practice and its effects.

### **Literature Review**

American Music Therapy Association (AMTA) (2017) defines music therapy as a profession in which therapists use music to facilitate growth in the physiological, emotional, cognitive, and social domains in persons across the lifespan. In general, music therapy goals include eliciting positive emotional experiences, improving management of stress, relieving

pain, expressing emotion, promoting memory, improving communication ability, and promoting physical rehabilitation, among others for the general population (AMTA, 2017).

Music therapy is a reflexive process, in which the therapist helps the client to optimize the client's health, using various kinds of music experience and the relationships formed through them as the impetus for change. Within music therapy, assessment, goal setting, intervention, and evaluation are indispensable components of the treatment process. Music therapy is unique in that there are three factors of the music therapy process, the music therapist, the music, and the clients, and the relationships that develop between them are integral to the treatment (Bruscia, 2014).

Studies have shown that music therapy can alleviate the negative effects of stress and anxiety on older adults. The breathing training and muscle relaxation training can promote the positive thinking and self-confidence of older adults. Music therapy intervention can activate or calm the behavior of older adults (Ridder & Wheeler, 2015)

The most commonly seen disorders of older adults may be categorized as physical impairments and cognitive impairments. Physical impairments are related to those diagnoses-stroke, TBI, Parkinson disease that can severely limit physical movement. Cognitive impairments are related to those diagnoses-dementia, mild cognitive impairment, and Alzheimer's disease, that can decline cognitive functions.

Within these populations, cognitive and physical impairments are two important areas that music therapy may address (Rosin, Ericsson, & Larsson, 2015). Physiological changes lead to multiple medical and social problems among individuals beyond the age of 70 (Economos, O'Keefe, & Schwantes, 2017). These changes affect individual's ability to live independently (Clair & Memmott, 2008). In relation to the physical rehabilitation of older adults, there are common diagnoses that require such intervention, for example, Parkinson's disease, stroke, and traumatic brain injury (TBI) (Clair & Memmott, 2008). For physical

impairment, minor impairments may be evident in poor balance or poor endurance, whereas other difficulties might lead to complete dependence to meet physical needs and functioning (Rizzonelli et al., 2017).

Parkinson's disease is a neurodegenerative and incurable disorder, which is characterized by muscle tremor, rigidity, postural changes, and decreases in spontaneous movement that lead to bradykinesia (abnormal slowness of movement) and impairment of gait and postural stability (Greenberg, Aminoff, & Simon, 2002). For patients with Parkinson's disease, the lack of postural reflexes and the imbalance using appropriate arm or leg movements are common issues. Therefore, addressing walking gait and stabilization of posture is particularly important (Clair & Memmott, 2008). Studies support the use of music to improve the physical function of people with Parkinson's disease. For example, using rhythmic auditory stimulation (RAS) in music therapy sessions could help people with Parkinson's disease improve gait control (Pohl, Dizdar, & Hallert, 2013).

Stroke is one of the major health problems for older adults (Jun, Roh, & Kim, 2013). A stroke typically occurs when the blood supply to part of the brain is interrupted or reduced, depriving brain tissue of oxygen and nutrients. When brain cells die during a stroke, abilities controlled by that area of the brain such as memory and muscle control are lost (Thaut et al., 1997).

During the rehabilitation period for the first weeks to month after a stroke, the brain can go through significant changes (Kreisel et al., 2006). In stroke rehabilitation, music has been used in various treatment modalities to promote the recovery of language and motor functions (Thaut et al., 1997). Research shows that in the human brain, the most powerful auditory stimulation comes from music (Sacks, 2006). Scientists have examined brain responses to music, noting that almost all the areas of the human's brain are engaged because music triggers a sequel of cognitive and emotional components with distinct neural substrates

(Gold, 2014). When a music therapist structures musical engagement to capitalize on these brain responses, music therapy can effectively help the rehabilitation of stroke (MacRea, 1992). Steckler (1998) studied the influence of rhythm in music on behavior change for stroke patients. He found that rhythm and music decreased heart rate, improved muscle tone, lowered blood pressure, and lowered breathing rate, which help stroke patients' physiological health.

Dementia is a progressive and detrimental disorder in older adults, especially the Alzheimer's type dementia (Clair & Memmott, 2008). There are three stages of dementia. The early-stage dementia begins with short-term memory loss and increased forgetfulness, disorientation, and confusion (Finkel et al., 1996). In the middle-stage, people with dementia usually have difficulty remembering names; are unaware of recent events; have difficulty sleeping; and are unable to finish tasks (Clair & Memmott, 2008). The late-stage dementia is characterized by the loss of the abilities of speech and physical ambulation (Ashida, 2000). Because of individuals' rhythmic attunement and emotional responses to music, music therapy is used help to people with dementia. The rhythm in music gives older adults the intention to move, for example by tapping their feet, clapping, or even dancing with the music spontaneously (Palo-Bengtsson et al., 1998). In the music, people with dementia may react positively to familiar songs (Sung & Chang, 2005), which is helpful to facilitate memory. The re-creative method of music therapy can improve the cognitive functioning of older adults because the part of the brain that processes songs is last to deteriorate (Crystal, Grober & Masur, 1989). Within the context of nonpharmacological and psychosocial approaches to dementia care, music therapy as a creative arts intervention has become increasingly important in recent years (Economos, O'Keefe, & Schwantes, 2017).

Once diagnosed, people with dementia often feel a sense of helplessness and a loss of control because the deterioration of this neurodegenerative disease is likely to be

accompanied by behavioral and neuropsychiatric problems, such as irritability and aggression (Clair & Bernstein, 1990). Dementia usually leads a loss of autonomy. Thus, depression often accompanies dementia (Iliffe, Manthorpe, & Eden, 2003). Music therapy interventions may provide a means of communicating for people with dementia (Goodall & Eters, 2005). In addition, group music therapy offers an opportunity for older adults to engage in social interaction, in which they can get support and understanding from each other (Sixsmith & Gibson, 2007).

Pain, arthritis, hypertension, cardiovascular diseases are also common diseases in older adults (Gatz, Smyer, & DiGilio, 2016). However, I did not review these diseases in this systematic review because this review is based on my clinical work in a nursing homes and the diagnoses of my clients are mainly include stroke, TBI, Parkinson's disease, dementia, mild cognitive impairment, Alzheimer's disease. Therefore, this systematic review will mainly focus older adults with these diagnoses.

### **Purpose Statement**

I completed this systematic review to provide evidence examine the effectiveness of music therapy for older adults living with physical and cognitive impairments and to understand the most common and effective music and music interventions for this population. When I searched the relevant research, I found some systematic reviews that focused on using *music* to help improve cognitive and physical functions of older adults, but there are few reviews about *music therapy* intervention. A key difference is that music therapy focuses on the relationships developed in the therapeutic process as contributing to change. I completed a systematic review of the literature published in the last 10 years. Therefore, I asked the following questions:

1. What are the common goals addressed through music therapy for older adults living with physical and cognitive impairments?

2. What are the most commonly used music therapy interventions used in the treatment of older adults living with physical and cognitive impairment?
3. What are the most effective music therapy interventions with older adults living with physical and cognitive impairment?

### **Method**

Initially, I planned to research the influence of music therapy on the behavior and mood of stroke patients in the past 10 years. The population I focused on was individuals formally diagnosed with any type of stroke occurring with hemorrhagic stroke, ischemic stroke, thrombotic stroke, Embolic stroke, or other types. However, I could not find enough studies that meet the criteria about music therapy with stroke. Therefore, I decided to review the published studies that examined older adults living with physical and cognitive impairment in general, rather than limiting it to stroke treatment.

The following inclusion criteria are applied for this study:

1. Study design: published within the last 10 years; either a Randomized Controlled Trial (RCT), a controlled clinical trial (CCT), a case study, or a pre-and post-experimental group.
2. Intervention: the music therapy intervention must be defined as a single music-related activity or a combination of music-related activities facilitated by a board-certified music therapist.
3. Study population: older adults over the age of 65 who were formally diagnosed with any type of physical impairment or cognitive impairment. The study had no restrictions on gender or and race of the participants.

The exclusion criteria include:

1. The study was published before 2009.
2. The population was aged under 65 years old.

3. The study intervention is not music therapy.
4. The study was not focused on physical or cognitive impairments.

**Database Search Strategy**

I identified studies that evaluated the effects of music therapy on physical and cognitive impairments of older adults who have been formally diagnosed Parkinson’s disease, stroke, TBI, or dementia through a search of the following electronic databases: PsycINFO, MEDLINE, Academic Search Complete. The key words included “music therapy, older adults, cognitive, physical, dementia, Alzheimer's disease, Parkinson’s disease, mild cognitive impairment, stroke, and TBI”. All studies were published between 2009 to 2018.

**Results**

These keywords produced 166 results in the three database resources (see Table 1). For the keywords of “music therapy, older adults, and cognitive”, there are a total of 92 articles (n=26 from MEDLINE; n=43 from PsycINFO; n=22 from Academic Search Complete). For the keywords of “music therapy, older adults, and physical”, there are a total of 76 articles (n=17 from MEDLINE; n=37 from PsycINFO; n=21 from Academic Search Complete).

Table 1

*The Results of Database Search*

Database	Results using keyword “Cognitive”	Results using keyword “Physical”
MEDLINE	n=26	n=17
PsycINFO	n=43	n=37
Academic Search Complete	n=22	n=21
Total: n=166		

After removing the duplicates, there were 104 articles from these three databases. After examining the research population and the research methods of each article, I found seven studies that met the full inclusion criteria. Each article was screened according to the established inclusion and exclusion criteria. The specific reasons for the exclusion of other articles are listed in Figure 1. These reasons include lack of focusing on physical or cognitive rehabilitation, the age of the subjects did not meet the criteria, the method in the article is not a music therapy intervention, or the article was not a research study.

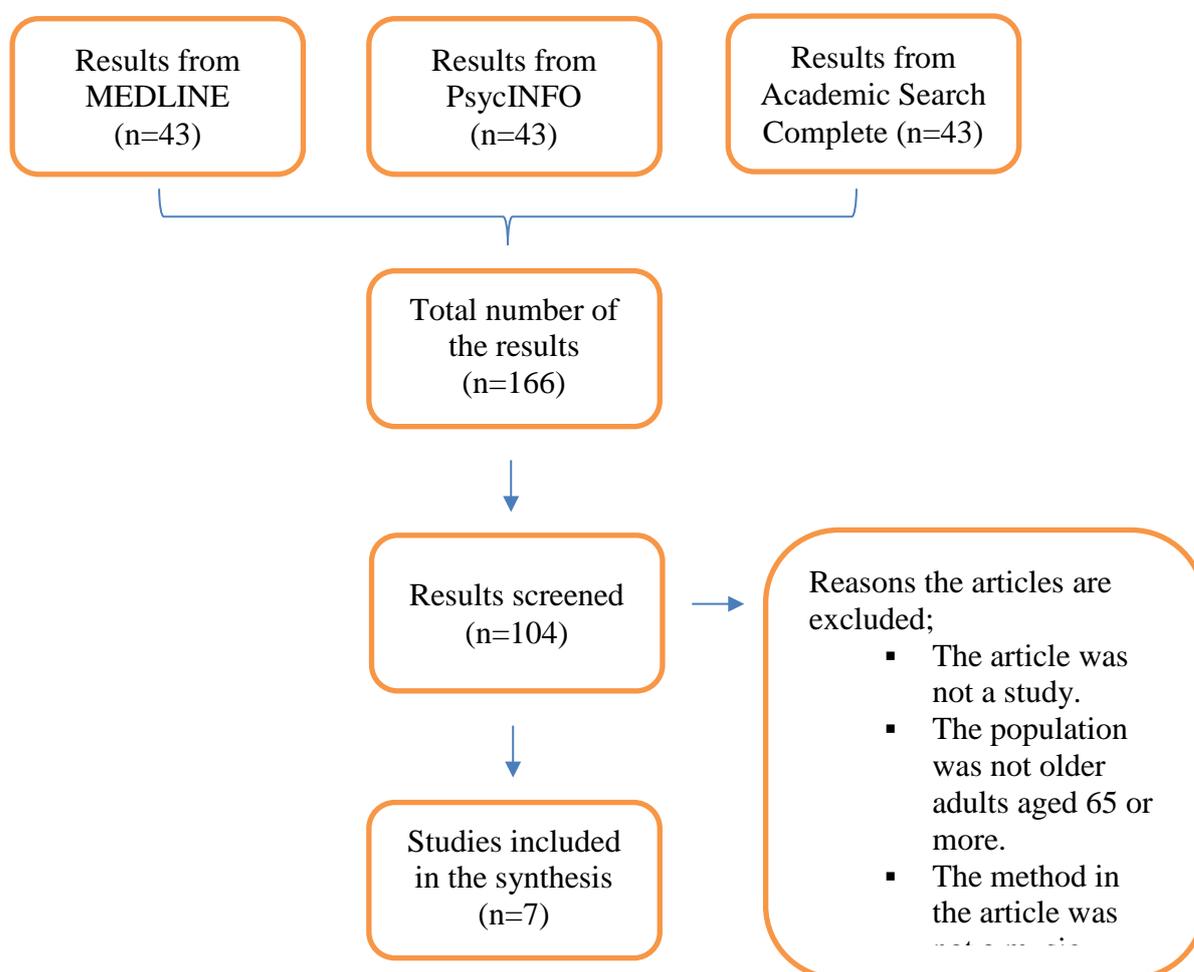


Figure 1. Databases Search Results

### **The Participants and Study Designs**

A total of 193 participants over the age of 65 were included in the seven studies. However, there were 180 participants who completed research participation. Reasons for withdrawal from the research included: health issues, death, and some were asked to withdraw from the experiment by the researcher. The mean age of all the participants was 76.42 years. The diagnoses of these participants included: mild cognitive impairment, dementia, Alzheimer's disease, and Parkinson's disease. There are many studies focus on stroke but the subjects' age span was in a large range. I found a few number of music therapy study for stroke that meets my inclusion criteria from these three databases because of the age limitation.

In the seven studies, three studies were conducted in nursing home, one study was conducted in a hospice care center, and three studies were conducted in medical setting. Five of the seven studies used the method of Randomized Controlled Trial (RCT). The other two studies used the method of comparing the results of pre-and post-experimental groups. There are differences in the number of subjects in each study. There was one study only had nine participants (Belgrave, 2009). One study had 55 participants (Sung et al., 2011). In order to present all the studies clearly, I summarized the basic information for each study (see Table 2).

Table 2

*The Basic Information of Each Study*

Author	Number of subjects (Completed/Enrolled)	Experimental site	Method
Shimizu et al. (2018)	n=39/45	Nursing home	Controlled clinical trial
Sung et al. (2011)	n=55/60	Nursing home	Controlled clinical trial
Elefant et al. (2012)	n=10	Hospital	Pre-and post-experimental group
Solé et al. (2014)	n=16	Nursing home	Pre-and post-experimental group
Shih et al. (2012)	n=13/15	Medical Center	Pre-and post-experimental group
Belgrave (2009)	n=9	Hospice program	Pre-and post-experimental group
Raglio et al. (2017)	n=38	Hospital	Controlled clinical trial

For the measurement, many scales and physiological indicators tests have been mentioned in these seven studies. For cognition, test included the Mini-Mental State Exam (MMSE), cerebral blood flow, verbal fluency test, clock-drawing test, recognition memory test, Beck Depression test, Global Deterioration Scale, and the Rating of Anxiety in Dementia scale. Some of these scales are self-made scales used by specific organizations (see Table 3).

Table 3

*The Measurement of Each Study*

Author	Scale/Instrument
Shimizu et al. (2018)	Functional near-infrared spectroscopy (fNIRS), which measures brain activities through testing hemodynamic responses associated with neuron behaviour.
Sung et al. (2011)	Cohen-Mansfield Agitation Inventory (CMAI); Rating of Anxiety in Dementia (RAID).
Elefant et al. (2012)	Self-report of the participants; KayPentax Multi-Dimensional Voice Program (MDVP)
Solé et al. (2014)	GENCAT for Quality of Life, which has a total of 69 items evaluated on 4-point Likert-type scales
Shih et al. (2012)	The Mini-Mental State Examination (MMSE); Voice Handicap Index (VHI); Voice Related Quality of Life; Unified Parkinson’s Disease Rating Scale (UPDRS); Sound Pressure Level (SPL).
Belgrave (2009)	Behavior State Observation Sheet, which contained the eight behavior states.
Raglio et al. (2017)	National Institutes of Health Stroke Scale; Functional Independence Measure (FIM); Grip-Pinch Dynamometric Test; 9Hole Peg Test; Timed Up and Go Test (TUG); The Aachener Aphasia Test; Montreal Battery of Evaluation of Amusia-MBEA (rhythm and melodic contour perception); Hospital Anxiety and Depression Scale (HADS); McGill Quality-of-Life Questionnaire (MQOL-It).

### **Common Music Therapy Goals**

In the studies that focused on older adults living with cognitive impairments, the research objectives include improving cognitive function (Shimizu et al., 2018); vocal functioning and quality of life (Solé et al., 2014); communication and motor functioning (Raglio et al., 2017), evaluating the effects of music therapy intervention on anxiety and agitation of older adults with dementia (Sung et al., 2011); determining the effect of music therapy on the quality of life and the memory of older adults (Solé et al., 2014);

In the studies that focused on physical improvement of older adults, the research objectives include improving speech, singing, and breathing skills, which are physical related functions, in older adults (Elefant et al., 2012; Shih et al., 2012); improving behavior and physical function, such as indeterminate states, which means person's eyes are either open and eyelids appear "heavy" or eyes are opening/closing repeatedly, and wake states, in older adults (Belgrave, 2009). The detailed objectives of each study are listed in Table 4.

Table 4

*Aims of the Studies*

Author	Aim of Research
Shimizu et al. (2018)	To improve pre-frontal cortex (PFC) function and cognitive function through music movement interventions.
Sung et al. (2011)	To evaluate the effects of group music therapy intervention on anxiety and agitation of institutionalized older adults with dementia.
Elefant et al. (2012)	To determine the influence of a group music session on speech, singing, and depressive symptoms in older adults with Parkinson’s disease.
Solé et al. (2014)	To determine if a re-creative vocal music therapy (singing) can improve vocal functioning and quality of life. To determine the effect of group therapy program participation on the quality of life and the memory of older adults.
Shih et al. (2012)	To examine the potential therapeutic effectiveness of music therapy singing on Parkinson’s disease-related voice/speech disorders.
Belgrave (2009)	To find the positive effects of improvisation and instrument playing on behavior and physical function in older adults.
Raglio et al. (2017)	To evaluate the effects of music therapy on communication and motor rehabilitation of older adults with stroke.

In conclusion, there are several common focus areas of music therapy with older adults including memory, execution, exercise, balance, depression, quality of life, and gait. In these areas, memory function, execution ability, depression, mood were mentioned in the use of music therapy intervention in older adults with dementia, Alzheimer's disease, and cognitive

impairment. Balance, motor function and gait training are more often mentioned in music therapy for older adults with Parkinson's disease and stroke.

From the focus of these studies and the research questions raised by authors, I summarized the following goals that are common set for music therapy with older adults who have physical or cognitive impairments (see Table 5). For individual interventions, common goals included improved memory and executive functioning, and to improve motor function. For the group interventions, the goals included reducing depression and negative emotions, improving quality of life, improving participation in group setting, and improving motor functioning.

Table 5

*Common Music Therapy Goals for Older Adults*

	Psychosocial and Cognitive goals	Physical goals
Individual intervention	<ol style="list-style-type: none"> <li>1. Improve memory functions.</li> <li>2. Improve executive functioning.</li> </ol>	<ol style="list-style-type: none"> <li>1. Improve the motor function, which includes gait performance, gross motor skills, fine motor skills, and balance.</li> </ol>
Group intervention	<ol style="list-style-type: none"> <li>1. Improve memory functions.</li> <li>2. Reduce depression and negative emotions.</li> <li>3. Reduce anxiety.</li> <li>4. Improve quality of life.</li> </ol>	<ol style="list-style-type: none"> <li>1. Improve participation in group setting, which includes music-making and music movements.</li> <li>2. Improve the motor function.</li> </ol>

It can be seen from the table that the group music therapy focuses more on psychosocial needs of these populations, such as improving negative emotions. Memory-related music therapy goals are more commonly addressed in individual interventions. The physical and motor improvements are often targeted in both individual intervention and group intervention. In addition, improving the quality of life is also a common goal for older adults. This goal can involve the elements of psychosocial cognitive, and physical improvements

because there are many psychosocial, cognitive, and physical related indicators that are included in the quality of life measurement and scales (Solé et al., 2014; Raglio et al., 2017).

### **Commonly Used Music Therapy Interventions/Activities**

In the included studies, the researchers used many different music therapy interventions. These interventions include music and movements, group singing/choirs, instrumental improvisation, music combine with dance, song discussion, and sing along. In order to have a clearly summarize of the commonly used activities in all the seven studies, I briefly presented the authors, the diagnosis of the subjects, the research areas, and the main music therapy interventions of all these seven studies as below (see Table 6).

Table 6

*Primary Music Therapy Interventions*

Author	Population/Diagnosis	Main activity(ies)/interventions	Focus area(s)
Shimizu et al. (2018)	Mild cognitive impairment	Music and movement. Using the participants' preferred music to match the movement of the participants.	Frontal lobe function and physical rehabilitation
Sung et al. (2011)	Dementia	Therapeutic music instrument playing. The clients follow the instructions from the therapists to move their extremities and play various kinds of percussion instruments with preferred music.	Mood, anxiety, agitation
Elefant et al. (2012)	Parkinson's disease	Sing along. The clients sang 3-5 songs that they like, the music therapist accompanied with guitar and voice	Mood, memory, speech
Solé et al. (2014)	Dementia	Music listening, improvisation, singing favorite songs, song discussion, music and movement	Participation, social, memory, quality of life
Shih et al. (2012)	Parkinson's disease	Sing along of popular songs	Physical and voice
Belgrave (2009)	Alzheimer's patients	Therapeutic music instrument playing. The therapist played guitar to provide accompaniment	Behavior, physical
Raglio et al. (2017)	Stroke	Improvisation. The therapist invited the participants to do improvisation and to interact with the therapist by some instruments	Mood, quality of life, rehabilitation

Shimizu et al. (2018) examined music therapy and cognitive impairment through a pre-experimental research design. The experimental group engaged in music therapy while doing physical rehabilitation exercise facilitated by a physical therapist and a music therapist. While the physical therapist led movement and exercises, the music therapist played the

participants' preferred music to match the movement of the participants. The control group completed the exercises and movement with verbal counting of exercise repetitions, without musical accompaniment.

In a similar study, Sung et al. (2012) focused on music therapy with older adults with dementia. In this study, the experimental group received a twelve 30-minute music therapy sessions. In the music activity segment of the sessions, the participants played various percussion instruments with their preferred music. The instruments used in this study include hand bell, tambourine, maracas, guiro tone block, flapper, and loop bell.

Elefant et al. (2012) focused on older adults with Parkinson's disease. The music therapy experiences included: vocal exercises, in which the participants will produce a glissando from the highest to the lowest comfortable pitch; and singing exercises, during which the subjects sang three to five preferred songs with musical accompaniment by the music therapist.

In Solé et al. (2014), the subjects were diagnosed with dementia. The music therapy interventions included: semi-improvised songs with lyrics that include participants' names and relevant personal information, music listening, improvisation, singing favorite songs, song discussion, and music and movement.

Shih et al. (2012) studied with a group of older adults with older adults with Parkinson's disease. They used singing as the main activity in music therapy intervention. The researchers did a short breathing training before the singing, the songs used were popular songs.

Belgrave (2009) performed music therapy research with Alzheimer's patients. She played the guitar and sang to provide accompaniment to the participants who were asked to engage in instrumental expressive touch interventions using wind chimes and the cacho rattle, which also facilitated upper extremity movement.

Raglio et al. (2017) studied music therapy with stroke patients, employing the relational active music therapy approach (RAMT). The therapist used rhythmical-melodic instruments

without verbal discourse, and invited the participants to improvise and interact with the therapists through the instruments. Encouraged by the rhythm patterns, the client participated in the music performance, which helps the client to improve the motor function and helps them express the emotions.

The music therapy session format of “opening session - main intervention - closure” is commonly used in the music therapy sessions that were studied. In the research procedure of these seven studies, opening activity or warm-up was mentioned in the five studies. The warm-up session typically lasted for 5 to 10 minutes, which included a verbal check-in, a greeting song, stretching, and breathing exercises. Three studies mentioned a 5-minute closure at the end of each session. The closure includes a goodbye song, a simple conversation, and summary. For the main intervention, four studies used therapeutic music improvisation or instrument playing, three studies used sing along, two studies used music and movement, one study used song discussion, and one study used music listening.

### **The Results of Music Therapy Interventions**

All the seven studies found significant improvements in music therapy for the older adults with dementia, Parkinson’s disease, Alzheimer’s, stroke or mild cognitive impairment. Four of the studies also identified areas that did not improve significantly after music therapy interventions.

Shimizu et al. (2018) showed significant improvements in the Frontal Assessment Battery scores in the music therapy group. The cerebral blood flow in the prefrontal cortex during the exercise also increased significantly in music therapy intervention.

Sung et al. (2012) found a significantly lower anxiety score in music therapy group compared with control group ( $p=0.004$ ). However, there was no significant difference in the reduction of agitation between two groups.

Elefant et al. (2012) detected no significant improve in depression, emotion, or speech. However, they found that the singing skills, including volume, singing quality, and vocal range, had a significant improvement in the music therapy group ( $p<0.01$ ).

Solé et al. (2014) revealed a significant improvement in Emotional Well-being score in music therapy group ( $p=0.030$ ). However, there was no significant difference in quality of life score between pre and posttest ( $p=0.410$ ).

Shih et al. (2012) found no significant difference on social, emotional, functional, and physical from pre-treatment to immediately after the 12 weeks' intervention. The only significant change was voice-related measures, which included vocal loudness, volume, and speech. After 12 weeks' music therapy intervention, the participants' voice ability improved significantly ( $p=0.04$ ).

Belgrave (2009) measured the behavior states of all the participants. The behavior states include sleep, indeterminate, preferred awake, and other awake states. She focused mainly on preferred awake states. The results showed that instrumental touch was significantly more effective in sustaining participants' alert behavior states ( $p=0.04$ ).

Raglio et al. (2017) measured the moods of the participants. They found that the experimental group showed a decrease of anxiety and depression ( $p=0.016$ ). The strength of non-dominant hand increased significantly in experimental group ( $p=0.041$ ).

Table 7 illustrates the intervention activities and results from these studies.

Table 7

*The Results of Each Study*

Author	Activity(ies)	Results
Shimizu et al. (2018)	Music and movement	Significant improvements on physical and frontal lobe function
Sung et al. (2011)	Therapeutic music instrument playing with the preference music	Significant lower anxiety score ( $p=0.004$ ).
		No significant different on reduction of agitation.
Elefant et al. (2012)	Sing along accompanied and support them by the therapist's guitar and voice	Significant improvements on singing skills ( $p<0.01$ ).
		No significant found in depression, emotion, memory, or speech.
Solé et al. (2014)	Music listening, improvisation, singing favorite songs, song discussion, music and movement	Significant improvements on emotional and social ( $p=0.030$ and $p=0.038$ )
		No significant difference in quality of life
Shih et al. (2012)	Sing along of popular songs	Significant improvements in voice skills ( $p=0.04$ ).
		No significant difference on social, emotional, functional, and physical
Belgrave (2009)	Therapeutic music instrument playing with the accompaniment of guitar	Significant improvements in alert behavior states ( $p=0.04$ ).
Raglio et al. (2017)	Improvisation, instrument playing	Significant improvements in anxiety and depression ( $p=0.016$ ) also the strength of non-dominant hand ( $p=0.041$ ).

In the two studies that primarily used group sing along as the intervention (Elefant et al., 2012. Shih et al., 2012), the researchers did not find significant improvement in participants' social, physical, or emotional functioning. Instead, they found a significant improvement in voice skills. Solé et al. (2014) included sing along in their study but they also facilitated other

activities, including music listening, improvisation, music and movement, and instrument playing. These authors did find a significant difference in emotional and social functioning.

Shimizu et al. (2018) and Solé et al. (2014) used music and movement in their study. The former found significant improvements on physical and frontal lobe function, the latter found significant improvement on emotional and social functioning.

Instrumental playing and improvisation were in four studies (Sung et al., 2011; Solé et al., 2014; Belgrave, 2009; Raglio et al., 2017). The results showed that these two interventions helped the improvement of anxiety level, emotional functioning, social functioning, behavior states, depression, and hand strength.

In summary, using singing as the only main activity in music therapy intervention seems to have no significant improvement in the physical and cognitive skills of the older adults based on this limited number of included studies. In my opinion, this may be influenced by factors of the facilitation of the group itself, such the different group sizes (often these are large groups), different styles of engagement of the music therapists facilitating the groups, and other related factors that are not readily available in the study reports such as group set up, time of day, and support from other staff. As I mentioned before, the group size of each study was different. There was one study only had nine participants (Belgrave, 2009). One study had 55 participants spread over two groups with one facilitating music therapist (Sung et al. 2011). This may influence the effectiveness of music therapy intervention. The characteristic the music therapist may also influence the outcome of intervention. How did the therapist lead the singing? What songs the therapist chose for the group? Did the therapists have eye contact with the client? How did the therapist encourage the clients? All of these elements may affect the result of sing along.

Music and movement was mentioned as a helpful activity to improve anxiety, social interaction, and behavior but resulted in no significant improvement in agitation of older

adults (Sung et al., 2011). Therapeutic instrument playing and improvisation were found as an effective activity to improve anxiety levels, and physical and social functioning. Music improvisation was also an effective tool for older adults to improve and express emotions.

### **The Effect of Music Therapy on the of Older Adults Living with Physical and Cognitive Impairment**

For physical functioning, the researchers completed studies focused on the behavior states and muscle strength. They used music and movement, improvisation, and sing along in the interventions. Almost all the studies that focused on physical improvement showed a significant difference after music therapy intervention. The only study that did not show significantly improved was the intervention of sing along (Shih et al., 2012; Elefant et al., 2012).

For the cognitive functioning, the researchers completed studies focused on anxiety level, agitation, execution ability, and memory. They used song discussion, improvisation, music and movement, music listening, and sing along in the interventions. Most of the results showed a significant improvement on the anxiety, depression, and social functioning. The only study that did not show significantly improved was also the intervention of using only sing along.

In summary, using the combination of multiple activities in music therapy interventions is helpful for the older adults to improve their physical-related and cognitive-related functions. It is worth noting that the use of a single sing along in a music therapy intervention did not have a significant effect on cognitive functioning for older adults in any of the included studies.

### **Other Findings**

While screening the samples, I found other studies about the use of music with older adults. These studies do not meet the inclusion criteria of this review, but are worth noting.

**Music-related studies.** Bugos and Kochar (2017) researched the effect of short-term intense piano training on cognitive functions of older adults with a mean age of 70.79 years old. The short-term intense piano training included three hours of concentrated group practice and learning in a piano lab, taught by a pianist with a doctorate in music education. The course included music theory, technical exercises, finger dexterity, and standard piano repertoire. After taking the piano training, the researchers found a significant improvement in participants with the verbal fluency and processing speed.

Ahessy (2016) studied the effects of music therapy with well elderly. The experimental group participated in a music-therapist led choir for 12 weeks, while the control group received standard daily care, in which the nurse helps the older adults with activities of daily living, such as bathing, dressing, and eating. The result showed a significant improvement on the depressive symptoms ( $p = 0.004$ ), quality of life ( $p = 0.0004$ ), and cognitive functioning ( $p = 0.011$ ).

Maclean, Brown, and Astell (2014) examined the impact of a rhythmic musical beat on gait and cognitive performance of training healthy older adults. The subjects were divided into three groups; one group received a rhythmic musical training, one group had music playing in the background but no training, and a third group heard no music and received no training. The result showed that musical training group's step-time variability improved significantly after training.

### **Discussion**

This systematic review was conducted in order to discover the common goals addressed through music therapy in older adults living with dementia, Parkinson's disease, Alzheimer's disease, mild cognitive impairment, and stroke; to examine the most commonly used music therapy interventions for this population; to identify the most effective music therapy

interventions used in music therapy sessions; and to examine the effects of music therapy intervention on older adults with physical or cognitive impairment over 65 years of age.

I searched related studies from three databases: MEDLINE, PsycINFO, and Academic Search Complete. Seven studies were included in this review; four of the studies focused on patients with cognitive impairments, and the other three studies focused on patients with physical impairments. The results of these seven studies all showed significant improvement for physical or cognitive related areas, from which it can be concluded that music therapy intervention can be effective for physical or cognitive rehabilitation of older adults. However, different music intervention showed different effectiveness and results. Therefore, I summarized all the activities used in the included studies and compared all the results to make clearer conclusions of the effect of music therapy on older adults with physical or cognitive impairments.

### **Music Therapy for Older Adults with Physical Impairments**

In this systematic review, three studies examined the effects of music therapy for older adults with physical impairments such as stroke and Parkinson's disease (Elefant et al., 2012; Belgrave, 2009; Shih et al., 2012). The diagnoses of the subjects in those studies were stroke and Parkinson's disease. Typical goal areas of music therapy intervention are improving mood, memory, speech, and quality of life. In these included studies, the researchers used sing along, music improvisation, and therapeutic instrument playing to address these goals. In the singing activity, the therapist accompanied and supported the clients by playing the guitar or using voice, the clients chose their favorite songs (Elefant et al., 2012; Shih et al., 2012). In the improvisation, the therapist invited the client to improvise and to interact with the therapist with the instruments (Belgrave, 2009). In the therapeutic instrument playing, the client played the instrument freely, while the therapist played music as a background to support and match the client's music (Belgrave, 2009). It can be seen from the results of these

three studies that singing is an effective way to help the clients with their singing skills and vocal skills, but no impact on physiological functioning was found. Notably, the combination of these commonly used music activities was found to improve the quality of life and reduce anxiety and depression of older adults with Parkinson's disease or stroke.

### **Music Therapy for Older Adults with Cognitive Impairments**

Decline in cognitive function is a part of aging, which may be associated with disruptive behaviors, depression, anxiety and quality of life (Clark, Baker, & Taylor, 2012). In this review, I collected data about older adults who have cognitive impairment such as dementia, mild cognitive impairment, and Alzheimer's disease. Music therapy goals for people with cognitive impairments include improving memory and social functioning, reduce anxiety and agitation, and improving quality of life (Shimizu et al., 2018; Sung et al., 2011; Solé et al., 2014; Raglio et al., 2017).

The music therapy interventions for older adults who have cognitive impairment include music and movement, therapeutic music instrument playing, improvisation, sing along, music listening, and song discussion. In the included studies, music movement, song discussion, instrument playing and improvisation were conducted in a group setting. Sing along and music listening were used in both individual sessions and group sessions.

### **Limitations**

A main limit of this systematic review is the limited number of studies that met the criteria of the review. I only found seven studies for this review, which is a small sample size. Although all the studies had shown a meaningful conclusion about music therapy with older adults, the conclusions should be generalized with caution. Adjustments to the inclusion criteria may be effect to get more analyzable studies, though the homogeneity of results may be impacted.

The included studies were searched from three databases: MEDLINE, PsycINFO, and Academic Search Complete. There were 104 articles showed from these three databases after removing the duplicates. In order to make a more convictive conclusion, more databases can be considered to gather samples. In addition, databases from other countries can also be included in the review as there may be studies from other sources that focus on music therapy with older adults.

### **Future Research**

There were seven studies included in this review, which is a small sample. Therefore, I think gathering a larger sample can be helpful. For future research, more databases can be searched, and the time criteria can be appropriately expanded. In general, a larger sample size is needed to make the conclusion more meaningful.

When considering future research, it is important to focus not only on older adults with physical and cognitive impairments but also on well elderly. The number of well elderly is large, projections indicate older age groups will continue to grow faster than the total population (Norman. 2012). According to the U.S. Census Bureau in 2004, that older adults over the age of 65 will make up 20.7% of the population by 2030, compared to 12.4% in 2000 (Petrovsky et al., 2015). There are also many of studies about music therapy with well elderly .These studies focus on many areas such as mood and socialization (Ahessy. 2016). The results and the conclusion from these studies are worth learning.

When I screened articles that met the inclusion criteria, I found many music-related research articles that were not specific to music therapy. I think these studies provide music therapists with important information to inform music therapy practice. Therefore, I suggest that future research can focus on these music-related studies, summarizing the similarities between music-related studies and music therapy studies, and comparing the differences between these studies.

### **Conclusion**

This systematic review focused on music therapy for older adults with physical or cognitive impairments. The included studies were from MEDLINE, PsycINFO, and Academic Search Complete. A total of 180 participants were included in this review. After reviewing and summarizing the current studies, it is clear that music therapy intervention has a significant effect on the memory function, agitation, motor function, and voice skills of older adults with physical and cognitive impairment.

By examining the objects of included studies, five areas were commonly mentioned: memory, exercise, balance, depression, and quality of life. There are several common goals of music therapy with older adults, which includes 1) improve memory functioning and executive functioning, 2) improve motor functioning, 3) reduce anxiety and depression, 4) improve participation in music therapy session, and 5) improve quality of life. The first three goals are mentioned in both individual sessions and group sessions, while the latter two goals are commonly used within group music therapy sessions.

When it comes to the music therapy activities for older adults, the format of “opening session - main intervention - closure” is commonly used. The opening session usually lasts for 5 to 10 minutes, which includes a verbal check-in, a greeting song, stretching and breathing exercise. The closure usually includes a goodbye song, a simple conversation and summary. The main activities include therapeutic music improvisation or instrument playing, sing along, music and movement, song discussion, and used music listening. Instrument playing and sing along are two common activities for older adults with physical and cognitive impairment.

The results of all the studies showed significant improvements in the physical, cognitive and psychosocial functions. By comparing different results, it can be seen that singing along can significantly improve the vocal skills. However, it is worth noting that, based on this

limited number of included studies, using singing along as the only main activity in music therapy intervention seems to have no significant improvement in the mood, physical, and cognition of the older adults. The reason may include the group size, the characteristic the music therapist, and the engagement of the therapist. For the motor functioning, music and movement was mentioned a lot, especially for older adults with Parkinson's disease or stroke. The results also show music and movement is a helpful activity to improve anxiety, social interaction, and behavior of older adults. Therapeutic instrument playing and improvisation were used a lot for older adults with cognitive impairments. The results showed that instrument playing and improvisation can be used as an effective activity to improve anxiety levels, and physical and social functioning. Music improvisation was also an effective tool for older adults to improve and express emotions.

In conclusion, music therapy intervention has a significant effect on older adults living with physical and cognitive impairment. Using the combination of multiple activities in music therapy interventions is helpful for the older adults to improve their physical-related and cognitive-related functions. According to the results of this systematic review, how the music therapists lead the intervention may influence how the client could benefit from the music session. I suggest that music therapists should consider controlling the number of groups when doing music therapy intervention with older adults. Also, it's important to choose the client's preferred music and to engage the client in the session.

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