THE EFFECTS OF GROUP SINGING
ON QUALITY OF LIFE AND AFFECT OF PEOPLE WITH DEMENTIA:
A RANDOMIZED CONTROLLED TRIAL

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ABSTRACT

The prevalence of dementia, a progressive and degenerative syndrome, increases dramatically with age (Alzheimer's Disease International, n.d.), and it is critical to develop effective strategies and evidence-based interventions to improve the quality of life for persons with dementia (Crespo, Hornillos, & De Quirós, 2013; Vink, Birks, Bruinsma, & Scholten, 2004). Music therapy has drawn attention as a promising non-pharmacological approach for individuals with dementia (Brotons, 2000; Vink et al., 2004). A variety of music interventions have been widely applied for dementia care not only by music therapists, but also by other healthcare professionals. Among those interventions, singing and listening are utilized most frequently.

The purpose of the current study was to compare the short-term effects of two music interventions, including a music therapy-singing group and a music medicine-listening group, as well as a control-TV group, on quality of life and positive and negative affect of persons with dementia at a long-term care facility. Fifty-two participants, ranging in age from 63 to 99 years, were randomly assigned to one of three groups, and thirty-seven completed the interventions. The participants in each group were engaged for a 40-minute session twice a week for four consecutive weeks. The music therapy-singing group was facilitated by a music therapist, whereas the music medicine-listening and the control-TV group were led by nursing home activity assistants.

Quality of life was measured at baseline and after the last session. Only the MT-singing group demonstrated significant improvements when compared to the other groups. Positive and negative affect were measured at three points, including pre and post the first, fourth and eighth sessions. Only the MT-singing group increased positive affect scores and decreased negative affect scores significantly. Based on the findings of the current study, music therapy involving singing may be beneficial in improving quality of life and affect in persons with dementia at long-term care facilities.

I would like to dedicate this dissertation

to residents of New York State Veterans' Home, Oxford,

who served WWII, Korean War and Vietnam Conflict.

Thank you for your service.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

The population of the United States is aging like the rest of the world, and the number and proportion of older adults will continue to rise rapidly over the coming decades (Wiener & Tilly, 2002). The number of people who are 65 and older in the United States will reach 83.7 million by 2050, which is almost double from 43.1 million in 2012 (Ortman, Velkoff, & Hogan, 2014); its proportion is projected to increase to 20.3 percent by 2050 (Wiener & Tilly, 2002). Moreover, the number of people who are 85 and older is projected to increase by 350% between 2000 and 2050 (Wiener & Tilly, 2002). The current rate of growth in the number and proportion of the older population in the United States is unprecedented in the nation's history and largely due to the baby boomers, who began turning 65 in 2011 (U.S. Department of Health and Human Services, 2013). The increase in number and proportion of the aging population will have a wide range of implications for families, policy makers and healthcare providers (Ortman et al., 2014).

As a part of the aging process, the older population may experience various chronic problems, rather than acute, such as heart disease, osteoporosis, arthritis and dementia. Therefore, the prevention and treatment of chronic diseases of an aging population will be a growing concern for healthcare providers, shifting the focus from one-time intervention to the ongoing management of multiple conditions. Because chronic diseases often result in continuing disabilities, long-term care services, such as nursing homes, will become an important source of healthcare delivery for this population (Wiener & Tilly, 2002).

Of the various chronic conditions the older population may experience, dementia is a disease of particular concern and one of the major challenges for healthcare providers because of its prevalence and the enormous burden it places on persons with dementia, their families and healthcare providers (Helvik, Engedal, Benth, & Selbæk, 2015; Plassman et al., 2007). Dementia is in most cases progressive, caused by various brain disorders and is characterized by cognitive impairment, such as a decline in memory, language, and problem-solving skills that affect a person's ability to perform everyday activities, as well as changes in behaviors and social functioning (Helvik et al., 2014; Plassman et al., 2007). Dementia is also often associated with higher mortality rates, risk of hospitalization, dependency, and reduced quality of life (Helvik et al., 2015).

Dementia

Definition of Dementia

Dementia is an overall term that describes a wide range of symptoms associated with multiple deficits in cognition (e.g., memory, language, etc.), and changes in behavior that are severe enough to interfere with a person's ability to perform daily activities. It is a clinical syndrome that is progressive and degenerative, affecting memory, thinking, behavior, emotion and personality (Alzheimer's Association, n.d.; Alzheimer's Disease International, n.d.).

The latest edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-5*; American Psychiatric Association, 2013a) replaces the term, "dementia," with "major neurocognitive disorder" (American Psychiatric Association, 2013b). The *DSM-5* recognizes a less severe level of cognitive impairment as a mild neurocognitive disorder, which goes beyond normal issues of aging, but doesn't yet rise to the level of a major neurocognitive disorder. An individual with a mild neurocognitive disorder experiences modest cognitive decline, but still can perform complex activities, such as paying bills or managing medications with great mental effort (Sachs-Ericsson & Blazer, 2015). The addition of criteria for a mild neurocognitive disorder in *DSM-5* is intended to promote early detection and treatment of cognitive decline, because early identification may allow interventions to be more effective and prevent or slow progression. The term, dementia, can be still used to refer to major neurocognitive disorder (Walchol, 2015).

Prevalence of Dementia

As the size and proportion of people who are 65 and older in the United States continues to increase, the number of Americans with dementia will grow as well, because the prevalence of dementia increases dramatically with age (Alzheimer's Association, 2015; Plassman et al., 2007). In 2002, the prevalence of dementia among individuals aged 71 and older in America was 13.9%, and increased with age, from 5.0% of those aged 71-79 years to 37.4% of those aged 90 and older (Plassman et al., 2007).

Behavioral symptoms and an inability to perform daily activities and social functions due to cognitive impairment are the leading reasons that persons with dementia and their families seek long-term care services (Douglas, James, & Ballard, 2004). As a result, the prevalence of dementia in long-term care facilities is much higher than in the community (Seitz, Purandare, & Conn, 2010).

Causes and Types of Dementia

Over 70 diseases can cause dementia which is associated with damage to brain cells (Alzheimer's Association, n. d.; LoGiudice, 2002). The damage interferes with the ability of brain cells to communicate with each other. The brain has many distinct regions, each of which is responsible for different functions, such as memory, judgment and movement. When brain cells in a particular region are damaged, that region cannot carry out its functions normally, and a person's thinking, behavior and feelings may be affected and altered (Alzheimer's Association, n. d.).

Although Alzheimer's disease is the most common cause of dementia, accounting for 60 to 70 percent of cases of dementia, there are many different forms of dementia, including vascular dementia, dementia with Lewy bodies (DLB) and frontotemporal dementia, and Parkinson's disease (Desai, Schwarts, & Grossberg, 2012; LoGiudice, 2002; Lunde, 2007). Alzheimer's disease is the most common cause of dementia in people over age 65 with the cause possibly related to amyloid plaques and neurofibrillary tangles. It accounts for 60% of all dementia; almost all brain functions, including memory, movement, language, judgment, behavior, and abstract thinking, are eventually affected (Alzheimer's Association, 2015; LoGiudice, 2002)

Vascular dementia is the second most common cause of dementia after Alzheimer's disease and is caused by brain damage from cerebrovascular or cardiovascular problems (strokes) or other problems that inhibit vascular function. Symptoms are similar to Alzheimer's disease, but impaired judgment or ability to plan necessary steps to complete a task are more likely to be the initial symptoms, as opposed to the memory losses often associated with the dementia of Alzheimer's disease. Personality and emotions are affected only late in the disease process (Alzheimer's Association, 2015; LoGiudice, 2002).

Dementia with Lewy bodies accounts for up to 20% of dementia cases. This form of dementia is characterized by visual and auditory hallucinations, Parkinsonism, gait imbalance, and fluctuating cognition (Alzheimer's Association, 2015; LoGiudice, 2002).

Frontotemporal dementia is linked to degeneration of nerve cells in the frontal and temporal brain lobes. This form of dementia tends to occur at an earlier age (45-65 years) and approximately 50% of those affected have a family history of the disease with a first-degree relative. It is characterized by the early onset of behavioral and personality changes, which can manifest in a diverse range of dysfunctional social behaviors, such as stealing, neglecting responsibilities, compulsive behavior and eventual motor skill problems and memory loss. (Alzheimer's Association, 2015; LoGiudice, 2002).

As seen above, clinical profiles tend to be distinct for the different dementia types. However, overlaps do also exist and mixed dementia is more common than previously thought. In mixed dementia, abnormalities linked to more than one type of dementia occur simultaneously in the brain (Alzheimer's Association, 2015). In the early stages of disease, the differences appear to be clearer among the various forms of dementia. However, as the specific disease progresses, more parts of the brain become affected, and the differences among different types of dementia become much more subtle (Lunde, 2007).

Behavioral and Psychological Symptoms of Dementia

Behavioral and psychological symptoms are common among persons with dementia, and about 90% of those with dementia experience behavioral disturbances at some point in the course of their illness. Common disturbances can be grouped into four categories: mood disorders (e.g., depression, apathy, euphoria), sleep disorders (insomnia, hypersomnia, night-day reversal), psychotic symptoms (delusions and hallucinations) and agitation (e.g., pacing, wandering, aggression). In most cases, the majority of individuals will have more than one symptom (Cerejeira, Lagarto, & Mukaetova-Ladinska, 2012; Desai et al., 2012; Finkel, 2001; LoGiudice, 2002).

Although the changes in the brain that are causing dementia are key determinants of behavioral disturbances, in most cases, there are also other determinants of behavioral disturbances. Common factors that contribute to behavioral disturbances in people with dementia include medications, medical conditions (e.g., urinary tract infection, constipation, dehydration, pain), environmental factors (e.g., excessive noise), psychosocial factors (e.g., loneliness, boredom, physical inactivity), and other factors related to caregiving (e.g., impatience, disrespectful attitude). In advanced stages of dementia, behavioral disturbances may often be a means to communicate emotions and discomfort (Desai et al., 2012; LoGiudice, 2002).

The behavioral and psychological symptoms of dementia are prevalent and persistent and contribute significantly to patient and caregiver suffering, thus reflecting a decreased sense of well-being and quality of life. Behavioral and psychological disturbances, especially psychotic symptoms, agitation, and persistent wandering, are the primary triggers for the placement of a person with dementia in a long-term care facility because of safety concerns, thus imposing considerable economic and psychological burdens on persons with dementia, as well as their families, professional caregivers and society (Douglas et al., 2004; Finkel, 2001). Therefore, it is critical to evaluate and develop cost-effective interventions to manage and alleviate the behavioral and psychological symptoms of dementia.

Pharmacological Interventions

When behavioral disturbances are persistent and severe, posing significant danger to persons with dementia and others, pharmacological interventions may be necessary to manage behavioral symptoms (Desai et al., 2012; Vink et al., 2004). However, pharmacological interventions have limited ability to treat many of the behavioral symptoms, and are often accompanied by several side effects and complications. Furthermore, no drug has been approved by the US Food and Drug Administration (FDA) for the treatment of behavioral disturbances in individuals with dementia to date (Desai et al., 2012). Currently, the black box warnings of antipsychotic medication clearly identify risks of stroke and increased mortality for their use in an attempt to manage behavioral disturbances of dementia. Also, more side effects have been reported with typical antipsychotic use, such as falls and fractures. Antipsychotics may also increase the risk of hospitalization, pneumonia, and cognitive decline (Desai et al., 2012).

The inappropriate use of psychoactive drugs to manage behavioral disturbances of persons with dementia in nursing homes has caused widespread concern (Talerico, Evans, & Strumpf, 2002), and recent guidelines from national and international associations have recommended that the pharmacological approach should not be the first-line of treatment for dementia (Sink, Holden, & Yaffe, 2005). Antipsychotic medications should not be used for reasons of convenience or without clear psychiatric indicators and there is a need for periodic evaluation to assess appropriateness of continued use of these medications. Also, it is important to continuously attempt to reduce dosages of antipsychotic medications in all patients with dementia who do receive them (Desai et al., 2012).

Pharmacological interventions, especially the use of antipsychotics to manage behavioral disturbances in persons with dementia, should be used through a thoughtful and balanced evaluation that considers individual vulnerabilities to side effects, the risks their behavioral disturbances pose to others, and the goals of care. Pharmacological interventions need to be restricted to behavioral emergencies and for short-term treatment of behavioral disturbances that pose imminent danger to self or others. The recommended rule for prescribing any medication to persons with dementia is “start low and go slow” (Desai et al., 2012).

Non-Pharmacological Intervention

Considering the side effects and risks of antipsychotic medication, there have been more research attempts to understand the effects of non-pharmacological treatment (Olazarán et al., 2010). Compared to the traditional medical model that uses a pharmacological approach, one distinct feature among the non-pharmacological interventions is the emphasis on a person-centered approach (Douglas et al., 2004). Kitwood (1997) was one of the first researchers to challenge the medical model in dementia care by emphasizing the use of a person-centered approach, and by making greater attempts to understand the individual's experience of dementia (Bryden, 2002; Cheston, 1998). Based upon the person-centered approach, persons with dementia are now recognized as having psychological, emotional and physical needs. It is equally important to understand and address the psychosocial aspects of dementia, as it is to reduce problematic behaviors associated with dementia. As a result, psychosocial treatments for dementia have received increasing research interest (Bryden, 2002; Junaid & Hedge, 2007).

Patients, caregivers and healthcare professionals have been searching for effective interventions for persons with dementia and an increasing number of non-pharmacological interventions have become available (Olazarán et al., 2010; Vink et al., 2004). The most commonly used non-pharmacological interventions include cognitive approaches (cognitive training, cognitive rehabilitation, cognitive stimulation therapy), reality orientation, validation therapy, reminiscence therapy, activity therapy, aromatherapy, multisensory approaches, and creative arts therapy, such as music therapy or art therapy, (Douglas et al., 2004; Takeda, Tanaka, Okochi, & Kazui, 2012). However, studies regarding the effectiveness of these treatments have generally suffered from small sample sizes and weak methodologies, and it is premature to conclude the therapeutic benefits of these non-pharmacological approaches at this point (Cohen-Mansfield & Mintzer, 2005; Douglas et al., 2004).

Music therapy has gained increasing attention as one of the non-pharmacological approaches for persons with dementia since the 1990s, helping individuals with dementia at all levels not only in alleviating behavioral problems, but also in addressing psychosocial needs (Bruer, Spitznagel, & Cloninger, 2007; Palmiero, Di Giacomo, & Passafiume, 2012; Raglio et al., 2008). Music therapy is “the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship” (American Music Therapy Association, 2012). It aims not only to restore an individual’s functions, but also to develop an individual’s potential so that the quality of life of persons with dementia may be improved (Vink et al., 2004).

In addition to music therapy studies, there are also numerous studies utilizing music to improve various aspects of dementia care (Sambandham & Schirm, 1995). Compared to “music therapy” studies that implement various music therapy methods by a credentialed music therapy professional, “music medicine” studies are characterized by the use of primarily passive music listening of pre-recorded music implemented by medical personnel, such as nurses or occupational therapists (Dileo & Bradt, 2005). Most music medicine studies for persons with dementia utilize music as background and compare different types of music selections, such as classical or preferred music (Casby & Holm, 1994; Clark & Harding, 2012; Gerdner, 2000), or stimulative or sedative music (Ziv, Granot, Hai, Dassa, & Haimov, 2007). In order to understand and promote the benefits of music-based intervention for dementia care more effectively, it is necessary to differentiate music therapy from music medicine interventions.

Music and Dementia

Music interventions, including music therapy and music medicine, have been widely utilized for persons with dementia. Compared to music medicine studies, which can be defined as a use of mostly pre-recorded music listening implemented by non-music therapists (Dileo & Bradt, 2005), most music therapy studies in dementia care have utilized extensive live music experiences, with broader therapeutic goals, such as enhancing emotional expression, increasing social support, and improving a sense of belongingness. Furthermore, what differentiates music therapy from music medicine is its emphasis on the mutual relationship between a therapist and a participant (Dileo & Bradt, 2005; Raglio, 2011).

In this section, both music therapy and music medicine research studies for persons with dementia in the existing literature will be reviewed in five target areas, including behavioral, cognitive, social, emotional areas and quality of life.

Behavioral Outcomes

Music Therapy Studies Focusing on Behavioral Outcomes

The majority of the music therapy studies in the existing literature have focused on behavioral issues of dementia care (See Table 1). These behavioral symptoms are complex and challenging, causing a severe strain not only for persons with dementia but also for their family and professional caregivers (Wall & Duffy, 2010). Music therapy studies in this area have explored the use of music on decreasing the frequency of disruptive behaviors, such as wandering (Fitzgerald-Cloutier, 1993; Groene, 1993), managing overall behavioral and psychological symptoms of dementia (Choi, Lee, Cheong, & Lee, 2009; Raglio et al., 2008, 2010, 2015; Svansdottir & Snaedal (2006), and alleviating agitation (Aslakson, 2010; Brotons & Pickett-Cooper, 1996; Ledger & Baker, 2007; Ridder & Aldridge, 2005; Vink et al., 2013).

Wandering was the focus of earlier studies (Clair & Bernstein, 1990; Fitzgerald-Cloutier, 1993; Groene, 1993). Both Fitzgerald-Cloutier (1993) and Groene (1993) compared the frequency of wandering behavior during music therapy and reading sessions and found a larger decrease in the amount of wandering during music therapy than reading sessions, suggesting that music therapy might be more effective than reading for decreasing wandering behavior of persons with dementia. Clair and Bernstein (1990) also observed the positive impact of music therapy on decreasing wandering. As a result of 15-months of music therapy interventions, three male subjects consistently remained seated in chairs with less wandering without physical restraints for the duration of a 30-minute session.

Several studies have focused on managing overall behavioral and psychological symptoms of dementia (Choi et al., 2009; Raglio et al., 2008, 2010, 2015; Svansdottir & Snaedal, 2006). A majority of the music therapy studies have found significant effects of music therapy in reducing behavioral and psychological symptoms of dementia, compared to control groups which utilized standard care (Choi et al., 2009; Raglio et al., 2008, 2010, 2015; Svansdottir & Snaedal, 2006) or recreational activities (Vink et al, 2013). Among these studies, it is interesting to note that Raglio et al. (2010) adopted a music therapy scheme with non-continuous cycles of sessions, involving three working cycles of 12 active music therapy sessions spaced out by one month of no treatment, and found that it was effective in reducing behavioral disturbance in severely demented patients. Raglio et al. (2015) found that the addition of an active music therapy or an individualized music listening did not have a significant effect in improving behavioral and psychological symptoms of dementia, compared to standard care. All groups, including an active music therapy, an individualized music listening, and standard care, improved behavioral and psychological symptoms of dementia without showing significant differences. Raglio et al. (2013) also compared the effects active music therapy with individualized music listening on behavioral and psychological symptoms of dementia and found that music therapy had larger effects than music listening on BPSD, even though the differences were not significant.

There are several studies that have focused specifically on alleviating agitation (Aslakson, 2010; Brotons & Pickett-Cooper, 1996; Ledger & Baker, 2007; Ridder & Aldridge, 2005; Ridder, Stige, Qvale, & Gold, 2013; Vink et al., 2013). Significant effects of music therapy on reducing agitation have been reported in some studies (Brotons & Pickett-Cooper, 1996; Ridder & Aldridge, 2005; Ridder et al., 2013), whereas others have failed to demonstrate that there were beneficial effects of music therapy compared to other activities (Aslakson, 2010; Ledger & Baker, 2007; Vink et al., 2013). Regarding the effect of musical training on results, Brotons and Pickett-Cooper (1996) found that participants were significantly less agitated during and immediately after music therapy regardless of their musical training earlier in life. It was also interesting to note that decreased agitation was maintained for at least 20-minutes of the post-music therapy observation period. Ledger and Baker (2007) also found a short-term reduction in agitation as a result of one to three weekly music therapy sessions for 42 weeks. However, no significant long-term effect of the intervention on agitation was manifested over time.

A variety of interventions were compared with music therapy interventions, including a reading group (Fitzgerald-Cloutier, 1993; Groene, 1993), nature video watching (Aslakson, 2010), usual care (Choi et al., 2009; Ledger & Baker, 2007; Ridder et al., 2013; Svansdottir & Snaedal, 2006), recreation activities (Vink et al., 2013), or entertainment (Raglio et al., 2008, 2010). The treatment interventions utilized in music therapy studies included improvisation (Raglio et al., 2008, 2010), singing (Fitzgerald-Cloutier, 1993; Groene, 1993; Ridder & Aldridge, 2005), and a combination of various music activities such as singing, playing instruments, and movement (Aslakson, 2010; Brotons & Pickett-Cooper, 1996; Choi et al., 2009; Ridder et al., 2013; Suzuki et al., 2004; Svansdottir & Snaedal, 2006; Vink et al., 2013).

Table 1.

Behavioral Effects of Music Therapy in Persons with Dementia

Author & year	*N*	Research design	Dependent variable	Independent variable	Results
Aslakson, 2010	40	Pre, post-test	Agitation	MT: singing, playing instruments Control: TV	No significant difference between MT and TV
Brotons & Pickett-Cooper, 1996	20	Within subject	Agitation	MT: singing, playing instruments, dancing, and improvisation	Significant reduction in agitation during and after MT
Choi et al., 2009	20	Experimental/ Control	BPSD	MT: singing, playing instruments, song drawing and song writing Control: usual care	Significant improvement in BPSD in MT
Clair & Bernstein, 1990	3	Within subject	Wandering	MT: singing, rhythm instrument playing, and movement	Less wandering in MT
Fitzgerald-Cloutier, 1993	1	Case study	Wandering	MT: singing Control: reading	Less wandering during MT
Groene, 1993	30	Within subject	Wandering	MT: singing, listening, playing instruments Control: reading	Significantly longer seating in MT
Ledger & Baker, 2007	45	Experimental-Control	Agitation	MT: singing, playing instruments, moving, listening and discussion Control: standard care	No significant differences between groups over time
Raglio et al., 2008	59	RCT	BPSD	MT: playing instruments Control: standard care and entertainment activities	Significant decrease in specific BPSD in MT
Raglio et al., 2010	60	RCT	BPSD	MT: group improvisation Control: standard care and entertainment activities	Significant decrease in BPSD in MT

Note. N=number of participants; BPSD=behavioral and psychological symptoms of dementia; MT=music therapy intervention; RCT=randomized controlled trial.

Table 1.

(continued)

Author & year	*N*	Research design	Dependent variable	Independent variable	Results
Raglio et al., 2013	17	RCT	BPSD	MT: individual improvisation Control: Music listening	MT: larger effects on BPSD No significant differences between MT and ML
Raglio et al., 2015	120	RCT	BPSD	MT: individual improvisation Music listening without interaction with a therapist Control: standard care	All groups improved behavioral symptoms without a significant difference
Ridder et al., 2013	42	Crossover	Agitation	Individual MT: singing, listening and dancing Control: standard care	Significant decrease in agitation in MT
Svansdottir & Snaedal, 2006	38	RCT	BPSD	MT: singing, playing instruments, improvising, and dancing. Control: usual care	A significant reduction in activity disturbances and aggressiveness in MT
Vink et al., 2013	77	RCT	Neuropsychiatric symptoms	MT: listening, singing, playing instruments, and dancing Recreational activities	Significant reductions in neuropsychiatric symptoms in MT

Note. *N*=number of participants; BPSD=behavioral and psychological symptoms of dementia; MT=music therapy intervention; RCT=randomized controlled trial.

Music Medicine Studies Focusing on Behavioral Outcomes

Compared to music therapy studies that utilized a variety of active forms of music interventions, such as singing, instrument playing or improvisation, most music medicine studies in dementia care conducted by other healthcare professionals have adopted mainly a receptive music method, such as music listening, and examined the effects of a passive music intervention on a variety of aspects of dementia-related behaviors, such as disruptive vocalizations (Casby & Holm, 1994), agitation (Gerdner, 2000; Gerdner & Swanson, 1993; Hicks-Moore & Robinson, 2008), fall (Gill & Englert, 2013), and aggressive behaviors during specific periods of time, such as bathing (Clark, Lipe, & Bilbrey, 1998; Thomas, Heitman, & Alexander, 1997), and mealtime (Denney, 1997; Goddaer & Abraham, 1994; Hicks-Moore, 2005; Ho et al., 2011; Ragneskog, Bråne, Karlsson, & Kihlgren, 1996). Since these professional caregivers are involved with direct care, such as bathing, toileting, feeding, and distributing medication, evaluating and developing an effective and safe intervention to decrease disruptive and aggressive behaviors during these time may be directly related to the quality of life of persons with dementia, as well as the practical issues of healthcare professionals, such as burnout, injury rate and job satisfaction.

As an intervention, these studies compared the effects of different types of music, such as classical vs. favorite music (Casby & Holm, 1994; Gerdner, 2000), and soothing music vs. folk songs vs. popular music (Ragneskog et al., 1996). Some of these studies did not utilize any control group (Denney, 1997; Gerdner & Swanson, 1993; Goddaer & Abraham, 1994; Ho et al., 2011; Thomas et al., 1997), whereas other studies compared the effect of a music intervention with other types of intervention, such as hand massage (Hicks-Moore & Robinson, 2008) (See Table 2).

It is interesting to note that more recently, music medicine studies have engaged persons with dementia not only in passive listening to pre-recorded music, but also in active music programs, and have found positive effects on behavioral symptoms (Lin et al., 2010; Suzuki, Kanamori, Nagasawa, Tokiko, & Takayuki, 2007).

Table 2.

Behavioral Effects of Music Medicine in Persons with Dementia

Author & year	*N*	Research design	Dependent variables	Independent variables	Results
Casby & Holm, 1994	3	Single-subject withdrawal design	Repetitive disruptive vocalization	Classical music listening Favorite music listening Control: no music	Significant decrease in disruptive vocalization in both music listening
Clark et al., 1998	18	Crossover	Aggressive behavior during bathing	Preferred music listening Control: no music	Decrease of aggressive behavior during music
Denney, 1997	10	Within subject	Agitation during meal	Background music	Reduction in verbal agitation
Gerdner, 2000	39	Within subject	Agitation	Preferred music listening Classical music listening	Reduction in agitation during and following individualized music listening
Gerdner & Swanson, 1993	5	Within subject	Agitation	Individualized music listening	Decreased agitation
Gill & Englert, 2013	60	Quasi experimental	Fall	Background music during and after meal	No reduction of fall
Goddaer & Abraham, 1994	29	Within subjects	Mealtime agitation	Relaxing music	Significant reduction in agitation
Hicks-Moore, 2005	30	Quasi-experimental	Mealtime agitation	Relaxing music	Reduced agitation
Hicks-Moore & Robinson, 2008	41	RCT	Agitation	Music listening Hand massage Control	Significant decrease in agitation immediately following intervention

Note. *N*=number of participants; BPSD=behavioral and psychological symptoms of dementia; RCT=randomized controlled trial.

Table 2.

(continued)

Author & year	*N*	Research design	Dependent variables	Independent variables	Results
Ho et al., 2011	22	Within subjects	Mealtime agitation	Researcher composed music	Significant decline in agitation
Lin et al., 2010	100	RCT	Agitation	Music: instrument playing, singing, listening Control: daily activities	Decreased agitation after group music intervention
Sung et al., 2006	36	RCT	Agitation	Music assisted movement Control: usual care	Significant reduction in agitation
Suzuki et al., 2007	16	Experimental-Control	BPSD	Music: singing, hand-bell performance, listening Control: no music	Improvement in behavioral symptoms after music intervention
Thomas et al., 1997	14	Within subjects	Behavior during bathing	Background music	No difference in verbal agitation Decreased aggressive behaviors
Ziv et al., 2007	28	Within subjects	Negative disruptive behaviors	With background music (Stimulative, familiar music listening) Control: no music	Significant decrease in negative behavior

Note. N=number of participants; BPSD=behavioral and psychological symptoms of dementia; RCT=randomized controlled trial.

Cognitive Outcomes

Music Therapy Studies Focusing on Cognitive Outcomes

Music therapy studies in this area of interest have investigated the effectiveness of music therapy in improving cognitive functioning of persons with dementia, including overall cognitive functioning (Bruer et al., 2007; Chu et al., 2014; Prickett & Moore, 1994; Smith, 1986; Suzuki et al., 2004), language functioning (Brotons & Koger, 2000; Dassa & Amir, 2014; Suzuki et al., 2004), communication (Ridder & Gummesen, 2015), and memory (Carruth, 1997) (See Table 3).

More specifically, Brotons and Koger (2000) examined the effect of music-cued reminiscence sessions on language functioning, including speech content and fluency. Compared to the conversational sessions with a therapist, there were significant effects in the singing group members regarding the content and fluency of their speech. Other studies also reported the positive impact of music therapy interventions on improving language skills (Smith, 1986; Suzuki et al., 2004) or short-term memory functioning (Carruth, 1997; Chu et al., 2014; Prickett & Moore, 1991).

However, study results regarding music therapy's effectiveness in improving overall cognitive function are inconsistent. Bruer et al. (2007) examined the effects of music therapy on overall cognitive functioning for persons with dementia. During the music therapy condition, participants experienced singing and playing instruments, whereas in the control group, participants watched familiar movies together. The Mini Mental State Exam (MMSE) was used to determine the participants' cognitive function, and the results showed improvements in participants' overall cognitive functioning immediately after the music therapy intervention, as well as the following morning. These scores were significantly greater than those of individuals in the control group. There were no significant cognitive differences between groups the following week.

Chu et al. (2014) also adopted the same standard measurement tool, the Mini Mental State Exam (MMSE), to evaluate cognitive function, and reported the positive impact of group music therapy with a variety of music interventions on improving cognitive function, particularly short-term recall function. In this study, the greatest impact was found in persons with mild and moderate dementia, and the positive effects were still apparent even one month after the end of the intervention. Compared to the positive impact of music therapy in improving overall cognitive function in these studies (Bruer et al., 2007; Chu et al., 2007), Brotons and Koger (2000), as well as Suzuki et al. (2004) reported that the change of total scores on the MMSE was not significant, even though both studies reported significant improvement on the sub-scale of 'language' for participants who received a music intervention.

Table 3.

Cognitive Effects of Music Therapy in Persons with Dementia

Author & year	*N*	Research design	Dependent variables	Independent variables	Results
Brotons & Koger, 2000	26	Crossove r	Language functioning	MT: singing and discussion Control: conversation	Significantly improved speech content and fluency in MT
Bruer, Spitznagel, & Cloninger, 2007	28	Crossove r	Cognitive functioning	MT: singing, playing instruments Control: movie	Significant improvements in MMSE immediately after MT and the following morning
Carruth, 1997	7	Within subjects	Memory function	Individual singing Control: conversation	Improvement in naming ability in MT
Chu et al., 2014	104	RCT	Cognitive	MT: Singing, listening, movement, rhythm playing Control: Usual activities, such as watching TV, tea social, taking walks	Significant improvement of cognitive function even 1 month after MT Improved short-term recall function
Dassa & Amir, 2014	6	Qualitati ve	Language Conversation	MT: singing familiar songs	Spontaneous conversation
Prickett & Moore, 1991	10	Within subject	Cognitive functioning	Singing Reciting	Improved ability to recall words and lyrics
Ridder & Gummesen, 2015	1	Case study	Communication	Improvisation Singing Listening	Improved communication and engagement
Smith, 1986	12	Experim ental	Cognitive	Active music making Musically-cued reminiscence Verbally cues reminiscence	Improved cognitive function in active music making Both musically and verbally cued reminiscence improved language score

Note. N=number of participants; MT=music therapy intervention; RCT=randomized controlled trial.

Table 3.

(continued)

Author & year	*N*	Research design	Dependent variables	Independent variables	Results
Suzuki et al., 2004	23	Within subjects	Cognitive	Music: singing, playing instruments Control: recreational activities	Significant improvement in language No significant improvement : total score of MMSE

Note. N=number of participants; MT=music therapy intervention; RCT=randomized controlled trial.

Preserved Music Skills of Persons with Dementia

Another group of studies focused on the cognitive area of dementia have explored the preserved musical skills of persons with dementia. Most studies have adopted a case study approach and have explored preserved musical skills of people with music backgrounds, either amateur or professional before the onset of dementia. Although not entirely consistent, these studies have described that persons with dementia continue to play musical instruments skillfully and are able to recreate previously learned music fluently, despite severe cognitive limitations and deterioration due to the progress of dementia (Beatty, Rogers, & Rogers, 1999; Beatty, Zavadil, & Bailly, 1988; Beatty, Zavadil, Bailly, Winn, & Adams, 1994; Crystal, Grober, & Masur, 1989; Hsieh, Mioshi, Baker, Piguet, & Hodges, 2009) (See Table 4).

The results are interesting, considering that these persons' abilities to perform in other functional areas were extremely impaired and limited (Cuddy & Duffin, 2005). It is also interesting to note that none of the studies on this topic were conducted by music therapy professionals. It was suggested that musical skills are preserved in these individuals with musical backgrounds because these skills have been well-rehearsed and have become automatic motor movements (Crystal et al., 1989).

Regarding the processing of new musical information, conflicting results have been reported. Two reports (Beatty et al., 1988, 1999) have described attempts to teach a pianist with Alzheimer's disease in an advanced stage new songs. The pianists from both studies failed to learn new songs, even though they were still able to play familiar works. On the contrary, a moderately demented person with probable Alzheimer's disease successfully learned to play a new song on the violin that was published after the apparent onset of his dementia (Cowles et al., 2003).

Table 4.

Preserved Music Skills of Persons with Dementia

Author & year	*N*	Music Instrument	Research design	Results
Beatty et al., 1998	1	Guitar Piano	Case study	A preserved ability to play familiar songs competently Unable to acquire new songs
Beatty et al., 1994	1	Trombone	Case study	A preserved ability to play the trombone
Beatty et al., 1999	1	Guitar Piano	Case study	A preserved ability to play familiar songs competently
Cowles et al., 2003	1	Violin	Case study	Learned a new song
Cuddy & Duffin, 2004	1	Piano	Case study	Respond to familiar melody Recognize musical distortion
Crystal et al., 1989	1	Piano	Case study	A preserved ability to play previously learned piano compositions from memory
Hsieh et al., 2009	1	Piano	Case study	A preserved ability to play the piano consistently

Note. N=number of participants.

Social Outcomes

The deterioration of cognitive function and the increased manifestation of disturbed behavioral symptoms in persons with dementia inevitably make them withdraw and isolate themselves from others. The avoidance of social interaction is accompanied by feelings of loneliness, sadness and depression and may make persons with dementia isolate even further as the course of the disease progresses. Therefore, it is critical to meet their psychosocial needs throughout the course of their illness to ensure quality of life (Lesta & Petocz, 2006).

Music Therapy Studies Focusing on Social Outcomes

Music therapy studies in this area have focused on improving overall social behaviors (Clair & Bernstein, 1990; Clair & Ebberts, 1997; Lesta & Petocz, 2006; Olderog-Millard & Smith, 1989; Pollack & Namazi, 1992) and level of participation (Cevasco, 2010; Solé, Mercadal-Brotons, Galati, & De Castro, 2014), as well as on eliciting purposeful responses (Clair, 1996; Groene, 2001; Groene, Zapchenk, Marble, & Kantar, 1998; Hanson, Gfeller, Woodworth, Swanson, & Garand, 1996) (See Table 5).

In an attempt to improve social interaction, a variety of active music therapy interventions have been tested, such as singing (Cevasco, 2010; Clair, 2010; Clair & Bernstein, 1990; Clair & Ebberts, 1997; Lesta & Petcoz, 2010; Olderog-Millerd, 1989; Pollack & Namazi, 1992; Solé et al., 2014), playing instruments (Cevasco, 2010; Clair & Bernstein, 1990; Clair & Ebberts, 1997; Pollack & Namazi), and dancing or movement (Cevasco, 2010; Clair & Ebberts, 1997; Solé et al., 2014).

Clair and Bernstein (1990) observed the impact of music therapy on improving social behaviors, such as interacting and participating. As a result of 15-months of music therapy interventions, three male subjects continued to participate in structured music activities in spite of deterioration in their cognitive, physical, and social capacities over the course of the disease. Data in the later stage of the treatment indicated that participants were able to function with others in a group context, regardless of their level of deterioration.

Groene (2001) examined the influence of a therapist's different music accompaniment patterns on the subjects' levels of participation. The study compared the differences between live and recorded music, as well as simple and complex guitar accompaniment style on the engagement levels of individuals with dementia. Results showed that live music with complex rhythm maintained the attention of individuals who had dementia at much higher rates than live music with simple rhythms, or recorded music with complex or simple rhythms. Groene et al. (1998) compared sing-along music therapy sessions with exercise sessions to recorded music. The results indicated that levels of participation were higher for the exercise group with recorded music than the sing-along group with live music. Hanson et al. (1996) evaluated the frequency of purposeful behaviors based on interventions with a high demand versus those with a low demand for participants. This study found that both high and low functioning clients participated for longer durations during movement activities than during rhythm playing or singing activities. There were no significant differences concerning activities with a high or low demand. It is interesting to note that participants in both studies (Groene et al., 1998; Hanson et al., 1996), showed more purposeful responses during exercise than during singing. Given the different demands placed upon the tasks of moving to music during exercise versus singing words to songs, it may be easier cognitively to accomplish the former task. The demands during exercise to music sessions may involve both visual and auditory cues and naturally stimulate more responses.

Clair (1996) examined the frequency of alert responses during unaccompanied singing for individuals with dementia in late stage. The study focused on examining the frequency of alert responses during singing without instrument accompaniment, during newspaper reading, and during silence, and indicated that individuals who have late-stage dementia without discernible language can still present purposeful responses to auditory stimulation. Alert responses occurred most frequently when participants listened to unaccompanied singing, followed by reading. The fewest responses were recognized when participants were sitting silently without any intervention.

Table 5.

Social Effects of Music Therapy in Persons with Dementia

Author & year	*N*	Research Design	Dependent variables	Independent variables	Results
Cevasco, 2010	38	Within subject	Participation level	MT: Singing, playing instruments and movement	Therapist's non-verbal behaviors, affect and proximity combined, result in improved participation
Clair, 1996	26	Within subject	Alert response	Singing Reading Silence	Most alert responses in singing
Clair & Bernstein, 1990	3	Within subject	Social behavior	MT: Singing and instrument playing	Improved social behavior
Clair & Ebberts, 1997	30	Within subject	Social behavior	Singing Rhythm playing Dancing Conversation	More participation in music compared to conversation
Groene, 2001	8	Within subject	Responsive behaviors	MT: Singing with different accompaniment styles	More responsive behaviors in live and complex accompaniment
Groene et al., 1998	7	Within subject	Responsive behaviors	Singing Exercise	More purposeful responses during exercise
Hanson et al., 1996	51	Within subject	Level of participation	Singing Rhythm Movement	Higher responses during movement
Lesta & Petocz, 2010	4	Within subject	Social behavior	MT: Singing	Significant improvement in social behavior
Olderog-Millard & Smith, 1989	10	Within subject	Social behavior	MT: Group singing	Improved social behavior

Note. N=number of participants; MT=music therapy.

Table 5.

(continued)

Author & year	*N*	Research Design	Dependent variables	Independent variables	Results
Pollack & Namazi, 1992	8	Within subject	Social behavior	MT: Singing, instrument playing and dancing	Increased social behavior
Solé et al., 2014	16	Within subject	Participation	MT: Singing, listening, playing instruments, improvisation, and movement	Decreased interpersonal relations High participation

Note. N=number of participants; MT=music therapy.

Music Medicine Studies Focusing on Social Outcomes

There are not very many music medicine studies in this area. Ziv et al. (2007) examined the effect of background music on positive social behaviors of persons with dementia, utilizing stimulative, upbeat and familiar music as background, and found that positive social behaviors were significantly increased during music. Holmes, Knights, Dean, Hodkinson, and Hopkins (2006) adopted different types of music listening, and found that persons with dementia showed a significant and positive engagement to live-music listening, compared to pre-recorded music listening or silence (See Table 6).

Table 6.

Social Effects of Music Medicine in Persons with Dementia

Author & year	*N*	Research design	Dependent variables	Independent variables	Results
Holmes et al., 2006	32	Within subject	Engagement	Listening to live music Pre-recorded background music listening Silence	Significant engagement in live music listening
Ziv et al., 2007	28	Within subject	Positive social behavior	Stimulative, familiar background music	More positive social behaviors during music

Note. N=number of participants.

Emotional Outcomes

Based on the emphasis on a person-centered approach (Bryden, 2002; Cheston, 1998; Kitwood, 1997), it is important to understand the overall experience of persons with dementia and address not only their physical needs, but also psychological and emotional needs, as well (Bryden, 2002; Junaid & Hedge, 2007).

Music Therapy Studies Focusing on Emotional Outcomes

Music therapy studies in this area have focused on improving depressive symptoms (Ashida, 2000; Chu et al., 2014), affect or mood (Cevasco, 2010; Lesta & Petocz, 2010), and increasing the emotional well-being of persons with dementia (Solé et al., 2014) and their caregivers (Brotons & Marti, 2003) (See Table 7).

Ashida (2001) examined the effectiveness of a reminiscence-focused music therapy intervention on depressive symptoms in persons with dementia. As a result of a small group music therapy intervention using reminiscence through familiar song for five consecutive days, the participants showed significant decreases in depressive symptoms. Chu et al. (2014) also provided a bi-weekly group music therapy intervention for six weeks, utilizing singing, listening, instrument playing and movement, and found significant improvements in depression.

Cevasco (2010) examined the effects of a music therapist's nonverbal behavior, affect and proximity to the participant on the affect of persons with dementia. Four treatment conditions were implemented for each session, including affect and proximity combined, affect only, proximity only, and no affect or proximity. The participants demonstrated the most positive affect when the therapist utilized both affect and proximity.

Brotons and Marti (2003) explored the overall impact of a music therapy intervention with persons with dementia and their caregivers. The caregivers reported that they observed an improvement in the emotional state of persons with dementia after music therapy interventions. With regards to the benefits of music therapy on the family caregivers, all the participants agreed that the intervention was positive because it helped them to relax, adding that it offered them a pleasant and enjoyable space where they could share and express feelings.

Table 7.

Emotional Effects of Music Therapy in Persons with Dementia

Author & year	*N*	Research design	Dependent variables	Independent variables	Results
Ashida, 2000	20	Within subject	Depression	MT: singing, drumming, and reminiscence	Significant improvement in depression
Brotons & Marti, 2003	28	Within subject	Emotional well-being	MT: Singing, listening, relaxation, musical games, and song writing	Improvement in emotional well-being
Cevasco, 2010	38	Within subject	Affect	MT: Singing, playing instruments, and movement	More positive affect when therapist's non-verbal behaviors, affect and proximity combined
Chu et al., 2014	104	RCT	Depression	MT: Singing, listening to music, movement, rhythm playing Control: Usual activities, such as watching TV, taking walks	Significant short-term improvement of depression in MT
Lesta & Petocz, 2010	4	Within subject	Mood	MT: Singing group	Significant improvement in mood
Solé et al., 2014	16	Within subject	Emotional well-being	MT: Singing, listening, playing instruments, improvisation, and movement	Significant improvement in emotional well-being

Note. N=number of participants; MT=music therapy

Music Medicine Studies Focusing on Emotional Outcomes

Music medicine studies in this area have focused on improving depression (Cooke, Moyle, Shum, Harrison, & Murfield, 2010; Guétin et al., 2009) and mood (Lord & Garner, 1993; Särkämö et al., 2014) (See Table 8). It is interesting to note that Cooke et al. (2010) utilized a live group music program which was led by musicians, whereas most music medicine studies adopted a passive music listening to a pre-recorded CD (Guétin et al., 2009; Lord & Garner, 1993).

Särkämö et al. (2014) examined the long-term effectiveness of everyday musical leisure activities implemented by caregivers, instead of a therapist-led intervention, comparing two types of music programs, including singing and music listening groups. Eighty-nine people with mild to moderate dementia and their family or professional caregiver dyads were randomized to a weekly 90-minute singing coaching, music listening coaching, or usual care group for 10 weeks. The singing coaching group was led by a music teacher and consisted primarily of singing, as well as occasional vocal exercises and rhythmical movements, whereas the music listening group was led by a music therapist and consisted of listening to songs from CDs and discussing emotions, thoughts, and memories. The intervention also included regular musical exercises of either singing or listening at home. Both singing and music listening were found to improve the participants’ mood. In addition, the singing group had a specific benefit on the emotional well-being of the family members.

Table 8.

Emotional Effects of Music Medicine in Persons with Dementia

Author & year	*N*	Research design	Independent variables	Dependent variables	Results
Cooke et al., 2010	47	Crossover	Depression	Live group music program by musicians Control: reading	Decreased depression more noticeable in music
Guétin et al., 2009	30	RCT	Depression	Individualized music listening Control: reading	Significant improvement s in depression in music
Lord & Garner, 1993	60	RCT	Mood	Music listening Puzzle Painting	Improved mood in music
Särkämö et al., 2014	89	RCT	Mood	Singing coaching group: singing, vocal exercises, rhythmic, and movements Music listening coaching group: listening, reminiscence and discussion Control: Usual care	Improved mood in both singing and listening

Note. N=number of participants; RCT=randomized controlled trial.

Quality of Life Outcomes

Quality of life is a concept that is concerned with a person's emotional and physical well-being, interpersonal relations, personal development, self-determination, and social inclusion (Moyle, Mcallister, Venturato, & Adams, 2007), and has become increasingly recognized as a valuable outcome measure in persons with dementia (Crespo et al., 2013).

Even though improving the quality of life of persons with dementia has become increasingly important clinical priority, only a few music medicine and music therapy studies have examined the effects of music interventions on the quality of life of persons with dementia (Cooke et al., 2010; Raglio et al., 2013; Ridder, Wigram, & Ottesen, 2009; Särkämö et al., 2014; Solé et al., 2014). Various assessment tools were utilized in these studies in order to measure quality of life, including the Cornell-Brown Scale for Quality of Life (CBS) (Raglio et al., 2013), the Quality of Life in Alzheimer's Disease (QOL-AD) (Särkämö et al., 2013), GENCAT for Quality of Life (Solé et al., 2014), and the Alzheimer's Disease-Related Quality of Life (ADRQL) (Ridder et al., 2009). The quality of life of persons with dementia was assessed by professional caregivers (Solé et al., 2014), family caregivers (Särkämö et al., 2014), or a proxy (Ridder et al., 2009).

Music Therapy Studies Focusing on Quality of Life Outcomes

Music therapy studies focusing on improving quality of life in persons with dementia have adopted various measurement tools to assess this outcome, and results of these studies are not consistent (See Table 9). Raglio et al. (2013) compared an active music therapy, utilizing improvisation, with an individualized music listening, and found that music therapy improved quality of life, whereas music listening worsened it. However, the differences between music therapy and music listening were not statistically significant.

Ridder et al. (2009) engaged two individuals with frontotemporal dementia in individualized music therapy using therapeutic singing for a total of 16 sessions over a period of four consecutive weeks. The Alzheimer's Disease-Related Quality of Life (ADRQL) was carried out as an interview with a proxy. At the end of four-week interventions, one participant showed improved quality of life, whereas another's total score of quality of life was decreased, which was due to the fact that she did not pay attention to the presence of others and sometimes was noted to be dozing off. However, it was argued that the decrease in the quality of life score in this case should be interpreted positively, because she seemed more relaxed and calmer, thus meeting her needs for withdrawal and allowing her to relax and avoid over-stimulation.

Solé et al. (2014) found that there was no significant improvement in quality of life scores after 12 weekly group music therapy sessions comprising various music interventions. It was speculated that the measurement tool used in this study, the GENCAT scale on quality of life included dimensions that were not directly addressed in music therapy sessions such as material well-being, self-determination, social inclusion, rights and physical well-being, and may not have reflected the effects of music therapy appropriately.

Based on the findings from both studies (Ridder et al., 2009; Solé et al., 2014), it seems challenging to capture and assess the quality of life of persons with dementia, especially considering subtle nuances and variables in its measurement, and it is critical to find and apply the appropriate measurement tool that is dementia-specific, so that the effects of the intended intervention can be more accurately assessed.

Table 9.

Effects of Music Therapy on Quality of Life in Persons with Dementia

Author & year	*N*	Research Design	Dependent variables	Independent variables	Results
Raglio et al., 2013	17	Crossover	Quality of life	MT: individual improvisation Music listening	MT improved quality of life ML worsened quality of life
Ridder et al., 2009	2	Mixed method Case study	Quality of life	MT: individual singing	Mr. A: increased quality of life Mrs. B: decreased quality of life
Solé et al., 2014	16	Within subject	Quality of life	Group MT: singing, listening, playing instruments, improvisation and movement	No significant difference

Note. N=number of participants; MT=music therapy; ML=music listening

Music Medicine Studies Focusing on Quality of Life Outcomes

It is interesting to note that music medicines studies also adopted active music intervention, such as singing, to improve quality of life of persons with dementia (See Table 10). Cooke et al. (2010) found that a live group music program was less effective than a reading group in improving the quality of life. The participants in the music program were engaged in musician-led singing and listening to a pre-recorded CD. The music intervention was very structured and followed a set pattern to ensure treatment consistency. In contrast, the reading group, which was led by a trained research assistant, included a range of activities, such as quizzes and discussions about the past and may have stimulated greater involvement and interaction from the participants.

Särkämö et al. (2014) examined the effectiveness of everyday leisure music activities led by caregivers, including singing and music listening groups, instead of a therapist-led intervention, and found that music listening had a long-term positive effect on quality of life of persons with dementia. After participating in 10-week singing coaching or listening coaching groups, the caregivers were asked to engage the participants either in singing or listening during the 6-month follow-up period. The reason why only music listening was found to be beneficial in improving the quality of life of persons with dementia may be related to the fact that the caregivers may have provided music listening more frequently than singing because it was easier and less demanding for them to implement.

Table 10.

Effects of Music Medicine on Quality of Life of Persons with Dementia

Author & year	*N*	Research Design	Dependent variables	Independent variables	Results
Cooke et al., 2010	47	Crossover	Quality of life	Live music program: Musician-led singing and listening to pre-recorded instrumental music Control: reading group	Higher feeling of belonging in reading first group
Särkämö et al., 2014	89	RCT	Quality of life	Singing coaching group: singing, vocal exercises, rhythmic, and movement Music listening coaching group: listening, reminiscence and discussion Control: Usual care	Positive effect of listening on Quality of life

Note. N=number of participants; RCT=randomized controlled trial.

CHAPTER TWO

LITERATURE REVIEW

Singing and Dementia

As indicated in Chapter 1, both music therapy and music medicine studies in the existing literature have explored the effects of music interventions on various outcomes in persons with dementia, including behavioral, cognitive, social, emotional areas and quality of life.

The benefits of singing in general include both physical and psychological improvements, such as increased immune system function (Kreutz, Bongard, Rohrmann, Hodapp, & Grebe, 2004; Sakano et al., 2014), lowered blood pressure (Takahashi & Matsushita, 2006), reduced stress levels, and improved mood, self-esteem, concentration, and sense of belonging (Clift et al., 2010). In a study by Sakano et al. (2014), elderly participants experienced improved immunity and swallowing function, and also reported feeling refreshed, comfortable, pleasurable, light-hearted, relieved and relaxed, after singing only three songs consecutively, which lasted less than four minutes total.

With its capacity for social, emotional, cognitive, and physical engagement, singing presents a potential to be an accessible intervention for various therapeutic outcomes (Clark & Harding, 2012). Singing has been widely used for persons with dementia, because it can promote a sense of well-being and social interaction with a relatively low threshold for participation (Bannan & Montgomery-Smith, 2008; Chatterton, Baker, & Morgan, 2010; Davidson & Fedele, 2011).

In this chapter, the application of active singing for persons with dementia will be reviewed according to three categories, including singing in the context of community group singing, singing implemented by non-music therapy professional caregivers, and singing as a primary intervention in music therapy.

Group Community Singing for Persons with Dementia

It is interesting to note that there has been an active movement to promote community group singing for persons with dementia and their caregivers (Bannan & Montgomery-Smith, 2008; Camic, Williams, & Meeten, 2013; Davidson & Fedele, 2011; Harris & Caporella, 2014) (See Table 11). These projects, implemented by music educators or professional musicians, were designed for persons with dementia and their caregivers mainly in the community, with the hope of delaying institutionalization (Bannan & Montgomery-Smith, 2008; Harris & Caporella, 2014). These studies have focused mainly on improving social and emotional aspects of persons with dementia, and have adopted singing to engage them in a form of communication that may enhance social interaction (Bannan & Montgomery-Smith, 2008).

Singing has also been used effectively for encouraging intergenerational interaction between persons with dementia and college students (Harris & Caporella, 2014). In this study, persons with dementia and their family members participated in group choral singing with college students for eight sessions. As a result, positive outcomes in both groups were reported. Whereas persons with dementia showed a decrease in social isolation, college students also reported a decrease in negative attitudes toward persons with dementia and an increase in positive attitudes, including better understanding of the capabilities of persons with dementia.

It is encouraging to witness such movements to engage persons with dementia in social contexts. In an effort to maximize interaction, these studies have also paid attention to details, such as setting the group up more informally by facing each other and selecting repertoire to reflect the interests of persons with dementia (Harris & Caporella, 2014). Furthermore, in a study by Bannan and Montgomery-Smith (2008), the identity of participants, either persons with dementia or their professional caregivers, was not revealed to the music facilitator intentionally to avoid any biases.

When qualitative data or study-specific measures were analyzed, the results of these community group singing interventions were invariably positive for those with dementia, including the capability of participating and learning new material (Bannan & Montgomery-Smith, 2008), as well as improved lucidity, social interaction, enjoyment and memory (Davidson & Fedele, 2011). In addition, their caregivers experienced decreased feelings of social isolation (Harris & Caporella, 2014) and improved relationship and communication with persons with dementia (Bannan & Montgomery-Smith, 2008). However, when standard outcome measures were utilized, few effects of group singing were revealed (Camic et al., 2013; Davidson & Fedele, 2011)

One of the distinct characteristics of these studies is the inclusion of persons with dementia, as well as their caregivers, either family or professional, in group singing interventions. Considering the psychological and physical burdens of caring for persons with dementia, it is encouraging to note that recent research studies pay attention to the needs of family and professional caregivers.

Table 11.

Effects of Community Group Singing in Persons with Dementia

Author & year	*N*	Dependent variables	Independent variables	Results
Bannan & Montgomery-Smith, 2008	22	Questionnaire Video/audio recording analysis	Group singing "Singing for the Brain"	Persons with Alzheimer's are able to participate in group singing and learn an unknown song Singing become more confident and louder
Camic et al., 2013	20	Mood Quality of Life BPSD Daily activities Cognitive status	Group singing "Singing Together Group"	Quality of Life remained stable despite slow deterioration on all other measures
Davidson & Fedele, 2011	48	Quality of life Qualitative analysis	Group singing	Little effect on quality of life Improved lucidity, social interaction, enjoyment and memory
Harris & Caporella, 2014	26	Qualitative analysis	Intergenerational choir	A decrease in social isolation A decrease in negative attitude

Note. N=number of participants; BPSD=behavioral and psychological symptoms of dementia.

Singing Implemented by Professional Caregivers

As reviewed in the previous chapter, music has been used not only by music therapists, but also by other professional caregivers for persons with dementia in healthcare settings. Most music medicine studies by professional caregivers have adopted passive forms of music intervention, such as listening. However, a small number of studies, mainly by Swedish researchers, have reported that professional caregivers without music training have also adopted active singing during daily care routines to improve the quality of life of persons with dementia (Brown, Götell, & Ekman, 2001; Götell, Brown, & Ekman, 2009; Götell, Thunborg, Söderlund, & Wågert, 2012; Hammar, Emami, Engström, & Götell, 2010; Hammar et al., 2011) (See Table 12).

When professional caregivers with no formal music training sing to persons with dementia individually during daily care routines, the usual reactions of aggression, combativeness, and confusion may be replaced by a sense of understanding and enhanced communication. Furthermore, singing by professional caregivers during direct care can alleviate distress not only in care receivers, but also in caregivers, who report considerable improvement in their perceptions of the situations (Chatterton et al., 2010).

Singing has been applied by professional caregivers during morning care routines (Brown et al., 2001; Götell et al., 2009; Hammar et al., 2010, 2011) or when transferring persons with dementia from one location to another, such as from a bed to a chair, or from a chair to a toilet (Götell et al., 2012). The effectiveness of so-called music therapeutic caregiving (MTC) included decreased agitation (Brown et al., 2001), reduced resistance (Hammar et al., 2011), improved mutual communication (Götell et al., 2009, 2012; Hammar et al., 2010), enhanced emotion and mood (Götell et al., 2009, 2012; Hammar et al., 2011), and more fluid movement (Götell et al., 2012).

Table 12.

Effects of Singing Implemented by Professional Caregivers in Persons with Dementia

Author & year	*N*	Research design	Dependent variables	Independent variables	Result
Brown et al., 2001	1	Case study	Agitation	Singing during morning care Usual care: no music	Less agitation during singing
Götell et al., 2009	14	Qualitative analysis	Emotion Mood	Caregiver singing during morning care Background music No music during morning care	Both singing and background music improved mutual communication Positive emotions enhanced Reduction in aggressiveness Enhanced sincerity Increased sense of playfulness in background music
Götell et al., 2012	17	Group interview	Caregivers' experiences	Caregiver singing during transfer	Enhanced mutual communication Residents move more fluidly Caregivers feel more competent and motivated More positive emotions and mood
Hammar et al., 2010	6	Group interview	Caregivers' experiences	Caregiver singing during morning care	Enhanced communication and cooperation during singing
Hammar et al., 2011	20	Within subject	Emotion Resistance to care	Singing during morning care	Significantly reduced resistant behavior during singing Increased positive emotions, pleasure and alertness during singing

Note. N=number of participants.

Singing as a Primary Intervention in Music Therapy

Among a variety of music activities, it is “singing” that has been employed most frequently in music therapy studies in dementia care. In most cases, singing was combined with other music interventions, such as listening, playing instruments, rhythm activities, improvisation, or movement (Ashida, 2000; Brotons & Koger, 2000; Brotons & Marti, 2003; Brotons & Pickett-Cooper, 1996; Bruer et al., 2007; Cevasco, 2010; Choi et al., 2009; Clair & Bernstein, 1990; Clair & Ebberts, 1997; Groene, 1993; Hanson et al., 1996; Ledger & Baker, 2007; Pollack & Namazi, 1992; Suzuki et al., 2004; Svansdottir & Snaedal, 2006; Takahashi & Matsushita, 2006).

However, it is noteworthy that several music therapy studies have used “singing” as a primary intervention for persons with dementia (Brotons & Koger, 2000; Carruth, 1997; Clair, 1996; Dassa & Amir, 2014; Fitzgerald-Cloutier, 1993; Groene, 2001; Groene et al., 1998; Lesta & Petocz, 2010; Olderog-Millard & Smith, 1989; Prickett & Moore, 1991; Ridder & Aldridge, 2005; Ridder et al., 2009) (See Table 13).

The outcomes of music therapy studies utilizing singing as a primary intervention include improving language functioning (Brotons & Koger, 2000) and memory functioning (Carruth, 1997; Prickett & Moore, 1991), enhancing communication (Dassa & Amir, 2014; Olderog-Millard & Smith, 1989), eliciting more responsive behaviors (Clair, 1996; Groene, 2001; Groene et al., 1998), decreasing wandering (Fitzgerald-Cloutier, 1993; Ridder & Aldridge, 2005), improving mood (Lesta & Petocz, 2010; Olderog-Millard & Smith, 1989), increasing social behavior (Lesta & Petocz, 2010; Olderog-Millard & Smith, 1989), and improving quality of life (Ridder et al., 2009).

These studies compared the effects of singing in persons with dementia with various conditions, such as conversation/discussion (Brotons & Koger, 2000; Carruth, 1997; Olderog-Millard & Smith), reading (Clair, 1996; Fitzgerald-Cloutier, 1993), or exercise (Groene et al., 1998).

A majority of these studies have reported positive effects of singing in target areas (Brotons & Koger, 2000; Carruth, 1997; Clair, 1996; Dassa & Amir, 2014; Fitzgerald-Cloutier, 1993; Lesta & Petocz, 2010; Olderog-Millard & Smith, 1989; Prickett & Moore, 1991; Ridder & Aldridge, 2005; Ridder et al., 2009), except one study (Groene et al., 1998). Groene et al. (1998) found more purposeful responses during exercise compared to singing. The demands during exercise to music sessions may involve both visual and auditory cues, naturally stimulating more responses than during singing.

Singing is facilitated either in a group format (Brotons & Koger, 2000; Dassa & Amir, 2014; Groene, 2001; Groene et al., 1998; Lesta & Petocz, 2010; Olderog-Millard & Smith, 1989) or as an individual intervention (Carruth, 1997; Clair, 1996; Fitzgerald-Cloutier, 1993; Prickett & Moore, 1991; Ridder & Aldridge, 2005; Ridder et al., 2009).

It is also interesting to note that singing has been accompanied by guitar in most cases (Brotons & Koger, 2000; Carruth, 1997; Dassa & Amir, 2014; Fitzgerald-Cloutier, 1993; Groene, 2001; Groene et al., 1998; Olderog-Millard & Smith, 1989), whereas a couple of studies used singing without any instrumental accompaniment (Clair, 1996; Fitzgerald-Cloutier, 1993). Regarding accompaniment style, Groene (2001) compared the therapist's accompaniment patterns on a guitar and found that persons with dementia maintained attention and responded most when singing was accompanied with guitar in a complex style.

Table 13.

Effects of Singing as a Primary Intervention in Music Therapy in Persons with Dementia

Author & year	*N*	Research design	Dependent variables	Independent variables	Singing format	Result
Brotons & Koger, 2000	26	Crossover	Language functioning	Singing Conversation	Group	Significantly improved speech content and fluency in singing
Carruth, 1997	7	Within subject	Memory function	Singing Conversation	Individual	Improvement in face-name recognition in singing
Clair, 1996	26	Within subject	Purposeful responses	Singing Reading Silence	Individual	Most alert responses during singing
Dassa & Amir, 2014	6	Qualitative	Language Conversation	Singing	Group	Spontaneous conversation
Fitzgerald-Cloutier, 1993	1	Case study	Wandering	Singing Reading	Individual	Less wandering during singing
Groene, 2001	8	Within subject	Responsive behavior	Singing with different accompaniment styles	Group	More responsive behaviors in live and complex accompaniment
Groene et al., 1998	7	Within subject	Responsive behaviors	Singing Exercise	Group	More purposeful responses during exercise
Lesta & Petocz, 2010	4	Within subject	Mood Social behavior	Singing	Group	Significant improvement in mood and social behavior

Note. N=number of participants. BPSD=behavioral and psychological symptoms of dementia.

Table 13.

(continued)

Author & year	*N*	Research design	Dependent variables	Independent variables	Singing format	Result
Olderog-Millard & Smith, 1989	10	Within subject	Social behavior	Singing Discussion	Group	Improved social behavior during singing
Prickett & Moore, 1991	10	Within subject	Cognitive functioning	Singing Reciting	Individual	Improved ability to recall words and lyrics
Ridder & Aldridge, 2005	1	Case study	Agitation Wandering	Singing	Individual	Decrease agitation, wandering Significantly lower heart rate A reduction in antipsychotic medication
Ridder et al., 2009	2	Mixed method Case study	Quality of life Agitation BPSD	Singing	Individual	Inconsistent result on quality of life Decreased agitation and BPSD

Note. N=number of participants. BPSD=behavioral and psychological symptoms of dementia.

Implication for the Current Study

Considering the increasing number of persons with dementia and the demands for cost-effective interventions to meet the complicated needs of persons with dementia, it is critical to investigate and implement the most effective interventions, as evidenced by vigorous research, in clinical settings. It is encouraging to observe that there have been efforts to improve the quality of life of persons with dementia not only in an institutional setting but also in the community. However, it may become inevitable for persons with dementia and their caregivers to seek professional care as the condition progresses.

Therefore, the responsibility of healthcare professionals in long-term care facilities in enhancing quality of life for persons with dementia becomes more important.

Non-pharmacological interventions that reduce behavioral symptoms, maximize the individual's remaining functions, and improve quality of life are potentially cost-effective and safe alternatives to pharmacological interventions (Curtin, 2010). However, compared to pharmacological intervention, non-pharmacological treatments have received far less attention, partly due to a lack of reliable research (Svansdottir & Snaedal, 2006).

As a non-pharmacological intervention, music therapy has gained increasing attention, helping persons with dementia at all levels to address not only their behavioral problems, but also their psychosocial needs (Bruer et al., 2007; Palmiero et al., 2012; Raglio et al., 2008). Singing has been utilized most frequently in music therapy studies for persons with dementia, mainly combined with a variety of techniques, such as music listening, instrument playing or improvisation, although fewer studies have investigated the effects of "singing" as a sole intervention (Brotons & Koger, 2000; Carruth, 1997; Clair, 1996; Dassa & Amir, 2014; Fitzgerald-Cloutier, 1993; Groene, 2001; Groene et al., 1998; Lesta & Petocz, 2010; Olderog-Millard & Smith, 1989; Prickett & Moore, 1991; Ridder & Aldridge, 2005; Ridder et al., 2009).

Especially at long-term care settings, music interventions have been used not only by music therapists but also by healthcare professionals to improve various aspects of persons with dementia. Among a variety of music interventions, singing and music listening have been utilized most frequently by both music therapists and professional caregivers in dementia care. However, in most music therapy or music medicine studies, the effects of music interventions have been compared with those of other non-music interventions, such as reading, exercise, usual care, and so on, and there haven't been many research studies that have compared the effects of different types of music interventions (Wan, Rüber, Hohmann, & Schlaug, 2014).

Because singing and music listening have been most frequently used by music therapists and other healthcare professionals in dementia care, it is critical to investigate and compare the effects of active singing to listening on the same outcomes. The results of such a study would be of great value to music programming in long-term care facilities.

Among a variety of dependent variables, the management of disruptive behaviors of persons with dementia has drawn most attention in the existing literature. In contrast, quality of life and emotional well-being of persons with dementia have been relatively under-researched and need to be explored further.

The framework of the current music therapy-singing program was influenced by a person-centered philosophy that was rooted in humanistic psychology. The person-centered framework focuses on the individual needs of a person rather than the convenience of the care provider, and honors the individual's choices (Love & Pinkowitz, 2013). In order to honor participants' choices, their musical preferences may be assessed and reflected in developing a music program, emphasizing the importance of a participant's preference and familiarity with the music. Familiar music can stimulate spontaneous singing responses and be perceived as less demanding when compared to unfamiliar music. The use of preferred and familiar music with personal meanings can be more motivating and enjoyable for persons with dementia.

The person-centered approach also focuses on promoting holistic well-being, including not only physical health, but also psychosocial health of persons with dementia. Psychosocial health of persons with dementia may be enhanced in music therapy interventions when it focuses on facilitating mutual interaction among participants, music, and a therapist. Through an interactive group process and collaboration, persons with dementia may experience an improved sense of belonging, which is particularly important for persons with dementia because they may experience isolation and social withdrawal due to cognitive decline and disruptive behaviors.

Providing a strong structure within the music therapy-singing group is also a very important factor in designing the singing program. Persons with dementia may experience a sense of loss and anxiety due to cognitive decline and changes throughout the course of the disease. Therefore, it is important to create an environment where they may feel secure and comfortable so that their strengths can be identified and maximized. Maintaining a consistent format for each session with the same welcoming and closing songs, designing a sequence of songs with a gradual flow involving the increase and release of tension, and providing a strong musical accompaniment by the therapist can provide persons with dementia a sense of safety, as well as a sense of mastery. A sense of self-worth of persons with dementia can be also enhanced in a music therapy-singing group when an individual's strength is validated and developed systematically through an interactive music process.

Purpose of study

The purpose of the current study was to examine the effect of active group singing on the quality of life and affect of people with mild, moderate, and severe dementia living at a long-term care facility, and to compare the effect of singing with that of music listening and control.

The specific research questions to be examined include:

Research Questions

1. Are there effects of a music therapy-singing group, a music medicine-listening group or a control-TV group on quality of life of persons with dementia?
    a. Are there effects of a music therapy-singing group on quality of life of persons with dementia?
    b. Are there effects of a music medicine-listening group on quality of life of persons with dementia?
    c. Are there effects of a control-TV group on quality of life of persons with dementia?
    d. Are there differences in the effects of a music therapy-singing group versus a music medicine-listening versus a control-TV group on the quality of life of persons with dementia?
    e. Are there any differences persons with dementia in various mental statuses on quality of life?
2. Are there effects of a music therapy-singing group, a music medicine-listening group or a control-TV group on affect of persons with dementia?

a. Are there effects of a music therapy-singing group on affect of individuals with dementia?

b. Are there effects of a music medicine-listening group on affect of persons with dementia?

c. Are there effects of a control-TV group on affect of persons with dementia?

d. Are there differences in the effects of a music therapy-singing group versus a music medicine-listening group versus a control-TV group on affect of persons with dementia?

e. Are there any differences between persons with dementia in various mental status on affect?

CHAPTER 3

METHOD

Participants

The participants were recruited from a Veterans' Home in upstate New York, which is a long-term care skilled nursing facility with a total of 242 beds. The residents of the Veteran's Home who met specified criteria were invited to the current study. The inclusion criteria included residents with dementia, who were an age of 65 years or above, had no significant hearing impairment, and were able to sit in a chair or wheelchair for at least one hour. Residents with severe psychiatric conditions, as well as receptive or expressive language problems, were excluded. A software calculator G*Power was used to estimate sample size (Faul, Erdfelder, Lang, & Buchner, 2007) with an alpha of .05, power of 0.80, and an effect size of 0.5. The required number of valid samples was at least 42, with an oversampling to compensate for attrition.

Research Design

The study was a randomized controlled trial with a pre-post test design with three groups, including two music interventions and a control group. Using a randomization number table, persons with dementia were randomly assigned to one of the three groups, including a music therapy-singing group (MT), a music medicine-listening group (MM), or a control group (TV).

Procedure

IRB Approval

The protocol of the present study was reviewed and approved by Temple University's Institutional Review Board (IRB) for the Protection of Human Subjects. Due to the absence of IRB at the facility where the research was to be conducted, the facility agreed to rely on Temple University's IRB for review and continuing oversight of the current research study.

Recruitment

After obtaining IRB approval, residents' charts were reviewed by the researcher and a nursing home activity assistant (NHAA1) to identify potential participants based on the inclusion and exclusion criteria of the study. Once potential participants were identified, an invitation to the study was sent out by other nursing home activity assistants to the potential participants or to family members of the participants who were not able to make decisions themselves with an explanation of the study, including the purpose, procedures, risks, benefits, confidentiality, and subjects' rights. A consent statement was also included in the invitation to the study (See Appendix A).

Random Assignment and Allocation Concealment

After acquiring consent forms, the participants were divided into three groups representing the participants' level of dementia, based on the Brief Interview for Mental Status (BIMS) score as a reference, including mild (BIMS score 13-15), moderate (BIMS score 8-12) and severe (BIMS score 0-7). A list of participants belonging to each category was created by the nursing home activity assistant (NHAA1) who also was responsible for identifying potential participants via a chart review at the beginning of the study. For the random assignment, the list of participants was given to another nursing home activity assistant (NHAA2) with specially assigned numbers in place of the participants' names. The participants' names were not revealed to the nursing home activity assistant (NHAA2) who was responsible for the random assignment until the randomization process was completed in order to ensure allocation concealment.

The participants belonging to each category of level of dementia based on the BIMS score were randomly assigned to one of three conditions, including a music therapy-singing group (MT), a music medicine-listening group (MM), and a control group (TV), by a nursing home activity assistant (NHAA2), using a random number table from a statistical text book (Ott & Longnecker, 2001) (See Figure1).

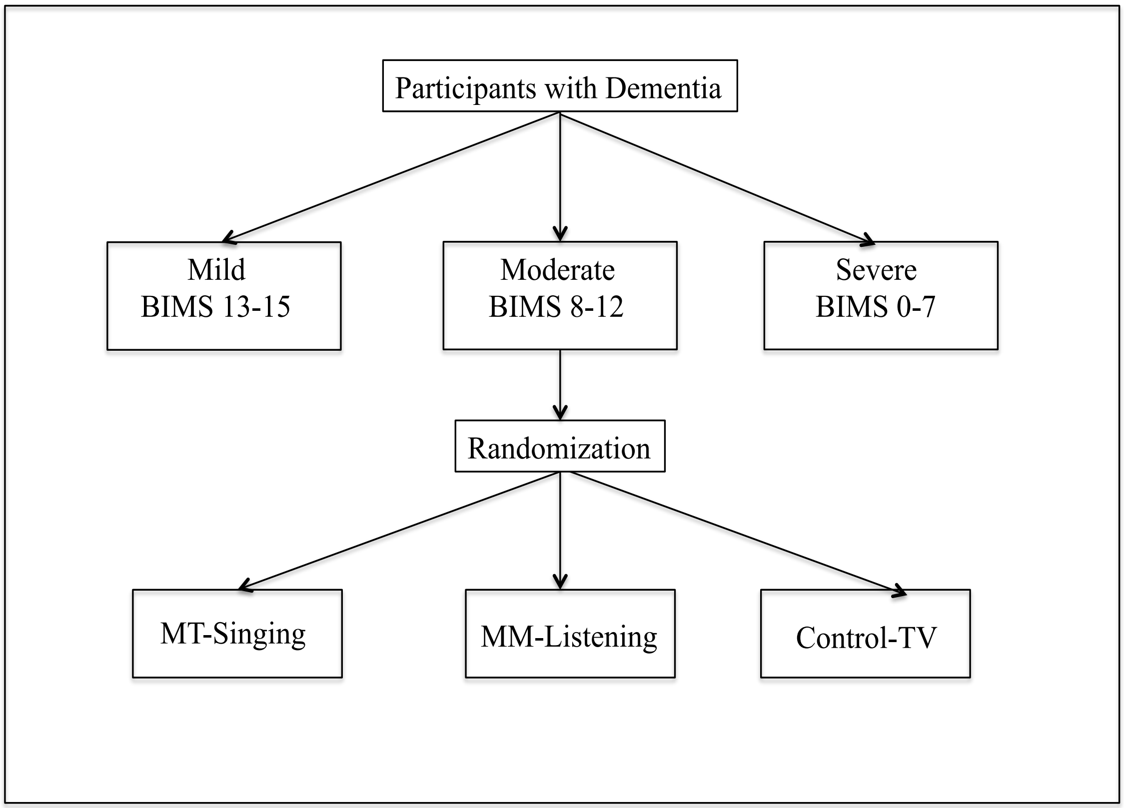

Figure 1. Random assignment of participants. Once potential participants' consents were obtained, they were divided into three sub-groups based on their level of dementia following BIMS (Brief Interview for Mental Status) scores. Then, participants in each group were randomly assigned to three intervention groups, including music therapy (MT)-singing, music medicine (MM)-listening, and control-TV group, utilizing a random number table.

Blinding Outcome Assessors

Several factors of the present study made it impossible to blind nursing home activity assistants who were involved in assessing the outcomes. First, the schedule of interventions for the present study was incorporated into the facility's daily activity schedule, which was displayed publically throughout the facility every morning. Second, because the outcome assessment interview took place before and after specific sessions, participants' intervention assignments became obvious and a complete blinding for the participant's group assignment to the assessors was not guaranteed.

Intervention

Delivery Schedule

Once the number of participants for each group was identified, an intervention delivery schedule was developed (See Table 14). Due to the large number of participants assigned to each group, the three intervention groups, including a music therapy-singing group (MT), a music medicine-listening group (MM), and a control group (TV), were divided into two sub-groups, one held in the morning and another held in the afternoon. These group sessions were incorporated into the facility's daily and weekly activity schedule. The participants in each group were engaged for a 40-minute session twice a week for four consecutive weeks.

The duration of music therapy interventions for persons with dementia found in the existing literature varied from 20 to 60 minutes. Furthermore, based on the music therapist's experiences, 40 minutes seemed to be reasonable and effective in maintaining the attention of persons with dementia and facilitating a therapeutic process. Therefore, each session was designed for 40 minutes in the current study.

The treatment period of music therapy interventions in the existing literature also varied greatly from four days to two years. Considering the vulnerable characteristic of participants, a short-term intervention was chosen for the current study. Due to the advanced age of participants, physical and mental changes were expected during the course of the study, as well. A shorter intervention period was chosen also to minimize the influence of possible changes in the mental and physical status of the participants.

Regarding the frequency of the intervention, the researcher initially considered providing it twice or three times a week. However, considering the challenges of providing each intervention group four times a week with two sub-groups for each intervention, as well as the complications involved in transporting participants to the assigned locations for each intervention, and in collecting data for two outcome measures several times throughout the study, the frequency of twice a week was chosen.

Table 14.

Intervention Delivery Schedule

Intervention	Monday	Tuesday	Wednesday	Thursday
MT-singing Group 1	3:00pm		3:00pm	
MT-singing Group 2		10:30am		10:30am
MM-listening Group 1	10:30am		10:30am	
MM-listening Group 2		3:00pm		3:00pm
Control-TV group 1	9:00am		9:00am	
Control-TV group 2		1:30pm		1:30pm

Note. MT=music therapy. MM=music medicine.

Music Therapy-Singing Group (MT)

A total of eight music therapy-singing programs were created and implemented by the researcher of the present study, who is a board-certified music therapist with fifteen years of experience in dementia care. She was not involved in recruitment, randomization of participants or data collection. Based on the person-centered approach used in this study, eight lists of songs for the music therapy-singing group were developed by the researcher, reflecting participants' preferences (See Appendix B). Participants were asked for their preferred music genres, songs and musicians, through open-end questionnaires, when they signed the consent forms to participate in the study.

Music Medicine-Music Listening Group (MM)

The music listening group was facilitated by nursing home activity assistants and the participants of this group were engaged in listening to a CD which contained the identical songs in the same order that were used for the music therapy-singing group. The researcher created eight CDs using pre-recorded songs from iTunes. The list of songs by particular artists is included in Appendix C. The nursing home activity assistants who were assigned to lead the music listening group were instructed to lead the group in the same manner as other activities and to validate and process the participants' responses, if any.

Control-TV Group

A control-TV group was facilitated by nursing home activity assistants and the participants in this group watched a DVD featuring an episode of the comedy program, "I

Love Lucy" for a similar duration as the singing and listening groups. Any spontaneous responses from the participants were validated.

Outcome Measures

Brief Interview for Mental Status (BIMS)

The Brief Interview for Mental Status (BIMS) score was used in the present study in order to classify the cognitive status of participants. The total BIMS score is highly correlated with Mini-Mental State Exam (Folstein, Folstein, & McHugh, 1975), providing a reliable estimate of a participant's cognitive function and mental capacity. The total score between 13 and 15 suggest cognitively intact, whereas the score between 8 and 12 suggest moderately impaired and 0 and 7 suggest severe impairment respectively.

It was not necessary to administer this test again specifically for the current study, because the facility routinely administered this instrument every six months unless significant changes were detected, and the results are available in every resident's chart. BIMS scores were taken from participants' charts by a nursing home activity assistant (NHAA1).

In order to assess the effects of each of the three interventions, two standardized measurement tools were utilized; "the Quality of Life-Alzheimer's Disease" (Edelman, Fulton, Kuhn, & Chang, 2005; Logsdon, Gibbons, McCurry, & Teri, 2002) and "the Positive and Negative Affect Schedule" (Watson, Clark, & Tellegen, 1988). Nursing home activity assistants who were not involved with providing the treatment interventions interviewed participants according to the specified instructions of these measures.

The Quality of Life-Alzheimer's Disease (QOL-AD)

This measurement instrument assesses the quality of life in older adults with cognitive impairment. The original measure had 13 items (Logsdon et al., 2002), but was modified for use in long-term care facility to include 15 items (Edelman et al., 2005). The 15-item questionnaire evaluates one's physical condition, mood, interpersonal relationships, and ability to participate in meaningful activities. Each item is rated on a 4-point scale ranging from '1=poor' to '4=excellent,' resulting in a single mean score ranging from 15-60, with higher score indicating greater QOL (See Appendix D). Utilizing this assessment tool, quality of life was evaluated twice, once before the first intervention session and once after the last intervention session (See Figure 2). This instrument has two versions, one designed directly for persons with dementia, and the other for caregivers. Reports from individuals with dementia and caregivers can be evaluated separately and/or combined into a single score if desired. However, for the current study, quality of life was assessed directly from persons with dementia.

The Positive and Negative Affect Schedule (Watson et al., 1988).

This 10-item scale measures the two primary dimensions of mood, both negative and positive affects (See Appendix E). With activity assistants' interview, participants of each group were asked to complete the PANAS Questionnaire immediately before and after the first, fourth and eighth session (See Figure 2).

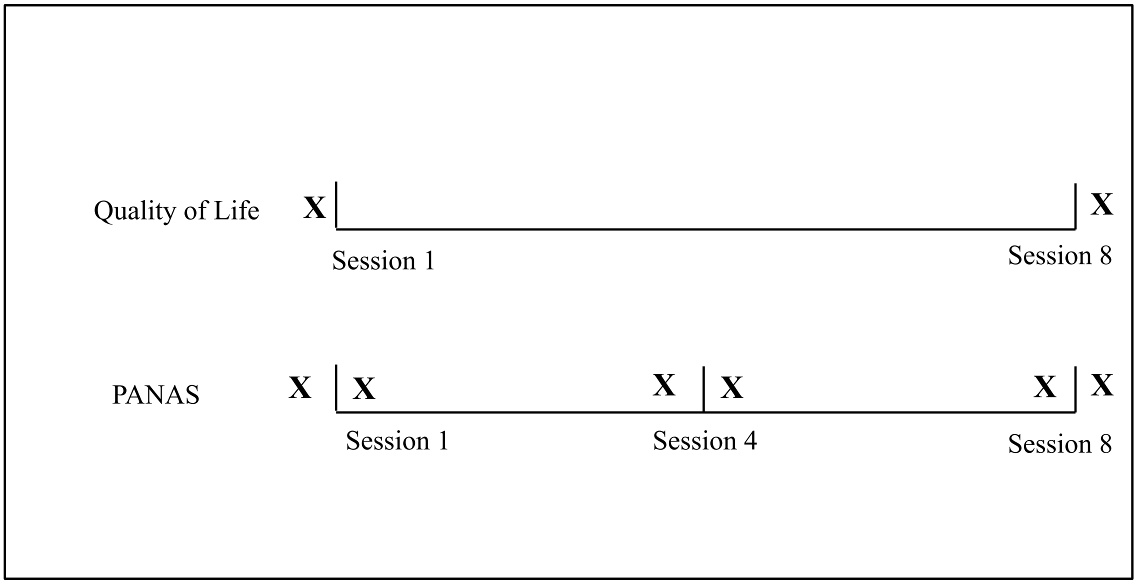

Figure 2. Outcome measurement schedule. Two dependent variables, quality of life and affect, were assessed via an interview at different points of the study. Quality of life was measured before the first session and after the last session, whereas positive and negative affects were measured before and after the first, fourth and last sessions.

Training

The present study was conducted by a primary researcher and assisted by the facility's twelve nursing home activity assistants throughout the research process. The researcher provided a training session for the nursing home activity assistants (NHAA), who were informed regarding the protocol and their role for the current research study, including recruiting participants, obtaining informed consents, transporting participants to assigned intervention sessions, providing interventions for a music medicine-listening group and a control-TV group, and collecting data. They also received special instruction regarding both outcome measurement tools, the Quality of Life-Alzheimer's Disease (Edelman et al., 2005) and the Positive and Negative Affect Schedule (Watson et al., 1988). These activity assistants' experiences in dementia care ranged from ten to twentynine years, and their routine responsibilities at the facility included providing a variety of activities, as well as conducting a periodic assessment, evaluation, and documentation. Therefore, their role specifically assigned for the current study was not different from their existing routine assignment. Out of twelve nursing home activity assistants, one was assigned for identifying potential participants and assessing their BIMS (Brief Interview for Mental Status) score, whereas another was assigned for the randomization process. For these two activity assistants, an additional training session was provided by the researcher.

Data Analysis

The Statistical Package for the Social Sciences (SPSS) version 22.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. Prior to analysis, basic frequencies were run on the data to screen for missing values and outliers and to establish data entry accuracy. Data were analyzed using a repeated-measures analysis of variance (ANOVA) to determine specific effects of the intervention, including a singing versus a listening versus a control group.

CHAPTER 4

RESULTS

Data Analysis

Demographic Data

Eligible participants were recruited from a local long-term care facility in September 2015. At the time of recruitment, a total of 232 residents lived at the facility. Eighty-nine participants, who met the criteria of the study, were invited to the study. Of the eighty-nine eligible participants, fifty-two (58 %) agreed to participate and thirty-seven (42%) refused. Fifty-two participants were randomly assigned to one of three groups, including singing group, listening group and TV group. Of the eighteen participants who were randomly assigned to the singing group, fifteen (83.3%) completed the intervention and data from fourteen participants only were included for analysis due to missing data for both quality of life and affect. Seventeen participants were assigned to the music listening group and fourteen (82.4%) completed the intervention and were analyzed for both quality of life and affect. Of the seventeen participants who were assigned to the TV group, only eight (47.1%) completed the intervention. For the quality of life measurement, only seven of eight who completed TV intervention were analyzed due to missing data. For PANAS (positive and negative affect scale), data from all of eight participants in the TV group were analyzed. Details of recruitment, allocation and participation for each group are included in Figure 3.

<u>Flow of Participants</u>

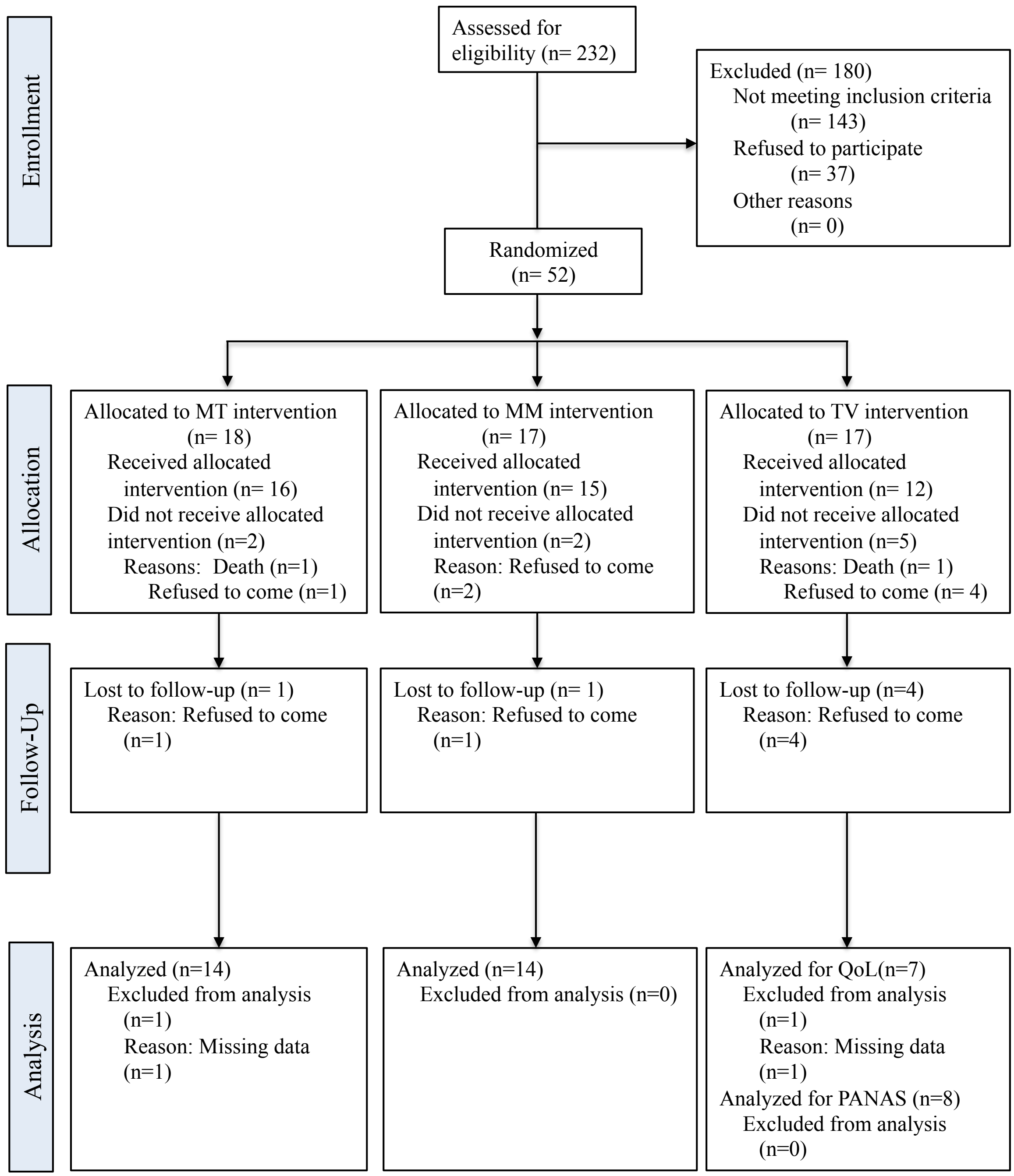

Figure 3. Participant recruitment and allocation. Format adapted from Moher, Schulz, & Altman (2001).

Data were collected for four consecutive weeks in October 2015. All of the three groups included both male (n=43) and female (n=9) participants in three different cognitive statuses. All participants were Caucasians. The participants in the singing group were between the ages 67 to 99 years with a mean age of 85.06, while those in the music listening group ranged from 75 to 98 years with a mean age of 87.94. The TV group included participants aged from 74 to 97 with a mean age of 87.00. See Table 15 for detailed baseline demographic and clinical characteristics of participants in each group.

Table 15.

Baseline Demographic and Clinical Characteristics

Variable	Total *N* of participants	MT-singing group	MM-listening group	TV group
Gender				
Male	43	15	14	14
Female	9	3	3	3
Total	52	18	17	17
Age:				
Mean		85.06	87.94	87.00
Standard Deviation		8.71	5.91	5.97
BIMS:				
Mean	1.90	10.22	10.24	9.88
Standard Deviation	.82	4.36	3.99	3.55
N	52	18	17	17
Mental Status:				
1 (BIMS 13-15)	20	7	7	6
2 (BIMS 8-12)	17	6	5	6
3 (BIMS 0-7)	15	5	5	5

Note. N=number of participants. BPSD=behavioral and psychological symptoms of dementia.

To determine if there were any differences regarding gender among groups, chi-square analysis was conducted and the results showed that there was no difference among groups regarding gender, Chi Square = .008, p = .999. A one-way ANOVA was also conducted and there was no difference on age, F (2, 49) = .772, p = .468, or on cognitive status, F (2, 49) = .043, p = .958.

Music Preferences

A summary of participants' preferred type of music is displayed in Table 16. Old Country Western was the most preferred type of music identified by the participants, followed by big band, classical and rock & roll. A list of their favorite songs and musicians is also displayed in Table 17 and 18 respectively.

Table 16.

Music Genre Preferences of Participants

Genre	Total
Old country	25
Big band	10
Classical	6
Rock & roll	5
Patriotic	4
Jazz	3
Musical	3
Polka	3
Pop	2
Hymn	2
Dixie land	2
Folk	1
Rag	1

Table 17.

A List of Favorite Songs Reported by Participants

Favorite songs of participants		
Allegheny moon	Half as much	Rhapsody in blue
Alley cat	Happy trails	Red river valley
America the beautiful	Hey good looking	Ring of fire
Anchors away	Home on the range	Rose of Texas
Anything you can do	How great thou art	Sentimental Journey
Are you lonesome tonight	I can’t give you anything but love	Seventy six trombones
At last	I could have danced all night	Shine on harvest moon
Autumn leaves	I left my heart in San Francisco	Shoo fly pie and apple pan dowdy
Battle hymn of the republic	I walk the line	Side by side
Beer barrel polka	If I had a hammer	Sioux city Sue
Bell bottom trousers	In the cool, cool, cool of the evening	Sixteen tons
Blue moon	I’ll be in Scotland before you	Sophisticated lady
Blue moon of Kentucky	I’ll be with you in apple blossom time	Stardust
By the light of the silvery moon	It’s only a paper moon	Sunday morning coming down
Bye bye blackbird	Jambalaya	Swinging on a star
Carolina moon	King of the road	Tennessee waltz
Come fly with me	Lili Marlene	That’s amore
Coming in on a wing and a prayer	Lollipop	The caissons go rolling along
Danny boy	Lucille	The marines hymn
Don’t be cruel	Mack the knife	There’s a tear in my beer
Don’t sit under the apple tree	Make the world go away	There’s no business like show business
East of sun west of moon	Mairzy doats	This is the army, Mr. Jones
Eight days a week	Moon over Miami	To each his own
Embraceable you	Moonlight bay	Under the boardwalk
Everybody loves somebody	Moonlight serenade	What do you do in the infantry
Folsom Prison Blues	My blue heaven	What’s he doing in my world
Fugue for tinhorns	New York, New York	When I’m sixty-four
Get me to the church on time	Off we go into the wild blue yonder	When Johnny comes marching home
God bless America	Oh how I hate to get up in the morning	When the moon comes over the mountain
God bless U.S.A.	Oh what a beautiful morning	White cliffs of Dover
Going to Kansas city	Old Cape Cod	Yellow rose of Texas
Good night my someone	Old man river	You can’t roller skate in a buffalo herd
Green green grass of home-	Pennsylvania Polka	You gave me a mountain
Greensleeves	Pittsburgh, Pennsylvania	Your cheating heart
	Praise the Lord and pass the ammunition	

Table 18.

A List of Favorite Musicians Reported by Participants

	Favorite Musicians	
Bing Crosby	George Strait	Kenny Rogers
Dean Martin	Hank Williams	Lawrence Welk
Elvis Presley	Johnny Cash	Roy Rogers
Gene Autry	Kate Smith	George Strait

Research Question 1: Quality of Life Analysis

The effects of two treatment groups and a control group on quality of life were measured before the first session, and after the last session, via an interview utilizing a standardized questionnaire scale, "Quality of Life-Alzheimer's Disease (QOL-AD)" (Edelman et al., 2005).

Out of fifty-two participants who were randomly assigned to three intervention groups, thirty-seven (71.2%) completed the interventions and thirty-five (67.3%) were included in the final analysis, due to missing data. The means and standard deviations are presented in Table 19.

Table 19.

Means and Standard Deviations of QOL-AD

QOL-AD	Group	Mean	Standard deviation	*N*
Pre-first session				
	MT	38.71	4.23	14
	ML	39.29	8.15	14
	TV	40.71	6.55	7
	Total	39.34	6.35	35
Post-eighth session				
	MT	47.29	6.58	14
	ML	41.43	7.09	14
	TV	45.71	6.37	7
	Total	44.63	7.09	35

Note: N=number of participants

To answer the research question, "are there effects of music therapy-singing, music medicine-listening, or control-TV group on quality of life of persons with dementia," data were analyzed using a repeated-measures analysis of variance. The analysis revealed that there was a significant difference between the pretest and posttest, $F(1, 32) = 27.19$, $p < .05$, $\eta p2 = .459$, and a significant interaction, $F(2, 32) = 4.56$, $p < .05$, $\eta p2 = .222$, as seen in table 20.

Table 20.

Repeated Measures ANOVA for Quality of Life

Source	Sum of Squares	df	Mean square	F	*p*	ηp2
Group	124.20	2	62.10	.862	.432	.051
Error between	2304.29	32	72.01			
Pre-Post	432.14	1	432.14	27.19	**.000**	.459
Interaction	145.00	2	72.50	4.56	**.018**	.222
Error within	508.57	32	15.89			

**p < .05.*

To follow up on this significant interaction, a simple effects analysis was conducted to determine where the significant difference was located and these findings are presented in Table 21.

Table 21.

Simple Effects Analysis for the Interaction

Groups at pre-test	F = .252	*p* = .778
Groups at post-test	F = 2.75	*p* = .079
MT-singing group, pre to post	t = 7.02	***p* = .000**
ML-listening group, pre to post	t = 1.39	*p* = .187
TV group, pre to post	t = 1.82	*p* = .118

**p < .05.*

Research Question 1.a. Are there effects of a music therapy-singing group on quality of life of persons with dementia?

Based on the statistical analysis, there were significant effects of a music therapy-singing group on quality of life of persons with dementia (t=7.02, p=.000) and only the singing group significantly increased quality of life between the pre-test and the post-test as seen in Table 21.

Research question 1.b. Are there effects of a music medicine-listening group on quality of life of persons with dementia?

The effects of a music medicine-listening group on quality of life of persons with dementia were not significant (t=1.39, p=.187).

Research Question 1.c. Are there effects of a control-TV group on quality of life of persons with dementia?

The effects of a control-TV group on quality of life of persons with dementia were not significant (t=1.82, p=.118).

The plot of the interaction suggests that participants in the music listening group increased quality of life the least, while participants in both the singing and TV group increased more, with the biggest increase in the singing group (See Figure 4).

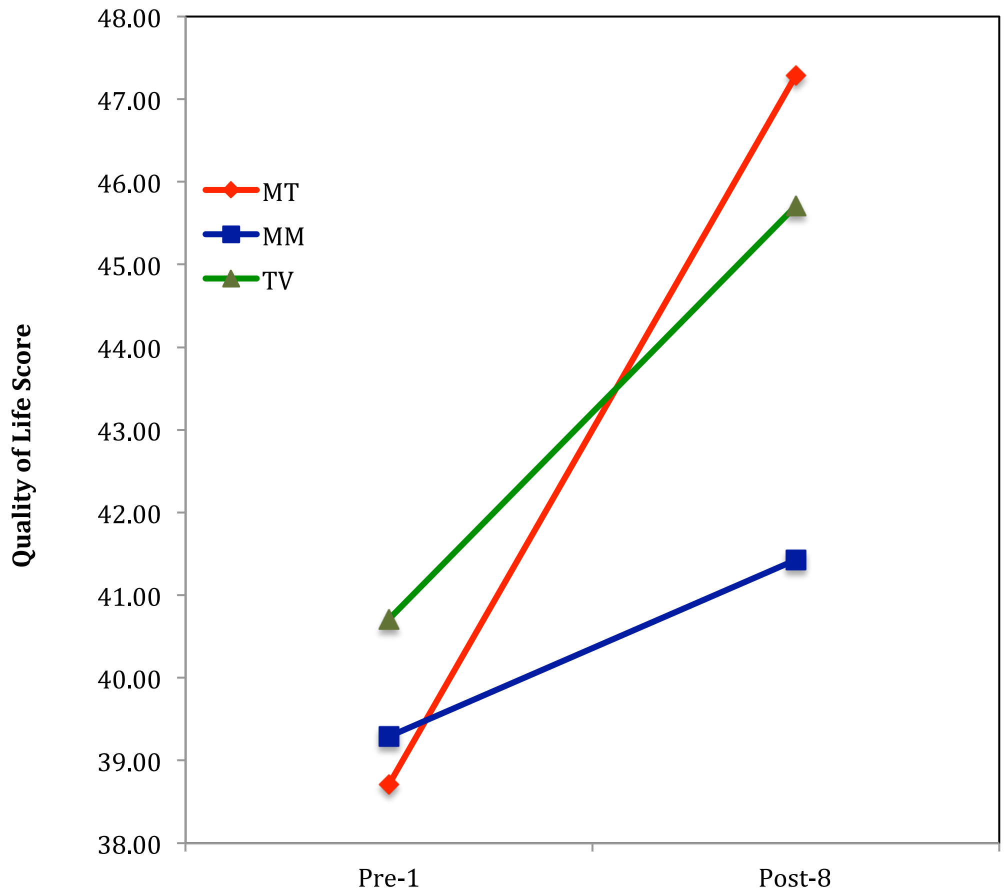

Figure 4. Quality of life mean score.

Research Question 1.d. Are there differences in the effects of a music therapy-singing group versus a music medicine-listening versus a control-TV group on the quality of life of persons with dementia?

As seen in Table 21, the three groups did not differ significantly at either pre-test or post-test. The differences in the effects of MT-singing group versus MM-listening group versus TV group on the quality of life of persons with dementia after the last session were not significant (*F*=2.75, *p*=.079).

Because the sample size was somewhat small, a one-way, non-parametric analysis was also conducted, using the Friedman Test, separately for each group. The analysis also revealed that only music therapy-singing group had significant changes in quality of life across time, whereas changes in MM-listening group or TV-group were not significant (see Table 22).

Table 22.

The Friedman Test for Quality of Life

MT-singing group	Chi Square =14.00	***P* = .000**
MM-listening group	Chi Square = 3.77	*P* = .052
Control-TV Group	Chi Square = 3.57	*P* = .059

Research Question 1.e. Are there any differences persons with dementia in various mental status on quality of life?

This question will be discussed in the separate section “Mental Status Analysis” with the research question 2.e.

Research Question 2: Positive and Negative Affect Analysis

To answer the research question, "are there effects of music therapy-singing, music medicine-listening, or control-TV group on affect of persons with dementia," a repeated measures ANOVA was conducted. Out of fifty-two participants who were randomly assigned to three groups, thirty-seven (71.2%) completed the interventions and data from thirty-six (69.2%) was analyzed. Positive affect (PAS) and negative affect (NAS) were analyzed separately.

Positive Affect Analysis

The means and standard deviations of the positive affect score (PAS) are presented in Table 23.

Table 23.

Means and Standard Deviations of Total Positive Affect Score

	Group	Mean	Standard deviation	*N*
Pre 1	MT-singing	29.43	4.65	14
	MM-listening	28.21	6.20	14
	TV	28.75	8.61	8
	Total	28.81	6.12	36
Post 4	MT-singing	36.43	7.93	14
	MM-listening	29.07	7.18	14
	TV	25.38	9.32	8
	Total	31.11	8.97	36
Post 8	MT-singing	41.29	6.90	14
	MM-listening	31.00	4.71	14
	TV	27.38	9.09	8
	Total	34.19	8.79	36

Note. N=number of participants. MT=music therapy. MM-music medicine.
**P* < .05

A repeated-measures analysis of variance revealed that there was a significant difference between the pre- and post-sessions (F (2, 33) =6.68, p = 0.002), and a significant difference between groups (F (2, 33) =7.09, p = 0.003), at the $p < .05$ level. There was also a significant interaction (F (4, 33) =4.56, p = 0.001), as seen in table 24, and a post-hoc analysis was also conducted to find out where the significant interaction was located (Table 26).

Table 24.

Repeated Measures ANOVA for Positive Affect Score

Source	Sum of squares	df	Mean square	F	Sig.	ηp2
Group	1374.99	2	687.50	7.09	**.003**	.300
Error Between	3202.19	33	97.04			
Pre-Post	340.13	2	170.06	6.68	**.002**	.168
Interaction	571.59	4	142.89	5.61	**.001**	.254
Error within	1680.06	33.00	50.91			

*$P < .05$

Because the sample size is somewhat small, a one-way, non-parametric analysis was conducted, using the Friedman Test, separately for each group and the results are presented in Table 25.

Table 25.

The Friedman Test for Positive Affect Score

MT-singing	Chi Square = 15.53	***P* = .000**
MM-listening	Chi Square = 3.04	*P* = .219
TV	Chi Square = 3.17	*P* = .156

Research Question 2.a. Are there effects of a music therapy-singing group on positive affect of persons with dementia?

The analysis revealed that only the singing group changed in total positive affect scores significantly across time (see Table 25). Therefore, based on the statistical analysis, there were significant effects of a music therapy-singing group on the positive affect of persons with dementia (χ^2=15.53, p=.000).

Research Question 2.b. Are there effects of a music medicine-listening group on positive affect of persons with dementia?

There were no significant effects of a music medicine-listening group on the total positive affect score (χ^2=3.04, p=.219).

Research Question 2.c. Are there effects of a control-TV group on positive affect of persons with dementia?

There were no significant effects of a control-TV group on the total positive affect score (χ^2=3.17, p=.156).

The plot of the interaction also suggests that MT-singing group increased PAS (positive affect score) most, while MM-listening group and TV group remained flat (Figure 5).

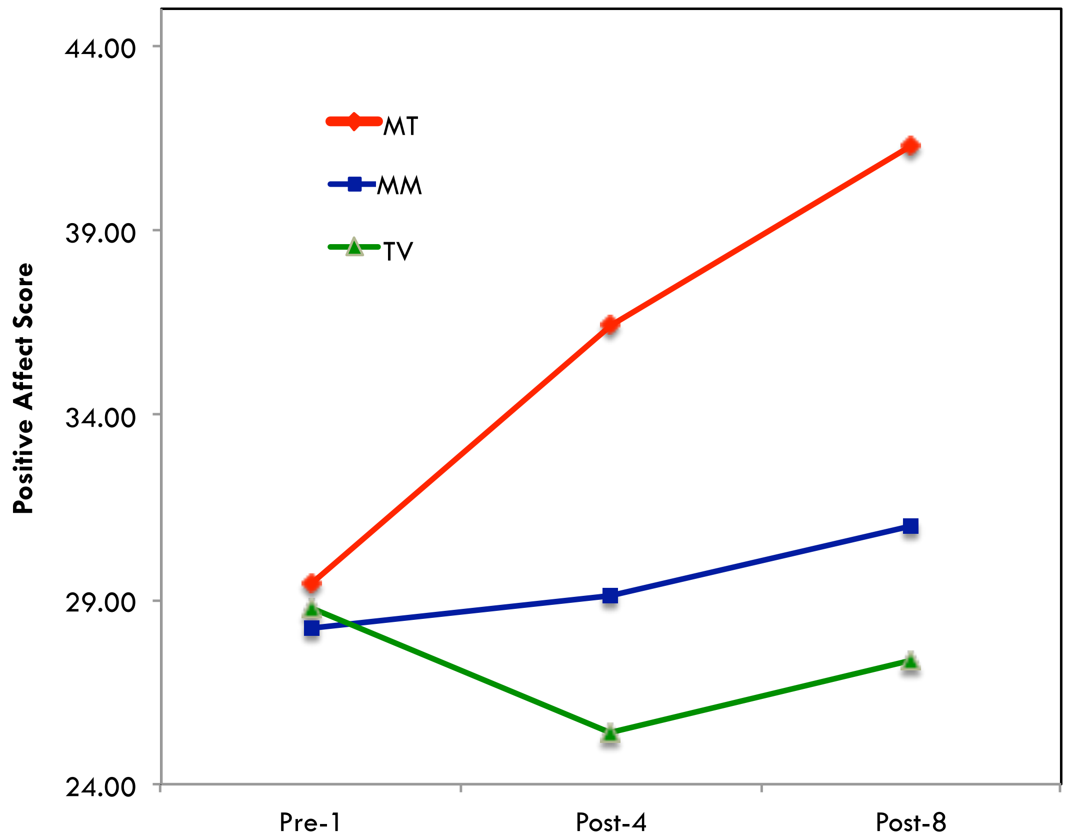

Figure 5. Positive affect score.

Research Question 2.d. Are there differences in the effects of a music therapy-singing group versus a music medicine-listening group versus a control-TV group on positive affect of persons with dementia?

To follow up the significant interaction to determine where the significance difference lies, a simple effects analysis was conducted. As seen in Table 26, the three groups did not differ at the pre-test (*F*=.023, *p*=.977). However, at post-fourth session, there was a significant difference between the singing and the TV group (*F*=5.65, *p*=.010), whereas the difference between MT-singing versus MM-listening (*F*=5.65, *p*=.051), or between TV versus MM-listening (*F*=5.65, *p*=.553), was not significant. At post-eighth session, the difference between MT-singing and TV (*F*=13.55, *p*=.010), as well as between MT-singing and MM-listening group (*F*=13.55, *p*=.001) was significant, whereas there was not a significant difference between TV and MM-listening group (*F*=13.55, *p*=.450),.

Table 26

Simple Effects Analysis for the Interaction between Groups

Groups		F	*p*
Groups at pre-1		F = .023	*p* = .977
Groups at post-4		F = 5.65	***p* = .008**
	TV versus MT-singing		***p* = .010**
	TV versus MM-listening		*p* = .553
	MT-singing versus MM-listening		*p* = .051
Groups at post-8		F = 13.55	***p* = .000**
	TV versus MT-singing		***p* = .000**
	TV versus MM-listening		*p* = .450
	MT-singing versus MM-listening		***p* = .001**

Note. MT=music therapy. MM=music medicine.
**P* < .05.

Negative Affect Analysis

The means and standard deviations of negative affect score (NAS) are presented in Table 27.

Table 27.

Means and Standard Deviations of Negative Affect Score

	Group	Mean	Standard deviation	*N*
Pre 1	MT-singing	14.86	3.96	14
	MM-listening	14.86	4.62	14
	TV	14.25	3.77	8
	Total	14.72	4.08	36
Post 4	MT-singing	10.86	1.02	14
	MM-listening	14.14	4.75	14
	TV	11.50	1.85	8
	Total	12.28	3.44	36
Post 8	MT-singing	10.07	0.27	14
	MM-listening	11.71	2.30	14
	TV	13.50	4.44	8
	Total	11.47	2.77	36

Note. MT=music therapy. MM=music medicine.
**P* < .05.

A one-way, non-parametric analysis was also conducted for NAS separately for each group due to somewhat small sample size and revealed again that only the singing group's scores changed significantly across time (see Table 28).

Table 28.

The Friedman Test for Negative Affect Score

MT-Singing	Chi Square = 21.38	***p* = .000**
MM-Listening	Chi Square = 4.50	*p* = .105
TV	Chi Square = 4.56	*p* = .102

Research Question 2.a. Are there effects of a music therapy-singing group on negative affect of persons with dementia?

Based on the statistical analysis, there were significant effects of the music therapy-singing group on negative affect of persons with dementia (χ^2=21.38, p=.000).

Research Question 2.b. Are there effects of a music medicine-listening group on negative affect of persons with dementia?

There were no significant effects of the music medicine-listening group on the total negative affect score (χ^2=4.50, p=.105).

Research Question 2.c. Are there effects of a control-TV group on negative affect of persons with dementia?

There were no significant effects of the control-TV group on the total negative affect score (χ^2=4.56, *p*=.102).

Research Question 2.d. Are there differences in the effects of a music therapy-singing group versus a music medicine-listening group versus a control-TV group on negative affect of persons with dementia?

A repeated-measures analysis of variance revealed that there was a significant effect for time, F (2, 33) = 8.72, $p < .05$, partial eta squared= .300, as seen in Table 29. Since the interaction for negative affect score was not significant, it was not followed up. The differences between groups were not significant, either. Therefore, there are not any significant differences in the effects of MT-singing versus MM-listening versus control-TV group on total negative affect score.

Table 29.

Repeated Measures ANOVA for Negative Affect Score

Source	Sum of Squares	df	Mean Square	F	Sig.	ηp2
Group	58.75	2	29.38	1.95	.158	-
Error Between	496.24	33	15.04			
Time	164.89	2	82.45	8.72	**.000**	.209
Interaction	86.52	4	21.63	2.29	.069	-
Error Within	623.91	66	9.45			

A visual examination of means is displayed in Figure 6, indicating that both the music therapy-singing and the music medicine-listening groups resulted in a decrease in negative affect.

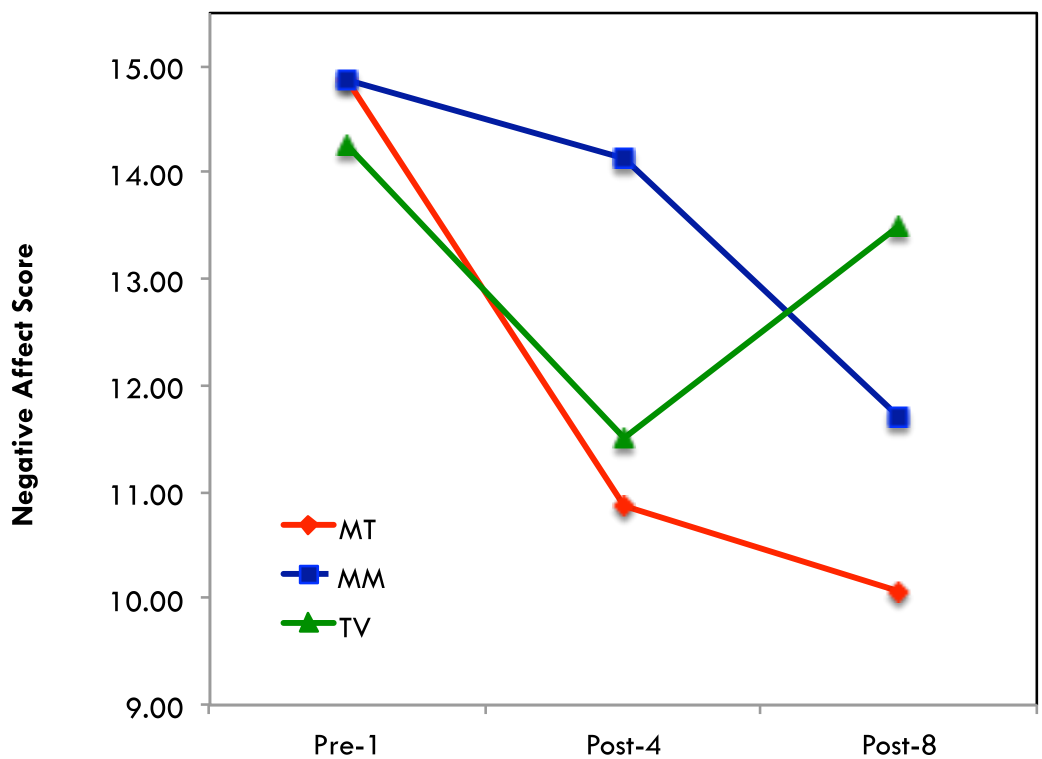

Figure 6. Negative affect score.

A post-hoc test on the main effect for time was conducted and there was a significant decrease between pre- first and post-eighth session, while there was no significant change between pre-first and post-fourth session, and the change between post-fourth and post-eighth session was not significant, either (see Table 30).

Table 30

Tukey Test on the Main Effect for Time

Pre versus post 4	t = .375	*p* = .710
Pre versus post 8	t = 3.87	***p* = .000**
Post 4 versus post 8	t = 1.29	*p* = .206

Mental Status Analysis

To answer the research question 1.e and 2.e., "are there any differences between individuals with dementia in various mental status on quality of life (1.e.) or on affect (2.e.)?" a change score, post-eighth minus pre-first for Quality of Life, Positive Affect and Negative Affect, was computed and reviewed as a function of mental status (See Table 31).

Table 31.

Descriptive Data for Quality of Life and Positive and Negative Affect Scores Based on Mental Status Analysis

						95% CI for mean			
Outcome measurement	Mental Status	*N*	Mean	Std. deviation	Std. error	Lower bound	Upper bound	Minimum	Maximum
Change	1	15	4.93	4.68	1.21	2.34	7.53	-4.00	13.00
QoL	2	11	5.45	8.18	2.47	-.04	10.95	-10.00	17.00
score	3	9	5.67	6.40	2.13	.74	10.59	-6.00	17.00
	Total	35	5.29	6.20	1.05	3.16	7.42	-10.00	17.00
Change	1	15	5.53	10.73	2.77	-.41	11.48	-14.00	24.00
PAS	2	12	4.42	8.62	2.49	-1.06	9.89	-8.00	25.00
score	3	9	6.44	5.32	1.78	2.36	10.53	1.00	16.00
	Total	36	5.39	8.74	1.46	2.43	8.35	-14.00	25.00
Change	1	15	-2.27	5.34	1.38	-5.22	.69	-9.00	10.00
NAS	2	12	-4.00	4.95	1.43	-7.15	-.85	-12.00	4.00
score	3	9	-3.89	4.91	1.64	-7.66	-.11	-11.00	1.00
	Total	36	-3.25	5.03	.84	-4.95	-1.55	-12.00	10.00

Note. QoL=the Quality of Life-AD. PAS=positive affect scale. NAS=negative affect scale.

The sample size was too small to add this variable to the ANOVAS and none of these analyses were significant (See Table 32). Therefore, there were no differences among persons with dementia in various mental statuses on quality of life or positive or negative affect.

Table 32

ANOVA Analysis of Mental Status

Outcome		Sum of squares	df	Mean Square	F	Sig.
Change QoL	Between Groups	3.48	2	1.74	.043	.958
	Within Groups	1303.66	32	40.74		
	Total	1307.14	34			
Change PAS score	Between Groups	21.68	2	10.84	.135	.874
	Within Groups	2654.87	33	80.45		
	Total	2676.56	35			
Change NAS score	Between Groups	24.93	2	12.46	.477	.625
	Within Groups	861.82	33	26.12		
	Total	886.75	35			

Chapter 5

DISCUSSION

The prevalence of dementia, a progressive and degenerative syndrome, increases dramatically with age (Alzheimer's Disease International, n.d.) and it is critical to develop effective strategies and evidence-based interventions to improve the quality of life for persons with dementia (Crespo et al., 2013; Vink et al., 2004). Music therapy has drawn attention as a promising non-pharmacological approach for individuals with dementia (Brotons, 2000; Vink et al., 2004). A variety of music interventions have been widely applied for dementia care not only by music therapists, but also by other healthcare professionals. Among those interventions, singing and listening are utilized most frequently.

The purpose of the current study was to compare the short-term effects of two music interventions, including a music-therapy singing group and a music medicine-listening group, as well as a control-TV group, on quality of life and positive and negative affect of persons with dementia at a long-term care facility. Fifty-two participants, ranging in age from 63 to 99 years, were randomly assigned to one of three groups and thirty-seven completed the interventions. The participants in each group were engaged for a 40-minute session twice a week for four consecutive weeks. The music therapy-singing group was facilitated by a music therapist, whereas the music medicine-listening and a control-TV group were led by nursing home activity assistants.

Quality of life was measured at baseline and after the last session. Only the MT-singing group demonstrated significant improvements when compared to the other groups. Positive and negative affect were measured at three points, including pre and post the first, fourth and eighth sessions. Only the MT-singing group increased positive affect scores and decreased negative affect scores significantly. Based on the findings of the current study, music therapy involving singing may be beneficial in improving quality of life and affect in persons with dementia at long-term care facilities.

Research Question 1: Quality of Life

Regarding the research question, “are there effects of a music therapy-singing, a music medicine-listening or a control-TV on quality of life in individuals with dementia?” all three groups showed improvements at the end of a total of eight interventions. However, only the singing group improved quality of life significantly from pre to posttest whereas the music listening group increased the least and the changes in both the music listening and the TV group were not significant.

There are only a few studies that have focused on the impact of music interventions on quality of life of people with dementia, and these findings are not consistent with the outcome of the current study due to different characteristics of interventions and research settings. Särkämö et al.’s study (2014) is the only one that compared the effects of singing with listening on quality of life of persons with dementia and has reported that music listening was found to have a more positive long-term effect on quality of life compared to singing, which is contrary to the findings of the current study. The major difference between the study of Särkämö et al. (2014) and the current study may be the intent of the music intervention and its delivery pattern. Särkämö et al. (2014) facilitated either a singing or music listening group for 10 weeks for the purpose of coaching, and then encouraged caregivers to apply an assigned music intervention, either a singing or music listening, as a part of everyday care for the following six months. Researchers did not have control over the frequency of the music intervention delivery by caregivers during the six-month follow-up period. The reason why only listening, not singing, was found to be beneficial on the quality of life may be due do the fact that caregivers may have provided listening more often than singing during the 6-month follow-up period because it was easier for them to implement.

The content of interventions was different, too. The singing group in Särkämö et al.'s study (2014) was facilitated by a trained music teacher and consisted of singing, performing vocal exercises and rhythmical movements, whereas the listening group was led by a music therapist, and consisted of listening to a CD and discussing emotions, thoughts, and memories. In other words, participants in each group experienced different content, in addition to the different types of music intervention. On the contrary, participants in both the singing and listening groups of the current study experienced the music interventions with the same contents. In the current study, a music therapist implemented the singing group and processed discussion about emotion, memories and reflections, whereas the listening group was implemented by nursing home activity assistants. Even though the activity assistants have several years of experience in dementia care, their training and focus might have been different from music therapists. The trained music teacher who implemented singing groups in Särkämö et al.'s study (2014) may have focused on the quality of performance, and the activity assistants in the current study may have focused on activity. In contrast, a music therapist's training emphasizes an interaction and a mutual relationship so that participants may experience relating not only to music, but also to a therapist and other group members. In other words, with the same music material, the outcome can be quite different depending on the approach and focus of the facilitator.

Instead of comparing different types of music interventions (Särkämö et al., 2014), Cooke et al. (2010) compared the effect of a live group music program with a reading group on the quality of life of people with dementia and found that participants in the reading group reported greater feelings of belonging than those in the music group at midpoint of the study. The music intervention in this study (Cooke et el., 2010) consisted of 30-minutes of musician-led singing and 10-minutes of pre-recorded instrumental music listening. The music group in the study of Cooke et al. (2010) was highly structured, following a set pattern each time, without allowing much opportunity for participants' involvement. In contrast, the reading sessions included a range of activities such as quizzes and discussions about the past, stimulating greater individual involvement and creating greater feelings of belonging as a result. On the contrary, the singing group in the current study was led by a music therapist with over 15 years of experience with dementia care, and participants' spontaneous involvement and interaction through singing were encouraged and stimulated; these factors may not have been emphasized in the musician-led music program in the study of Cooke et al. (2010).

The current study focused on the effects of singing in a group format, which was used in most existing studies (Cooke et al., 2010; Särkämö et al., 2014; Solé, 2014). However, in the study by Särkämö et al. (2014), participants were engaged in both group and individual interventions. After the 10-week coaching sessions were completed, the music interventions provided by caregivers was on an individual basis. The effects of singing in a group or individual format need to be explored further.

Ridder et al. (2009) focused on exploring an individualized music therapy intervention with therapeutic singing for two individuals with frontotemporal dementia. At the end of a four-week intervention period, one participant showed improved quality of life, whereas the other's total score of quality of life decreased. A drop in this participant's total score of quality of life was due to the fact that she was reported not to pay attention to the presence of others and sometimes noted to be dozing off. However, it was argued that the decrease in quality of life in this case based on the observation of the individual's not paying attention to the presence of others should be interpreted as positive because she seemed more relaxed and calmer, probably meeting her needs for withdrawal and allowing herself to relax and avoid over-stimulation.

Solé et al. (2014) also investigated the effect of a music therapy intervention on quality of life of people with dementia and failed to demonstrate significant improvement on quality of life. It was speculated that the particular measurement tool chosen for the study probably was inappropriate, not being able to capture the quality of life for people with dementia adequately. The fact that music studies on the quality of life of people with dementia used all different measurement tools may represent a challenge for a researcher to find the appropriate standardized tool to capture quality of life accurately. The limited number of music or music therapy studies on the topic of quality of life of people with dementia in the existing literature may be due to measurement difficulties inherent in this population. The measurement of quality of life in individuals with dementia is complex and challenging because of the individual's limited ability to participate in discussions as a result of their disease process. Due to the progressive nature of the disease, memory, language and insight are all impaired to varying degrees depending on the extent of the dementia process (Moyle et al., 2007). That's why most research studies of dementia rely on a caregiver's observations or reports of behaviors or mood of persons with dementia, instead of self-reports of participants, in measuring quality of life (Albert et al., 1996). Most music therapy studies in the existing literature also assessed quality of life of individuals of dementia based on the input of either professional (Ridder et al., 2009; Solé et al., 2014) or family caregivers (Särkämö et al., 2014). However, this indirect approach may not be a true reflection of persons with dementia's perception and may result in gaps in knowledge about the personal experience of these individuals. On the contrary to a common misconception, persons with dementia who are mildly or moderately affected were found to be able to report on their quality of life. In some circumstances, their insights and judgments about quality of life may be more meaningful and reliable than those provided by caregivers (Brod, Stewart, Sands, & Walton, 1999; Novella et al., 2001). Based on this assumption, the current study attempted to reflect the voice of individuals with dementia, rather than the observations of other individuals, so that the quality of life of persons with dementia may be more accurately determined by their perceptions and person-centered care could be advanced.

The current study used the standardized measurement tool "Quality of Life-Alzheimer's Disease" (Logsdon et al., 2000), as modified by Edelman et al. (2005) for specifically use in long-term care settings. This particular measurement tool (the QOL-AD) was selected because of its brevity with simple language, taking less than 10 minutes to complete, and its broad conceptualization of quality of life (Ready & Ott, 2003). It is also a disease-specific instrument, reducing unnecessary burden by only measuring relevant items for dementia. This scale was designed to assess quality of life from either people with mild to moderate dementia in a direct interview, or assessed by their caregivers, or both (Logdson et al., 2000). This approach to reflect directly the perception of people with dementia is consistent with the view of the current study that people with dementia have the capacity to communicate their perspective (Merchant & Hope, 2004). There is also recent evidence that the scale is valid and reliable for measurement of quality of life in people with MMSE scores as low as 3-11 (Hoe, Hancock, Livingston, & Orrell, 2006).

Solé et al. (2014) maintained pre-existing groups before the initiation of their study. Some of the participants in the current study were also exposed in music therapy with the researcher as their therapist before the initiation of this study. However, the existing music therapy groups were reassembled for the current study, and the individuals who had received music therapy interventions previously were mixed with others who had never received music therapy before. The ratio of participants in each group who had music therapy experiences previously was similar in three groups (Table 33).

Table 33.

The Ratio of Participants with Previous Music therapy Experience

	MT- singing group	MM- listening group	Control- TV group
With previous MT experience	7	6	6
Without previous MT experience	18	17	17
Percentage	0.39%	0.35%	0.35%

Note. MT=music therapy. MM=music medicine

Furthermore, the current study engaged participants with different levels of dementia in the same group. On the contrary, each group in the study by Solé et al. (2014) consisted of persons in a similar stage of dementia. The effectiveness of various groupings of persons in different stages of dementia on their perception of quality of life needs to be examined further.

It is interesting to note that all three groups, including the TV group, which served as a control, demonstrated improvements in quality of life, even though the improvements in the listening and the TV group were not significant. This positive improvement in the music listening and the TV group may be due to the fact that the interventions were provided in a group format with the presence of activity assistants, who were able to accommodate any responses from the participants, even though the level of engagement and facilitation may be different from that of a music therapist. The finding of the current study that quality of life was improved in all three groups may demonstrate the importance of engaging residents in meaningful activities in groups and encouraging spontaneous interaction among them at long-term care facilities. Considering the fact that a high percentage of residents at long-term care facilities may be exposed to music listening and TV at an individual level, further investigation should determine whether the improvements in quality of life in the current study were due to the interventions or other factors, such as engaging in a group format with the presence of a therapist or healthcare professionals.

It is promising and hopeful to witness that recently quality of life has been attracting interest in dementia care and research (Ballard et al., 2001; Moyle et al., 2007). The increased interest in promoting quality of life in dementia care may reflect a shift of perspective in dementia care that is focused on a person-cared approach, rather than viewing individuals with dementia as a mere disease with a milieu of debilitating conditions. Some people may think that quality of life is lost once a person is diagnosed with dementia. The concept and its application have been neglected for the most part in this population and in particular in people living in residential care institutions (Moyle et al., 2007). This tendency may have been reflected by the fact that a majority of research studies regarding individuals with dementia at care facilities has mainly focused on developing effective interventions or strategies to manage disruptive behaviors. However, dementia does not remove a person's ability to appreciate, respond to and experience feelings such as anger, fear, joy, love or sadness, whether he or she can express it or not, and there is no question that QOL is relevant to individuals with a diagnosis of dementia, just as it is for any other social or medical group. (Moyle et al., 2007).

Quality of life may be maintained well into the disease process when person-centered care and interventions are provided with compassion. As evidenced in this study, not only may quality of life of persons with dementia be maintained, but also it may be improved as a result of short-term therapeutic interventions, such as group singing.

Research Question 2: Positive and Negative Affect

To answer the research question, “are there effects of music therapy-singing, music medicine-listening or control-TV group on affect of individuals with dementia?” the current study investigated the effects of the three interventions on both positive and negative affect and found out that only the MT-singing group improved positive affect and decreased negative affect significantly across time. More specifically, it was only the MT-singing group that improved positive affect significantly between the baseline and post-sessions, whereas a slight increase in the MM-listening group and a decrease in the control-TV group were found without any statistical significance. Regarding negative affect, both the MT-singing and the MM-listening group decreased across time, and the difference between the baseline and post-sessions was significant in the singing group only, whereas the TV group demonstrated an increase of negative affect between post-fourth and post-eighth session.

Most music therapy studies in the existing literature that studied emotional aspects of individuals with dementia consistently demonstrated positive effects of music therapy interventions on improving mood, emotional well-being or in alleviating depression (Ashida, 2000; Brotons & Marti, 2003; Cevasco, 2010; Chu et al., 2014), utilizing singing not as a primary, but as a part of a combination of various music interventions, including listening, instrument playing, improvisation and movement to music. A study by Lesta and Petocz (2010) was the only one that used group singing as a primary intervention and reported its significant impact on improving mood. There were no music therapy studies that compared the effects of singing with listening on the emotions of persons with dementia. Whereas a majority of studies mentioned above (Ashida, 2000; Brotons & Marti, 2003; Cevasco, 2010; Lesta & Petocz, 2010) used a within-subject research design without having a control group for comparison, Chu et al. (2014) utilized usual nursing home activities, such as watching TV or taking a walk, and demonstrated that music therapy was more effective in alleviating depression than usual activities.

Most music medicine studies in the existing literature that focused on the emotional area of individuals with dementia adopted receptive music listening. Guétin et al. (2009) and Lord and Garner (1993) demonstrated the positive effects of receptive music listening in alleviating depression and improving mood. These studies used a within-subject design and did not compare the effects of music listening with other interventions.

However, several music medicine studies used an active form of music interaction, including singing, and did not find it more effective than a music listening (Särkämö et al., 2014) or a reading group (Cooke et al., 2010). A study by Särkämö et al. (2014) was the only one that compared the effectiveness of singing with music listening on the mood of persons with dementia and did not find that singing was more effective in improving a depressed mood. However, as mentioned in the discussion of quality of life above, the focus of both the singing and the music listening groups in the study by Särkämö et al. (2014) was to coach and encourage caregivers to engage people with dementia in everyday musical leisure activities outside the 90-minute session.

Cooke et al. (2010) utilized singing as a part of a live music intervention and found that it did not have a significant effect on improving the level of depression of persons with dementia, compared to a reading group. Both music and reading groups alleviated depression non-significantly. The music program used in a study by Cooke et al. (2010) consisted of singing, playing instruments, movements, and listening to pre-composed instrumental music and was led by musicians. On the contrary, the MT-singing group in the current study consisted of active singing only and was led by a music therapist who specifically focused on therapeutic goals, including improving mood and enhancing emotional expression. Even though both the study by Cooke et al. (2010) and the current study employed an active singing method, its effects on addressing the emotional needs were different and this difference may be due to a different focus of the facilitator. Compared to a musician-led music intervention, which may be more performance-oriented, the music therapy-singing group led by a trained music therapist of the current study emphasized stimulating participants' greater involvement and approached the music intervention as a process toward therapeutic goals. As a result, the participants in the MT-singing group of the current study may have felt that their individual needs were respected and addressed through the group process, demonstrating significantly increased positive affect and decreased negative affect. The participants of the current study were not screened for depression or emotional status specifically for this study, and the positive and negative affect scores of participants among three groups were not significantly different at baseline. Therefore, the positive effects of singing vs. listening on affect found in the current study may be due to the benefits of group singing with the therapeutic goals and the focus of the music therapist.

Regarding the role of a music therapist, various characteristics of a therapist, such as the way of engaging and interacting with participants through music, personality, and an ability to create an optimum music environment where participants could experience emotional release, containment and comfort, may have contributed to the positive outcomes. It is interesting to note that Cevasco (2010) demonstrated that a music therapist's nonverbal behavior, affect and proximity impacts patients' emotions, as well as physical and cognitive well-being. When the therapist utilized affect and proximity combined, persons with dementia showed the most positive affect. Groene (2001) also reported the influence of a therapist's different music accompaniment patterns on the subjects' level of participation. Even though the focus of the study by Groene (2001) was on participation level, it is still noteworthy that the participants' responses were different depending on the intensity and pattern of a therapist's musical approach. Considering the potential impact of a therapist's emotional, behavioral and musical approach on the outcomes of music therapy intervention, these factors needs to be examined further to obtain the maximum effects of therapy.

Several aspects of the MT-singing group in the current study were carefully designed and implemented based on a person-centered, humanistic theoretical foundation. First, the participants' music preferences were employed. The importance of accommodating participants' personal music preferences has been addressed in the existing literature (Dileo & Bradt, 2005; Gerdner, 1997). Second, songs that were familiar to the participants were selected. Persons with dementia often experience confusion and frustration due to their impaired ability to perceive and interpret the environment and surroundings appropriately. Especially when they reside in an institutional setting, such as a nursing home, the new environment and people around them may seem even more alien to them, creating increased confusion and disruptive behaviors. Therefore, it is important to provide an opportunity for persons with dementia to experience comfort and security. The use of familiarity of songs can minimize confusion, alleviate tension, and provide a structure and a sense of security for persons with dementia. Each session also consisted of songs related to a similar theme or a particular type of music, in order to maximize a familiarity and minimize cognitive demand (See Appendix B). The use of familiar and preferred music can also stimulate spontaneous reminiscence and the therapist assisted participants to process memories and emotions. Third, songs were carefully selected by the therapist to promote successful and interactive participation of persons with dementia. When songs are complex and difficult to follow, it may discourage persons with dementia from participating. The keys of each song were also transposed to lower keys by the therapist to maximize participation. Vocal ranges decrease with age, and it is critical to present songs in keys which are suited to these ranges and allow them to participate most comfortably and actively without straining the voice. Fourth, the order of songs was carefully determined by the therapist so that the participants would experience both stimulation and relaxation through alternating musical tension and release. Each participant's strength was discovered and stimulated further by the therapist through the group music process. The music therapist carefully attuned to each individual's responses, identified any strengths or potentials in their responses, and provided an opportunity to develop strengths further through music process. As a result, participants may have experienced a sense of empowerment and accomplishment. Last, the MT-singing group in the current study emphasized the importance of mutual interaction and relationship. Due to cognitive impairment, persons with dementia often are withdrawn and isolated. The music therapist focused on encouraging and stimulating spontaneous interaction. Throughout the group process, participants may have experienced a new relationship with music, the therapist and other participants, which may have helped them feel less withdrawn or isolated.

Another difference of the current study compared to most studies in the existing literature was that data for the outcome measurements of the current study were directly obtained from participants via an interview, instead of relying on the observations of their families or professional caregivers. Since the perception of persons with dementia may be different from that of their caregivers, the effort of the current study to reflect the subjective reports and perceptions of persons with dementia may be of importance and represent another effort to reflect a humanistic approach, despite the potential danger of bias of self-report. In order to minimize any bias or a possibility of participants' intentional report of higher score to please the therapist, the therapist was excluded from the interviews with participants. Furthermore, the responses of individuals' with dementia on affect may be less distorted than those involving cognitive tasks. Nevertheless, the findings of the current study need to be interpreted with caution because the participants' responses may be considered unreliable or invalid due to the cognitive effects of dementia.

The lack of significant effect of the music listening or the TV group on affect may be also due to the participants' disappointment with the group assignment. They may have not been satisfied with their assigned groups and reported negatively on the interview. Furthermore, the participants' preferences for the TV group were not assessed, whereas music programs for singing and listening group were created based on their music preferences. This may have closely related to the inconsistent results regarding affect in the TV group, as well as the highest drop-out rate of participants assigned to the TV group. Out of 17 participants who were assigned to the TV group, nine dropped out over the course of the study, and only eight completed the intervention.

Limitation

A limitation of the current study was that its sample size was relatively small. Fifty-two participants were initially included at the beginning and only thirty-seven participants completed the study. This may be due to the vulnerable nature of the participants with advanced age, which may reflect the reality of long-term care settings. Nevertheless, significant results were found. A future research study utilizing a multiple settings to recruit participants may increase the chance of increasing the sample size.

The current study did not target persons with dementia in any specific stage. Each intervention group had a similar ratio of individuals in different cognitive levels.

However, it was not possible to compare the responses of individuals in different stages of dementia due to the small sample size. Because of the nature of the group format of the current study wherein persons in different levels of dementia were included in the same group, the unique needs of participants in different stages may not have been adequately addressed or processed. Furthermore, the current study did not distinguish among the different types of dementia. Even though the differences among various types of dementia may decrease toward the end of the disease process, the different characteristics of various types of dementia are distinct especially at the earlier stages and need to be addressed.

Whereas participants' music preferences were surveyed and reflected in the music programs that were developed, their preferences for TV program were not reflected. Considering the importance of reflecting the preference of individuals' with dementia, the lack of reflection of their choices for TV program might have negatively influenced the outcome of the participants in that group.

Data of the current study were obtained entirely from participants' self-reports via interviews. Even though the attempt to reflect the participants' perceptions directly can be considered as the strength of the study, the accuracy and validity of data from persons with dementia may be questioned.

In order to maximize mutual interaction, two sub-groups with less than nine participants were created and each group met either in the morning or afternoon. However, persons with dementia may experience increased confusion, hyperactivity and agitation in the late afternoon, which is known as "sundowning syndrome." In order to avoid any influence of sundowning on the outcome, it would have been desirable to schedule all interventions in the mornings. However, due to a limited number of therapists and staff in the current study, it was not possible to provide all interventions in the morning.

As discussed before, the design of the current study did not make it possible to blind assessors to the participants' group allocation. It was also impossible to blind participants to their group allocations. However, it was explained to the participants that the purpose of the current study was to examine if there were any effects of different interventions, including singing, listening and TV groups, and to determine if these effects differed among the groups. Therefore, the participants may not have expected or assumed any benefits of one particular intervention over the others.

Implication for Clinical Practice

Due to the small number of participants and the short length of the intervention, the findings of the current study should be interpreted with caution. However, some insights acquired from the current study may be applied to clinical practice in dementia care.

The current study demonstrated the significant benefits of a short-term active singing intervention led by a music therapist in improving the quality of life and affect of persons with dementia. As discussed before, several aspects of the structured singing approach utilized in this study may have contributed to the positive outcome, including the neurological benefits of singing itself and the role of the music therapist, such as how the therapist chose songs and created the music program, how she accompanied singing on the keyboard, how she led the MT-singing group with the focus on specific therapeutic goals, and how she assisted participants to process reactions and memories.

The MM-listening group differed in that no real active participation was required from participants, and as a result, the participants in the listening group may have been less motivated to express or relate to each other. Unlike music listening, singing places additional demands on the nervous system, creating a strong coupling of perception and action (Wan, Rüber, Hohmann, & Schlaug, 2013). Group singing is also found to release endorphins, a hormone which is associated with feeling of pleasure, as well as oxytocin, another hormone which is associated with alleviating anxiety and stress (Horn, 2013). As a result, participants in the group singing may experience feeling both elevated and soothing.

Furthermore, the MM-listening group in the current study was facilitated by activity assistants who did not have same level of training as the music therapist, especially in facilitating a group process. It is interesting to note that some music medicine studies in the existing literature used active music intervention, such as singing, and failed to demonstrate significant effects of active music interventions compared to other activities. In most cases, active music interventions were implemented by musicians or music teachers, who may have facilitated singing in different ways than music therapists. These findings show the importance of a facilitator's role with regard to the outcome of the interventions. It would be interesting to investigate if there is any difference when both a singing and a listening group were led by a trained music therapist.

Based on the promising effects of group singing on quality of life and affect from the current study, a MT-singing group led by a music therapist with specific therapeutic goals based on person-centered approach needs to be promoted to benefit individuals with dementia, especially at long-term care facilities.

Considering the possibility of various factors that might have contributed to the positive outcome of singing group of the current study, including the therapist's music choices for the program, as well as her leading and accompanying style, these factors need to be considered and reflected when designing and implementing music therapy interventions to maximize the benefits of the intervention.

Implications for Future Research

With the focus on evidence-based practice in modern health care, it is critical to add to the music therapy research on persons with dementia and to promote the quality of this research. The current study attempted to improve the quality of research by adopting a RCT (randomized controlled trial) design and aiming for a larger sample size. However, due to the vulnerability of the participants with advanced age, the final sample size turned out to be relatively small. Future research studies need to continue to aim for higher quality by considering allocation concealment, blinding assessors, using RCTs, and a larger sample size. Because of the design of the current study, it was not possible to blind participants or interviewers for the group assignment. Since the nursing home activity assistants collected data from participants via an interview before and after the intervention, and the three intervention groups were scheduled as a part of the facility's daily activities, it was impossible to conceal the participants' group assignment from the assessors. However, it would have been possible to blind the interviewers who collected data from the participants, if staff members from other disciplines were utilized to collect data because they may not have been as familiar with activity schedules of the facility as were the activity assistants and they would not have been responsible for transporting the participants to the assigned location for each intervention group.

The outcomes of the current study need to be further explored to determine which factors contributed to the significant effects of group singing on the quality of life and affect. How was singing more effective than listening in improving quality of life and affect? Were these results due to the use of groups? Or would individual sessions lead to similar results? Did any of the personal or musical characteristics of the therapist play a role in achieving significant improvements in the MT-singing group? What if a therapist-led singing group were compared to a therapist-led listening group? More diverse aspects of music therapy treatment also need to be investigated, as well, including the potential dosage effect of music therapy. What results might have occurred if sessions were held over a longer period of time, such as six months, instead of one month? Furthermore, the effectiveness of other active methods of music therapy, such as improvisation, needs to be examined and compared with singing.

Considering the possibility of the impact of the therapist's personal and musical characteristics on the outcomes of the study, it would be interesting to explore the relationship, if any, of a therapist's various approaches, such as types of accompanying instruments, leading styles and personalities on responses of individuals with dementia.

Also, the relationship of an individual's preference of a specific type of activity to study outcomes needs to be explored.

The current study relied entirely on the participants' self-reports to determine the effectiveness of interventions, and the reliability of their responses may be questionable because of the presence of dementia. It would be interesting to obtain data from both participants and their caregivers, and to compare their reports to see if there are any similarities or discrepancies in their perceptions.

Furthermore, the effects of music therapy and music medicine interventions on other outcomes in persons with dementia at long-term care facilities, such as wandering, agitation, sleep, cooperation with ADLs (Activities of daily living), and reducing a dosage of antipsychotic medications, need to be investigated and compared through continuous research.

The current study attempted to distinguish a music therapy-singing group from a music medicine-listening group and demonstrated significant differences between two music approaches even after a relatively short period of intervention. Based on the findings of the current study, the importance of engaging persons with dementia in an active music therapy intervention needs to be promoted and communicated, in order to improve the quality of life and affect.

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APPENDIX A

RESEARCH SUBJECT INFORMATION CONSENT FORM

Permission to Take Part in a Human Research Study
Title of research: The Effects of Group Singing on Quality of Life and Affect of People with Dementia: A Randomized Controlled Trial

Investigator and Department:
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Why am I being invited to take part in this research?
We invite you to take part in a research study because you have a diagnosis of major neurocognitive disorder.

What should I know about this research?
This research study will explore the effects of various activities on quality of life and affect of individuals with dementia. You will be assigned to one of three activities, including singing, music listening or TV watching group, and expected to participate in these groups twice a week for four consecutive weeks. Whether or not you take part is up to you. Also, you can agree to take part and change your mind later. Your decision will not be held against you. You can ask all the questions you want before you decide.

Who can I talk to about this research?
If you have questions, concerns, or complaints, or think the research has hurt you, contact the research team at the following address:

New York State Veterans' Home
Activities Department
4207 State Highway 220
Oxford, NY 13830
607-843-3177
hcho@nysvets.org

This research has been reviewed and approved by an Institutional Review Board of Temple University. You may talk to them at (215) 707-3390 or e-mail them at: irb@temple.edu for any of the following:

- Your questions, concerns, or complaints are not being answered by the research team.
- You cannot reach the research team.
- You want to talk to someone besides the research team.
- You have questions about your rights as a research subject.
- You want to get information or provide input about this research.

Why is this research being done?

The purpose of the study is to investigate and compare the effects of group singing with music listening and active control in improving quality of life and affects of people with dementia. Considering the rapid growth of older population with dementia and their complex needs, both behavioral and psychological, it is critical to develop and implement the most effective interventions that are determined to be evidence-based through rigorous studies. Due to the side effects and risks involved with pharmacological interventions to treat symptoms of dementia, non-pharmacological interventions have received increasing interest not only from family caregivers, but also from health care professionals. Among various non-pharmacological interventions, music interventions, both active and passive forms, have been implemented and reported positive outcomes on behavioral, cognitive, social, and emotional areas of dementia care. However, there are some concerns in the existing music-related literature for dementia care. First, there have not been clear distinctions in the existing literature between music therapy studies that implement active music methods, such as singing, improvising, and instrument playing, by a credentialed music therapy professional, and music medicine studies that are characterized by the use of passive music listening of pre-recorded music, implemented by medical personnel. Therefore, it is important to investigate and compare the effects of music therapy using active method with those of music medicine using passive method, on the same outcome measures. Second, even though ‘singing’ has been used most frequently in music studies for people with dementia, it is difficult to determine the true effectiveness of singing, because most studies utilized singing combined with a variety of other techniques, such as movements, improvisation, rhythm activities, and so on. Third, among various outcome measures explored in dementia related studies, the management of difficult behaviors has drawn most attention. In contrast, the effects of music therapy interventions on quality of life and emotional well-being of people with dementia have been investigated relatively less frequently and needs to be explored further.

Therefore, the present study will investigate and compare the effects of music therapy utilizing active ‘singing’ method and compare its effectiveness with those of music medicine utilizing passive music listening of pre-recorded music on quality of life and affect of people with dementia. The result of such a study would be of great value to music programming in dementia care at healthcare settings.

How long will I be in this research?
We expect that you will be in this research for four weeks.

What happens if I agree to be in this research?
You will be randomly assigned to one of three interventions, including singing, music listening or TV watching. You are expected to participate in an assigned group twice a week for four consecutive weeks. Each group will take 40-45 minutes. At certain point of the study, including the first, fourth and eighth sessions, you will be interviewed to assess outcome measurements, including quality of life and affect, and completing each interview should not take more than 15 minutes. Each intervention will be implemented by a music therapist or nursing home activity assistants in activity areas of designated unit.

Will being in this research help me in any way?
We cannot promise any benefits to you or others from taking part in this research. However, possible benefits may include improved quality of life and affect. You may also experience social, cognitive and physical benefits of the study. Also, the findings of the study would be of great value to music programming in long-term care facilities.

What happens to the information collected for this research?
To the extent allowed by law, we limit the viewing of your personal information to people who have to review it. We cannot promise complete secrecy. The IRB, Temple University, Temple University Health System, Inc. and its affiliates, and other representatives of these organizations may inspect and copy your information. Your personal information, including a diagnosis of dementia and the level of cognitive impairment determined by BIMS score, will be used only for purpose of equal distribution to each group. Your response of outcome measures will be kept in a student investigator’s office at the facility for analysis up to a year. After a year, it will be shredded permanently.

Signature Block for Adult Subject Capable of Consent

Your signature documents your permission to take part in this research.

Signature of subject	Date
Printed name of subject	
Signature of person obtaining consent	Date
Printed name of person obtaining consent	

Signature Block for Adult Subject Unable to Consent

Your signature documents your permission for the individual named below to take part in this research.

____

Printed name of subject

____ ____________________

Signature of legally authorized representative Date

____

Printed name of legally authorized representative

____ ____________________

Signature of person obtaining consent Date

____

Printed name of person obtaining consent

APPENDIX B

MUSIC PROGRAMS USED FOR MUSIC THERAPY-SINGING GROUP

Session	Theme/Genre	Title of songs
Session 1	Country	Hail King of the rod You can't roller skate in a buffalo herd Your cheating heart Jambalaya Make the world go away Half as much There's a tear in my beer Hey good looking Happy trail Show me the way to go home
Session 2	Rat pack	Hail I can't give you anything but love That's amore I left my heart in San Francisco Blue moon My blue heaven Swinging on a star Mack the knife New York New York Bye bye black bird Show me the way to go home
Session 3	Moon	Hail Allegheny moon By the light of the silvery moon Moonlight bay Carolina moon Shine on harvest moon Blue moon of Kentucky Blue moon Moon over Miami When the moon comes over the mountain It's only a paper moon Show me the way to go home
Session 4	WWII	Hail Sentimental journey Oh how I hate to get up in the morning Lili Marlene This is the army, Mr. Jones White cliffs of Dover Don't sit under the apple tree I'll be with you in apple blossom time When Johnny come marching hom God bless America Show me the way to go home

Session	Theme/Genre	Title of songs
Session 5	Broadway	Hail Oh what a beautiful morning Anything you can do There's no business like show business Fugue for tinhorns Old man river I could have danced all night Get me to the church on time Good night my someone Seventy six trombones Show me the way to go home
Session 6	50s and 60s	Hail Alley cat Pittsburgh, Pennsylvania Old Cape Cod Under the boardwalk Lollipop King of the road Are you lonesome tonight Eight days a week When I'm sixty-four Show me the way to go home
Session 7	Autumn	Hail In the cool, cool cool of the evening Side by side Autumn leaves Shine on harvest moon Mairzy doats Shoo fly pie and apple pan dowdy Sioux city sue New york, New york Pennsylvania olka Show me the way to go home
Session 8	Patriotic	Hail Bell bottom trousers What do you do in the infantry Coming in on a wing and a prayer Danny boy The cassions go rolling along Anchors aweigh The marine's hymn Off we go into the wild blue yonder Praise the Lor and pass the ammunition Battle hymn of the republic America the beautiful Show me the way to go home

APPENDIX C

MUSIC SELECTIONS USED FOR MUSIC MEDICINE-LISTENING GROUP

	Song Title	Artist	Time
CD 1	King of the road	Roger Miller	2:28
	You can't roller skate in a buffalo herd	Roger Miller	1:56
	Your cheating heart	Hank Williams	2:43
	Jambalaya	Hank Williams	2:53
	Make the world go away	Eddy Arnold	2:40
	Half as much	Hank Williams	2:44
	There's a tear in my beer	Hank Williams	2:48
	Hey good looking	Hank Williams	2:54
	Happy trail	Roy Rogers	2:16
CD 2	I can't give you anything but love	Barry Manilow	3:40
	That's amore	Dean Martin	3:07
	I left my heart in San Francisco	Tony Bennett	2:57
	Blue moon	Frank Sinatra	2:51
	My blue heaven	Frank Sinatra	2:03
	Swinging on a star	Bing Crosby	2:20
	Mack the knife	Frank Sinatra	4:27
	New York New York	Frank Sinatra	3:30
	Bye bye black bird	The McGuire Sisters	2:11
CD 3	Allegheny moon	Patti Page	2:54
	By the light of the silvery moon	Mitch Miller	2:13
	Moonlight bay	Lawrence Welk	2:58
	Carolina moon	Maureen McGovern	2:45
	Shine on harvest moon	Rosemary Clooney	1:26
	Blue moon of Kentucky	Bill Monroe	2:09
	Blue moon	Frank Sinatra	2:51
	Moon over Miami	Jimmy Cooke	2:52
	When the moon comes over the mountain	Kate Smith	3:11
	It's only a paper moon	Paul McCartney	2:35
CD 4	Sentimental journey	Doris Day	3:08
	Oh how I hate to get up in the morning	Irving Berlin	3:08
	Lili Marlene	Marlene Dietrich	3:26
	This is the army, Mr. Jones	Irving Berlin	2:19
	White cliffs of Dover	Vera Lynn	3:03
	Don't sit under the apple tree	The Andrews Sisters	3:02
	I'll be with you in apple blossom time	The Andrews Sisters	3:04
	When Johnny come marching hom	Alan Ett & William Ashford	1:01
	God bless America	Kate Smith	2:23

	Song Title	Artist	Time
CD 5	Oh what a beautiful morning	The Hollywood Studio Orchestra	3:35
	Anything you can do	Ethel Merman	3:15
	There's no business like show business	Ethel Merman	2:29
	Fugue for tinhorns	David Green	1:43
	Ol' man river	Paul Robeson	4:08
	I could have danced all night	Julie Andrews	3:29
	Get me to the church on time	André Previn	5:56
	Good night my someone	Barbara Cook	2:45
	Seventy six trombones	Robert Preston	3:01
CD 6	Alley cat	Ray Conniff	3:02
	Pittsburgh, Pennsylvania	Guy Mitchell	2:57
	Old Cape Cod	Patti Page	2:38
	Under the boardwalk	The Drifters	2:43
	Lollipop	The Chordettes	2:11
	King of the road	Roger Miller	2:28
	Are you lonesome tonight	Elvis Presley	3:06
	Eight days a week	The Beatles	2:43
	When I'm sixty-four	The Beatles	2:38
CD 7	In the cool, cool cool of the evening	Bing Crosby	3:24
	Side by side	Michael Kamen & Robert Kraft	2:19
	Autumn leaves	Tony Bennett	2:01
	Shine on harvest moon	Bing Crosby & Rosemary Clooney	1:53
	Mairzy doats	Dodie Stevens	1:52
	Shoo fly pie and apple pan dowdy	Dinah Shore	2:51
	Sioux city sue	Gene Autry	2:37
	New York, New York	Frank Sinatra	3:25
	Pennsylvania Polka	Frankie Yankovic	2:53
	Beer Barrel Polka	Frankie Yankovic	2:20
CD 8	Bell bottom trousers	Guy Lombardo	2:33
	What do you do in the infantry	Glenn Miller	3:06
	Coming in on a wing and a prayer	Anita Ellis	2:17
	Danny boy	Irish Tenors	3:08
	The caissons go rolling along	Hard Corp	1:43
	Anchors aweigh	Hard Corp	2:23
	The marine's hymn	Hard Corp	1:50
	Off we go into the wild blue yonder	US Air Force Band	1:11
	Praise the Lord and pass the ammunition	Kay Kyser	2:32
	Battle hymn of the republic	US Army Band and Chorus	5:17
	America the beautiful	US Navy Band	3:34

APPENDIX D
QUALITY OF LIFE-ALZHEIMER'S DISEASE (QOL-AD)

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APPENDIX E

POSITIVE AND NEGATIVE AFFECT SCHEDULE (PANAS: Watson et al., 1988*)*.