Music Therapy Techniques for Memory Stabilization in Diverse Dementias

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Abstract

Music contains certain unmistakable healing properties pertaining specifically to the matured body and soul affected by various types of dementia. Music therapy aids in memory retention or the retarding of the loss of mental function as a result of Alzheimer's disease, Dementia with Lewy bodies, and Senile Dementia. Music can help subjects access lost memories through interaction with a music therapist. Certain music therapy techniques have been shown to yield additional physical, communicative, and psychological benefits. The disease progress of Alzheimer's disease, Dementia with Lewy bodies, and Senile Dementia may be further delayed by music therapy when paired with pharmaceutical interventions, such as previously established memory enhancing medications.

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Within palliative care, music therapy can be defined as "the professionally informed and creative use of music in a therapeutic relationship" (O'Callaghan, Petering, Thomas, & Crappsley, 2009, p. 197-205). Musical interaction can serve to orient and anchor a patient when alternative methods cannot (Sacks, 2008). Music is categorized as a mind-body medicine along with other interventions such as art therapy, guided imagery, animal therapy, and meditation (Tracy & Chlan, 2011). Certain musical therapy techniques, such as song writing, improvisation, guided imagery and music, lyric analysis, music-supported counseling, singing, instrument playing, and relaxation techniques result in physical improvements, psychological improvements, increased communication, and memory retention, or in certain cases, memory retrieval (Hilliard, 2005).

Needs often treated by music therapists in end-of-life care include social aspects (e.g., isolation, loneliness, boredom), emotional aspects (e.g., disorientation, confusion), physical aspects (e.g., pain, shortness of breath), and spiritual aspects (e.g., lack of spiritual connection; Hilliard, 2005). Physical aspects include benefits with physical improvements (i.e., how music acts as a muscle relaxer and engager) as well as aspects of rhythm and stimulation. Psychological focuses include mood improvement when music serves as a mental distraction and pain refocusing occurs. Communication improves among fellow patients, primarily because music creates an avenue in which outward behaviors of a patient indicate their internal states that the therapist subsequently attempts to connect with (North & Hargreaves, 2013). At its most basic state, music has the potentiality of transcending the nursing home environment and improving the patient's

quality of life, perhaps transporting the individual to previously warm and familiar memories. (Man in Nursing Home Reacts to Hearing Music From His Era, 2014).

Music Within Developmental Stages

The forming of music in the brain begins in the earliest stages of development within the mother's womb. A developing fetus has auditory memory at only five months gestation (Wheeler, 2014). Innate musicality functions from the moment the child leaves the womb. Newborns audiate, and later imitate, their mothers' vocal timbre in their cries, using sound as the earliest means of communication. The sounds an infant makes contain pitch, timbre, rhythm, intensity, and melody (Darnley-Smith & Patey, 2008). Through the developmental process, sound turns into speech as infants continue to utilize certain sounds to interact with their surroundings.

Communication between parents and children occurs through employing familiar elements such as timing, turn-taking, and regulating pitch and timbre of certain vocalizations. These musical aspects refer directly to a concept known as Communicative Musicality; this concept includes the musical attributes that are vital for communication between parent and infant. Conversely, the lack of opportunity for this specific type of early communication will have a notable effect on the emotional and cognitive development of the individual (Darnley-Smith & Patey, 2008).

Prenatal and early childhood development results in later musical interaction within the aged brain of a geriatric patient. An aged brain can continue to grow new brain cells throughout life; this growth is limited to two areas of the brain: the hippocampus and the olfactory bulb. Lateralization, the specialization of function in one hemisphere of the brain, occurs in the aging brain, but at a significantly slower rate than in prior

developmental stages. The utilization of both hemispheres, throughout life and into end of life care, improves the cognitive functioning of older adults (King, 2013). When considering hemispheric dominance within musical activities, no laterality differences are apparent; musical stimuli involves both hemispheres (Aldridge, 1992).

Music plays a vital role in the development of all psychosocial stages of life. Generativity vs. Stagnation, the seventh psychosocial stage of life according to Erikson, occurs in the middle adult years when an individual is striving to make a lasting impact on their environment. Generativity, which involves productivity and creativity, is the predominant goal of the individual during this stage of life. As this is a common age in which the signs of early onset dementia become apparent, achieving a level of Generativity may be hindered (Capps, 2004).

In regard to the subsequent stage of Integrity vs. Despair, individuals begin to analyze life in retrospect as they approach the end of their life. At this late stage in adulthood, the ultimate goal is to reflect on the past in order to reveal a life well spent. If a successful retrospection should occur, the individual should experience feelings of accomplishment, pride, rest, and completion. If this does not take place, retrospection will likely yield certain characteristics of depression, including doubt or gloom (Capps, 2004). Through the reengagement of brain faculties that were once active in earlier stages of life, an individual can properly reflect (Santrock, 2016).

An analysis tested cognition levels in geriatric patients over a twelve-year period. Patients who significantly reduced their cognitive lifestyle activities (i.e. playing interactive games with others) subsequently evidenced declines in episodic memory, semantic memory, and verbal speed. These cognitive functioning declines were linked to

subsequent lower engagement in all social activities (Santrock, 2016). Within a therapeutic setting, social and cognitive interactions take place. Due to its involvement of both hemispheres, music can be a most effective tool to encourage brain activity and subsequently, memory stabilization (Memory Moments–Music Therapy, 2011).

Music and the Brain

Music activates various parts of the brain, including the prefrontal cortex, auditory cortex, visual cortex, motor cortex, sensory cortex, and the cerebellum. The prefrontal cortex, the executive area of the brain, is activated within the musical structure of theory, including certain expectations within the harmonic structure. Consequently, the violation or satisfaction of musical expectation occurs in the prefrontal cortex as well. The cerebellum and motor cortex are utilized within a musical context due to movement involvement; this may appear in a musical setting through foot tapping, dancing, or playing an instrument. The cerebellum is also involved in emotional reactions to music (Levitin, 2008). The sensory cortex is activated while interacting with music through tactile feedback; beating a drum, for instance, activates this area of the brain. The auditory cortex is involved within the first stages of listening to sounds, through either a formal or informal analysis of tones (Simon, 2015). Auditory stimulation results in the encouragement of increased awareness and responsiveness toward stimuli experienced through other senses (North & Hargreaves, 2013). The visual cortex is similarly utilized through the reading of music and the observing and mirroring of the therapist's movements (Levitin, 2008).

Other areas of the brain are heavily influenced by interaction with and subjection to music, including the corpus callosum, amygdala, and hippocampus. The corpus

callosum, the connection between left and right hemispheres, is strengthened by lateralization that occurs as a result of musical interaction. The amygdala is activated when an emotional reaction is provoked by music, creating an emotional connection to specific songs. The hippocampus is responsible for the memory of music and is perhaps the most important aspect of brain activation within a musical context. The hippocampus is involved when the individual dedicates a song to memory through the incorporation of lyrics, melodic line, and harmony (Levitin, 2008).

Practicing music with focused attention results in an increased amount of myelin, a fatty substance that covers axons. This myelination process results in faster and more efficient message transmission between neurons. Furthermore, myelination increases the speed in which impulses are conducted; this manifests itself in the development of musical skills through persistent practice. If an individual stops playing a musical instrument, the effects of building the skill still persist into adulthood. These effects include stronger brain responses to sound, as opposed to those individuals who never learned to play an instrument (Hodges, 2018).

Dementia

Dementia is defined as “any neurological disorder in which the primary symptoms involve a deterioration of mental functioning” (Santrock, 2016, p. 387). Individuals diagnosed with dementia may become unable to recognize previously familiar surroundings and people, including family members. Dementia is oftentimes accompanied by feelings of disorientation or displacement; an estimated one-third of individuals diagnosed with dementia reveal significant evidence of being depressed (Aldridge, 2000). Furthermore, the prefrontal cortex is one of the first areas of the brain

to be affected by dementia; the loss of short-term and working memory follows shortly after this deterioration (Wheeler, 2014).

Dementia is primarily characterized by memory loss as a result of significant changes in nerve cells, decreases in neurotransmitter levels, and the eventual destruction of synapses (Levitin, 2008). Deficits of episodic memory in dementia are caused by hippocampal atrophy. Studies on memory impairment and medial temporal lobe atrophy in dementia reveal that memory test performance correlates with hippocampal volume but not with the volumes of the amygdala or of the whole temporal lobe (Andersen, Morris, Amaral, Bliss, & O'Keefe, 2007).

The Mini-Mental State Exam (MMSE) is utilized as a measuring tool of dementia and its severity (see Appendix). The test analyzes cognitive impairment and semantic memory in individuals diagnosed with varying degrees of dementia. Individuals who score below twenty-four points out of the possible thirty are considered demented (Aldridge, 2000).

Music and the Brain Affected by Dementia

For patients with dementia, sensory stimulation is necessary; a lack of stimulation results in increased confusion and disorientation. Music within a therapeutic context provides the necessary sensory stimulation through increased communication, the encouragement of verbally expressing emotion, and reminiscence of the past (Maj & Sartorius, 2000). The communicative and active linguistic responses to music by dementia patients are a remarkable phenomenon, primarily because language and music have a functional neural independence (O'Callaghan et al., 2009).

While language deterioration is a common feature of cognitive deficits, musical abilities still appear to be preserved to some extent (Darnley-Smith & Patey, 2008). Language is localized in the left hemisphere of the brain; however, music encourages active participation and emotional responses that activate multiple areas of the brain, as previously discussed. When pathways between brain structures are broken, the brain creates new pathways to identify and utilize words through active participation in singing and general music (Music Therapy Comforts, 2013).

The parallels of the left and right hemispheres contain significant anatomical differences, including the kinds of neurons each contain. The inherent musicality of language, including the intonation and rhythm of speech, is localized primarily in the right hemisphere. Therefore, when language is altered in diseases such as aphasia, the right hemisphere still provides a musical foundation for language, allowing most diagnosed patients to sing previously familiar lyrics. Phrasing in singing and speaking is relatively similar; for an individual who is regaining the ability to speak coherently, music can provide a solid foundation for this regeneration to occur (Jourdain, 1997). Active music participation also encourages focused attention of a patient, causing increased awareness of present surroundings (North & Hargreaves, 2013).

Sufficient evidence supports the impact music can have on the aged brain due to its remaining plasticity. If neurotransmitters are not firing as rapidly and mylenation is not as efficient as in previous years, music contains the potential to act as an energy source that initiates these interactions within neurons. Sensory environment and experience can remodel the cerebral cortex of both children and adults. Therefore, the adult brain remains malleable in later years of life, especially when certain lifestyle

choices occur. Similar to a weakened muscle, brain activity can be initiated and encouraged by an engaging activity such as music. Music either functions to bypass damaged areas of the brain or to build links to underdeveloped areas of the brain (Darnley-Smith & Patey, 2008).

Although disconnects often exist with the effected individual and the rest of the surrounding world, music contains the capabilities to stimulate communication and improve psychological states. Music can also activate the retrieval of memory when utilized for that purpose (De Backer, 2014). Music awakens areas of the brain that contain emotion, specifically those attached to memory. Patients diagnosed with various levels of dementia vividly remember songs from their emotionally charged teen years. This occurs due to the significant connection between memories and heightened emotions. The amygdala and neurotransmitters tag certain memories as significant in the individual's life and store the memories for later use (Levitin, 2008).

Alzheimer's Disease

Alzheimer's disease (AD), the most common form of dementia, is a progressive neurological disease that ultimately leads to the deterioration in cognitive abilities. Unlike frontotemporal dementias, AD manifests itself with memory or cognitive losses first, rather than behavioral changes (Sacks, 2008). A progressive decline in neurological capabilities results in language deterioration and cognitive deficits such as memory loss (Dassa & Amir, 2014). Alzheimer's disease leaves a patient's speech empty, containing a high proportion of words and utterances that convey little or no meaning in comparison to the speech of elderly people without AD (Kave & Levy, 2003).

Alzheimer's disease involves a deficiency in the brain messenger chemical, acetylcholine, which plays a primary role in memory (Santrock, 2016). Once destruction of brain tissue occurs within AD, it is highly unlikely that any treatment, whether medicinal or therapeutic, can regain memories already lost to the individual. However, certain activities and lifestyle choices can delay the process significantly.

As the disease progresses, the brain deteriorates due to the acetylcholine deficiency. This deterioration also occurs as a result of amyloid plaques, which are significantly high deposits of protein that accumulate in blood vessels and form neurofibrillary tangles. The gene apolipoprotein E (ApoE) binds with protein and destabilizes microtubules, which causes the eventual formation of neurofibrillary tangles (Andersen et al., 2007). ApoE is linked to an increased presence of plaques in the brain (Santrock, 2016). Scientists are not entirely certain of the cause of the excess of the ApoE gene or the depletion of acetylcholine; age, genetic makeup, and various lifestyle choices all contribute to the development of Alzheimer's disease (Santrock, 2016).

Alzheimer's disease has affected an estimated 5.4 million Americans ages sixty-five and older. A projected ten million individuals within the baby-boomer generation will develop AD in their lifetime. By the time this generation reaches age eighty-five in 2031, there will be an estimated 3.5 million people ages eighty-five and older diagnosed with AD. Alzheimer's disease accounts for seventy percent of all dementia cases in the United States, as recorded in Figure 1 (Alzheimer's Disease Facts and Figures, 2009).

Figure 1. Dementia Cases in America (Alzheimer's Disease Facts and Figures, 2009, p. 18). Image removed to comply with copyright.

Dementia with Lewy Bodies

Dementia with Lewy bodies (DLB) is the second-most common form of neurodegenerative dementia. DLB causes a pattern of decline similar to that of Alzheimer's, including a depletion of memory, judgment, and other significantly noticeable behavioral changes (McKeith et al., 2004). Abnormal deposits of the protein

Alpha-synuclein, known as Lewy bodies, form within the nerve cells in the brain, resulting in significant brain deterioration (Andersen et al., 2007). Most DLB patients evidence cognitive similarities to Alzheimer's patients, including cortical amyloid plaques and neurofibrillary tangles (McKeith et al., 2004). Lewy bodies are often associated with plaque density in the mid-frontal cortex and hippocampal atrophy (Andersen et al., 2007). Within DLB, alertness and severity of cognitive symptoms may fluctuate daily. External commonalities between DLB patients may also include visual hallucinations, muscle rigidity, and tremors (Alzheimer's Disease Facts and Figures, 2009).

Senile Dementia

In order to gain a complete conceptual perspective of Senile Dementia, it is critical to first discuss Mild Cognitive Impairment (MCI), a condition that causes an individual to experience deteriorations in memory, language, and other essential cognitive functions. These deteriorations cause noticeable change in behavior and reveal themselves on cognitive tests, but are not considered severe enough to interfere with daily life. As many as ten to twenty percent of individuals sixty-five or older have been diagnosed with MCI. Many, but not all, individuals who are diagnosed with MCI are also later diagnosed with AD, DLB, and other forms of dementia (Alzheimer's Disease Facts and Figures, 2009).

Musical Interventions and Advantages

A previous study explored the temporal limits of cognitive change in individuals who experienced group music therapy. Elderly cognitively impaired inpatients (N=28), seventeen of which were formerly diagnosed with dementia, participated in an eight week

randomized control trial (Bruer, Spitznagel, & Cloninger, 2007). The MMSE was utilized in order to assess cognition three times per week: before intervention, immediately after intervention, and the morning following intervention. The MMSE scores of the next-day subjects assigned to music therapy evidenced average improvements of 3.69 points in comparison to the control subjects. The study concluded that musical therapy intervention facilitated by an accredited music therapist significantly improved cognitive functioning among dementia patients who were introduced to music the previous night (Bruer et al., 2007).

A study by Winckel, Feys, Weerdt, and Dom (2004), evaluated the effect of a musical exercise program on mood improvement and cognitive function in women with dementia. The study measured memory and attention deficits, which are the first clinical manifestations of dementia. The trial involved twenty-five patients formally diagnosed with dementia, fifteen of which attended exercise training for three months. Both the control and exercise group were relatively similar in age, length of hospitalization, and rate of cognitive decline, as measured by the MMSE and the Amsterdam Dementia Screening Test 6 (ADS6). The thirty-minute daily training sessions consisted of physical exercises supported by music. The exercise group was compared with a control group of ten patients who received an equal amount of attention through daily conversation alone without the pairing of exercise and musical regiments. Each cognition assessment, measured by the MMSE and the ADS6, was documented before the trial, after six weeks of intervention, and immediately following the three-month experimental period (Winckel, Feys, Weerdt, & Dom, 2004).

The exercise group showed a significant amount of improvement in cognition and behavior. The mean MMSE score was 12.87-15.53; the median score on the ADS 6 significantly increased as well, rising from ten to fourteen points. In comparison, the control group showed no measurable improvement, on the MMSE nor the ADS fluency subtest. The results of the study concluded that music, combined with exercise, enhances arousal and consequently motivates engagement and alertness of present surroundings. Music combined with physical activity could result in improvement of cognitive tasks such as verbal fluency, verbal processing, and time and space orientation. Physical exercise stimulations partnered with music may increase temporary arousal, stimulating cognitive activity (Winckel et al., 2004).

Language skills and communication improve after interaction with music. Communicative musicality does not end at the first few stages of development, but rather continues into the latter years of life. Individuals continue to communicate through pitches, rhythm, and timbre throughout their lifetime. Even when language deterioration is present and cognitive depletion hinders communication, musical abilities seem to be preserved. Musical abilities may remain because the fundamentals of language, which are inherently musical, develop prior to semantic and linguistic functions (Darnley-Smith & Patey, 2008).

Rhythm is the integrative process underlying both physiological coherence and musical perception. This process occurs due to the concept of personal rhythm, in which external auditory activity is translated through the internal perceptual shaping of the individual. Rhythm is also fundamental to internal processing and external social interaction (Aldridge, 1992).

Community music therapy, a psychosocial intervention within the patient's environment, is highly applicable and effective for dementia patients residing in a nursing home. These ongoing, intentional techniques, which occur outside the boundaries of the individual or small group therapy sessions, involve the therapist's flexible responses to the social and cultural context of the environment (Darnley-Smith & Patey, 2008). Community music therapy elicits responses and communication through the emphasis on interactions between clients of similar age (Koger, Chapin, & Brotons, 1999).

Songs of personal significance can stimulate responses of individuals with dementia. Certain common melodies may soothe or stimulate, but in order to truly reach a dementia patient on a personal level, musical preferences of the individual must be taken into account by the therapist. Specific favored songs or musical genres tend to receive more attention over an individual's lifetime, ingraining the emotion into memory. It is through these connections with familiar songs that information can be presented and received within music therapy sessions. Familiar music not only stimulates communication and brain activity, but also revives memory and improves reminiscence abilities in individuals with poor cognitive function. Therefore, establishing a connection with the patient through the use of uniquely familiar songs is of utmost importance and should be taken into account in the therapeutic context (Aldridge, 2000).

For elderly individuals who have been diagnosed with dementing diseases, the act of singing familiar songs can serve as a fundamental part of the treatment process. When individuals progress to the point that palliative care is necessary, singing can provide comfort and vital human interaction. Even for individuals who have become completely debilitated from age and disease, no longer functioning on their own, a response to

singing still oftentimes occurs. Involvement with singing can include active or passive participation; singing heavily contributes to wellness and therapeutic treatment. The act of singing can provide connections to personal histories as well as the retrieval of personal identity and dignity (Aldridge, 2005).

Personal identity destruction can be emotionally damaging for the individual with dementia; musical interaction may redefine the individual's view of themselves. A study was conducted by McDermot, Orrell, and Ridder (2014) in order to develop further insight into the musical experience of patients with dementia and to explore the meaning of music in their lives. In this study, it was evident that the choice of music was highly personal to each individual. Each patient had a musical identity that was closely related to their life events, personal and cultural identity, and the particular era in which they grew up. The recognition of familiar music is considered emotionally meaningful particularly for people affected by late stages of dementia.

Music and Alzheimer's Disease

A previous study done by Dassa and Amir (2014) explored the role of singing familiar songs to encourage conversation among patients with middle to late stages of Alzheimer's disease. Language deficits, in the form of gradual deterioration of spontaneous speech, often occur in this particular disease. Therefore, one of the primary purposes of musical techniques is to elicit spontaneous speech independent from the therapist's encouragement.

Six participants attended group music therapy sessions over the span of one month. Within these sessions, the music therapist utilized familiar songs from the participants' past-elicited memories, especially songs closely related to their identity.

Analyses indicated that post-session conversation related to the singing was extensive; the act of group singing also encouraged spontaneous independent responses among the participants. This study further proves that carefully selected music from an individual's past can encourage communication and connection with others. (Dassa & Amir, 2014).

A study by Prickett and Moore (1991) assessed memory recall of ten patients diagnosed with Alzheimer's disease after they were subjected to music. Before the trial, each subject was assessed for recall of material with lifelong familiarity, both sung and spoken. Each participant experienced three individual assessment sessions, each averaging twenty minutes. Each session involved orientation questions and familiar music interspersed with unfamiliar material. The number of recalled lyrics was recorded after each session. Overall, the subjects recalled lyrics much more effectively than spoken words or information. The average percentage for sung lyrics remembered was 61.9 while the average percentage for spoken words remember was 37.4. Further observation revealed that if the individual was introduced to entirely new material, seventy-five percent of the subjects would attempt to sing or hum along, eventually gaining the ability to repeat some of the new material. Therefore, it would appear that Alzheimer's patients may be stimulated to responsive participation and memory recollection through the use of familiar songs.

Music and Dementia With Lewy Bodies

Cognitive impairment is the present factor of Dementia with Lewy bodies, but does not occur in all cases. Patients with DLB show a combination of neuropsychological impairments, attention deficits, and prominent frontal-subcortical and visuospatial dysfunction. Patients who suffer from DLB perform more accurately than Alzheimer's

patients on verbal memory assessments, but perform significantly worse on visuospatial performance tasks, such as memorizing the specific locations of objects close in proximity to one another. Fluctuations in cognitive functioning can occur within days, hours, or even minutes; varying degrees of shifting attention and alertness are also common. Therefore, daily-administered music therapy techniques need to be refocused accordingly (McKeith et al., 2004).

Perhaps the most important neuropsychiatric target symptoms within DLB include visual hallucinations, delusions, misidentification, apathy, anxiety, and various degrees of depression. The desired behavioral outcomes of music therapy might simply be a reduction in frequency of these symptoms (McKeith et al., 2004). This reduction can be accomplished through the use of music's inherent calming and refocusing abilities (Juslin & Slobada, 2001).

Music and Senile Dementia

Senile Dementia occurs as a result of an aging process, rather than a diseased one. For a patient with Senile Dementia, stress reduction and the alleviation of the onset of dementia is the goal. Therefore, music therapy treatment for these individuals would most likely utilize the same techniques as other dementias, but with differing intentions and goals. Excitability is a consequence of senile dementia; music can combat excitability and irritation with certain calming techniques in an attempt to reduce direct biological indicators of stress such as blood pressure. Combined with medicinal intervention, music therapy has the potential to decrease irritability and frustration by activating the frontal lobe and by stabilizing emotions (North & Hargreaves, 2013).

Memory Stabilization

Music contains the potential to resurface painful and pleasant memories alike. This unlocking of memory can be achieved in a therapeutic setting through improvisation, performance, listening, or a combination of all three (Boyce-Tillman, 2000). Cognitive improvements are subservient to the end goal of engaging the brain in order to access memories lost to the dementing process of dementia. The aim of a music therapist is to enable individuals with dementia to maintain their functional abilities at their highest potential within the constraints of dementia (Rickard & McFerran, 2011).

The brain creates completely new neural pathways when listening to and interacting with music. Musical stimulations improve memory and provide an avenue for the communication of mental activity without being overly invasive. When stored memories are retrieved, language skills increase, communication improves, and mood elevation occurs (Rickard & McFerran, 2011). While short-term memory becomes inconsistent or completely absent within varying degrees of dementia, the long-term memory in songs and their associations result in a reminiscence of the past (Wigram, Pedersen, & Bonde, 2002).

Even in the final stages of dementia, musical sounds evoke responses of familiarity from the affected patient due to hippocampal involvement (Wheeler, 2014). Two possible explanations for responses to familiar music include the following: 1) the aesthetic nature of music activates well-preserved brain structures which allows for a temporary connection and 2) an interpersonal and caring relationship is established with a music therapist within the therapeutic context (Darnley-Smith & Patey, 2008).

Music is influential in decreasing the rate in which memory is affected due to its ability to retrieve strong emotional experiences from stored memory and return them into awareness. This process occurs primarily because music is a pervasive element of social life and accompanies highly significant events dedicated to memory. Memories naturally persist when they are of emotional significance to the individual. Music can also reach the brain's lower subconscious levels that are normally resistant to modifications and deterioration (Juslin & Slobada, 2001). Furthermore, long-term memory storage and emotional processing can be found in the limbic area of the mid-brain. The processing of familiar music by-passes higher cortical structures in the brain; therefore, through the use of meaningful songs, it is possible to reach the sense of self that is preserved in the brain affected by dementia (Aldridge, 2000).

A previous study was conducted on music's effect on the autobiographical memories of patients diagnosed with Alzheimer's disease (Muireann, Cunningham, Walsh, Coakley, & Lawlor, 2006). Autobiographical memories (ABM) were assessed through the Autobiographical Memory Interview (AMI) administered to two groups. The variable group contained ten individuals diagnosed with mild to moderate Alzheimer's disease. The control group consisted of ten individuals who scored a twenty-five or higher on the MMSE. The AMI evaluated the memories of three life periods: childhood, early adult life, and recent life. The background stimulus administered to the variable group was the first movement of Vivaldi's Four Seasons. While listening to music, the response of each individual was monitored by the Galvanic Skin Response Technique (GSR) to measure electrodermal activity. The average recall performance results of the

Alzheimer's patients and the control group are included below in Figure 2 (Muireann et al., 2006).

Figure 2. Performance on the AMI (Muireann et al., 2006, p. 113).
Image removed to comply with copyright.

Significant recall improvement occurred in the Alzheimer's group after introduction to music. ABM levels increased in all three life stages. Results of personal semantic (PS) recall and mean autobiographical incident (AI) are recorded below in Figure 3.

Figure 3. Semantic and ABM Recall Performance (Muireann et al., 2006, p. 114).
Image removed to comply with copyright.

Individuals with Alzheimer's disease improved by an average of 5.6 points on the AI scale after listening to music. There was an observable difference in arousal during sustained attention performance between individuals with Alzheimer's disease and healthy elderly individuals. GSR results revealed that the arousal response levels of Alzheimer's patients were constant across test sessions. Therefore, the impact of musical stimuli on arousal levels in Alzheimer's patients has a relative impact on cognitive task performance (Muireann et al., 2006).

Music Therapy Techniques to Delay Deterioration

Numerous reliable therapy techniques are utilized within the therapeutic context, specifically geared toward geriatric patients. Each technique, although not originally designed for individuals with memory disorders, can be utilized in certain cases to treat various stages of dementia. The following techniques focus on subservient cognitive goals while potentially affecting memory in the process (Juslin & Sloboda, 2001).

Five-Fold Model of Care

The five-fold model of care utilized in music therapy encompasses the primary psychological needs of individuals within the therapeutic context. These five areas include comfort, attachment, inclusion, occupation, and identity. All five aspects form an all-encompassing need: love. Comfort is included as an element of music therapy care because music contains the power to console by reaching into the depths of identity, by surpassing a level reached only by words. Attachment is included in the care model because improvised music can result in a therapist-client relationship that is unimpeded by loss of verbal skills. Therapeutic music is incomplete without the individual's personal contribution that results in a feeling of inclusion. Participative music-making refers to the

mind of the individual; this aspect of the therapeutic model encourages skill, imagination, and occupation. Creative music within a therapeutic setting also provides a sense of identity for the individual. Involvement in a dynamic relationship with others reinforces a sense of self that transcends certain limitations of a dementing disease such as dementia (Aldridge, 2000).

Seven Classifications for Music in a Medical Setting

Jayne Standley's meta-analysis includes seven classifications for music within the therapeutic context. Each classification may be utilized for geriatric patients diagnosed specifically with AD, DLB, and Senile Dementia. These classifications can be utilized dependent on various factors, such as the medical condition or state of mind of the patient on a particular day. The classifications include 1) passive music listening 2) active music participation 3) music and counseling techniques 4) music and developmental or educational objectives 5) music and stimulation 6) music and biofeedback and 7) music and group activity (North & Hargreaves, 2013).

Passive music listening and counseling techniques are utilized by music therapists to reduce pain, anxiety, and stress. At a basic level, music is often used as a distraction and a temporary alternative focus on immediate surroundings. In contrast, active music participation focuses attention through the use of musical interaction. The goal of the therapist in this situation is to eliminate distractions and engage the brain in a singular way through means such as improvisation. In an active approach to geriatric music therapy, patients are encouraged to articulate emotions by interacting within musical structures (Juslin & Sloboda, 2001). The next classification, music and developmental or educational objectives, activates learning structures and keeps the brain engaged. The

following classification, music and stimulation, focuses primarily on auditory stimulation in order to activate various parts of the brain. The classification of music and biofeedback acts to reinforce or structure physiological responses in order to monitor physiological states and to increase self-control and awareness of self. Music and group activity may promote positive interpersonal interaction; this classification is highly applicable for patients diagnosed with various degrees of dementia (Simon, 2015).

Four Models of Treatment and Examples

The practical application of Standley's seven classifications takes place in four main treatment models: 1) the medical model 2) psychoanalysis 3) behavior therapy and 4) humanistic psychology. The medical model focuses on physiological issue indicators, such as increased heart rate and breathing irregularity. The psychoanalysis model occurs when the music therapist observes and makes therapeutic decisions based on the natural emotion displayed by the patient. This requires great flexibility by the therapist and is critical in dementia care due to the wide spectrum of emotions exhibited daily. The behavior therapy model involves the classical learning theory as proposed by behaviorists. The humanistic psychology model emphasizes self-actualization and relationships; this model is perhaps the most applicable within the geriatric setting (North & Hargreaves, 2013).

Medical model: Melodic intonation therapy. When brain damage or deterioration has occurred, melodic intonation therapy can be vital to rehabilitation, especially to that of language loss. This medical model technique involves the embedding of short propositional phrases into repeated, simple melodic patterns accompanied by finger tapping. The inflection patterns of pitch changes and rhythms parallel the natural

speech included in a spoken sentence. Therefore, the singing of familiar songs is also emphasized in order to encourage articulation and fluency (Aldridge, 1993).

Psychoanalysis model: Improvisation. A common element of music therapy techniques is improvisation, both by client and therapist. In a psychoanalysis model, the therapist quickly evaluates the fluctuations in mood of the dementia patient and adjusts the therapy accordingly. Within the session, the mental state and emotion of the patient can contrast greatly, as influenced by many factors. The therapist is required to adjust therapeutic techniques and structure in order to properly reach the patient and accomplish previously set goals for the session (Wigram et al., 2002). In this medical model the therapist acts as a musical narrator, offering an overall structure to the incomplete musical story. This model of therapy manifests itself through the individual's created music and the therapist's subsequent interaction, in order to build from the provided musical foundation (Bunt, Hoskyns, & Swami, 2002).

Behavior therapy model: Creativity, social interaction, and rhythmic skill. Objective 3.17, as introduced by Standley and Jones (2007), utilizes a rhythmic instrument activity in order to teach creativity, social interaction, and rhythmic skills. This rhythmic activity involves a song in which various simple rhythms can be repeated by the patients. For example, the therapist can encourage a response to a specific direction through the use of contrasting dynamics or slight rhythmic variation. This technique is utilized in order to improve creativity, rhythmic accuracy, and spontaneous interaction.

Humanistic psychology model: Increase social interaction. Objective 2.46, a specific therapy technique introduced by Standley and Jones (2007), is an example of the

Humanistic Psychology treatment model. This objective encourages social interaction between geriatric patients. Through the use of music, the therapist uses commands within the musical song to encourage social interaction between members of a circle. Social interaction can be defined as asking or answering questions, listening, and looking at or smiling at other members of the circle (Standley & Jones, 2007).

The Person-Centered Care Approach

The Person-Centered Care Approach (PCC) is becoming increasingly more useful in dementia care. Traditionally, certain behavioral characteristics of dementia (i.e. frustration, agitation, excitability) have been treated primarily through medication. However, with the PCC approach, these negative behaviors are seen as directly related to needs of the individual. These needs are included in the Five-Fold Model of Care, as previously mentioned. Interactions by the therapist to meet these needs include recognition, negotiation, collaboration, play, celebration, relaxation, creation, giving, validation, and facilitation (Wheeler, 2015).

An example of the PPC approach at a technical level is acoustic cuing; this is an effective way to attract the initial attention of an individual with dementia. The therapist utilizes music and voice to signal what is going to happen within the session and to focus the attention of the patient. The musical cue then acts as a trigger to memory, aiding the individual in making a connection between specific music and events. The music therapist then uses this cognitive understanding of memory and cuing to structure the remainder of the music therapy session (Wheeler, 2015).

The Bonny Method of Guided Imagery and Music

The Bonny Method of Guided Imagery and Music (GIM) has been defined by Cohen (2018) as an experience in which:

> specifically programmed classical music is used to generate a dynamic unfolding of inner experience. It is holistic, humanistic and transpersonal, allowing for the emergence of all aspects of the human experience: psychological, emotional, physical, social, spiritual, and the collective unconscious (p. 108).

GIM, an advanced method of music therapy practice, utilizes carefully selected classical music while the patient is in a relaxed state. This technique provides further insight into therapeutic needs by evoking powerful feelings and symbolic images (Advisory on Levels of Practice in Music Therapy, 2005).

GIM, also known as the Bonny Method, is not intended for patients with significant clinical needs (Darnley-Smith & Patey, 2008). With this taken into consideration, a modified version of GIM could potentially be utilized for clients evidencing early stages of dementia with the intention of gaining a more complete understanding of the individual, their preferences, and their history. This method will likely reveal memory still available to the individual (Steinberg, 1995). For each GIM session, the licensed therapist chooses taped music based on the client's history, therapeutic issues, and current mood. The chosen music then evokes imagery that unfolds from the continuous music. The Bonny Method session can be divided into four essential sections: the prelude, induction, music, and postlude (Cohen, 2018).

Prelude. The therapist follows a standard procedure for each session, beginning with the preliminary conversation to assess whether or not the Bonny Method is

appropriate for certain patients based on their primary needs and levels of cognition. This pre-session conversation reviews and explores experiences or growth since the previous session. Further intentions for subsequent sessions are also discussed at this time. This portion of the Bonny Method lasts for approximately fifteen to thirty minutes.

Induction. This subsequent portion of the Bonny Method is the shortest, lasting for only five to ten minutes. The induction usually contains two basic elements, including physical relaxation and psychological concentration. Following this portion of the session, the therapist utilizes relaxation and concentration techniques such as the introduction of specific visual images. Since the Bonny Method is intended for individuals with full cognitive function, this portion may need to be modified within the confines of dementia.

Music. Prior to the musical portion of the therapy session, the goal of the therapist is to prepare patients for the moment that the music is turned on. Once the music begins playing, the patients are encouraged by the therapist to focus on current surroundings. Utilization of familiar songs in this portion of the method can be effective in focusing patients on any memories or emotions that become available.

Postlude. Also known as the post-session portion of the Bonny Method, this section helps patients to transition into a heightened state of sensory awareness. When working with individuals with dementia, the therapist would utilize this postlude portion to discuss any memories that are brought to consciousness as a result of the focused attention on familiar music. This portion of the method should last approximately fifteen minutes (Cohen, 2018).

Nordoff-Robbins Approach

The Nordoff-Robbins approach (NR-MT) emphasizes the developing musical relationship between client and therapist that naturally forms as a result of musical improvisation. The principles of NR-MT have recently been extended to work with adults in a variety of clinical areas, including dementia (Aldridge, 2000). In most sessions with dementia patients, NR-MT encourages both patient and therapist to be active in music-making (Schmid & Aldridge, 2004). Considered to be part of the creative music therapy realm, this model encourages the therapist to improvise on the piano alongside the patient using various instruments to express a wide range of emotions (Aldridge, 1992).

An effective NR-MT session includes the encouragement of the natural flow of the session, as well as the patient's autonomy through improvisation (Megan Truitt, Personal Communication, September 2016). Due to linguistic confusion that may occur as a result of dementia, verbal dialogue is not considered central to the therapeutic process in NR-MT. This specific type of creative music therapy differs from other therapeutic types because these linguistic limitations are taken into consideration. Through usage of improvisational structures, therapist and client alike share a complete musical experience (Aldridge, 2000).

One way that NR-MT occurs is through group clinical improvisation. In this technique, the patients in the group choose the instruments and interact together without a constricting musical plan. The music is created spontaneously and encourages exploration of the patients. Benefits of this group clinical improvisation includes increased internal awareness, realization of creative impulses, improvement of self-esteem, awareness of other's activities, and direct interaction (Cohen, 2018). This type of

creative music therapy provides a space for exploration of various, unpredictable feelings and emotions; NR-MT is a technique in which depressed individuals are encouraged to have new experiences of themselves and life itself (Aldridge, 2000).

Reflections and Conclusions

Active participation with music positively influences physical improvements, encourages communication, improves psychological states, and activates memory recollection of a geriatric client. The apparent relationship between music and health should certainly not be ignored (Alive Inside, 2014). Although dementing illnesses are primarily progressive and irreversible, certain treatment strategies, such as music therapy, have focused on management of pervasive symptoms (Rickard & Mcferran, 2011). The anecdotal evidence suggests that the quality of life of dementia patients is significantly increased by musical interventions; music provides social benefits as well as a sense of belonging and acceptance. Music remains unique in its powerful capacity to make contact and give life to the vital essence of personhood. Not only does music aid to deflect the individual's attention on their current situation, its elements contain the potential to facilitate memory recollection (Alive Inside, 2014). Consistent subjection to and interaction with music can enhance memory and stimulate cognitive abilities such as memory recall (Aldridge, 1993).

As the number of individuals suffering with dementia steadily rises, there is a pressing need for the increased development of substitutional interventions that counteract the desolation of a dementing illness and address psychological, emotional, and spiritual needs (Aldridge, 2000). Alternative methods and techniques such as those found in music therapy are becoming increasingly more applicable and necessary

geriatric care. Music therapists are employed by geriatric facilities to not only improve the quality of life of patients, but to also attempt to delay the devastating effects of dementia through the well-established connection between music and memory. Health care plans should continue to include alternative, less invasive methods of care, such as music therapy, in order to serve the individual holistically. As music therapists strive to activate the brain in an attempt to resurface memories, the quality of life of their patients will undoubtedly improve.

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Appendix

Glossary of Abbreviations

Alzheimer's Disease	AD
Amsterdam Dementia Screening Test 6	ADS6
Apolipoprotein E	ApoE
Autobiographical Incident	AI
Autobiographical Memories	ABM
Autobiographical Memory Interview	AMI
Bonny Method of Guided Imagery and Music	GIM
Dementia with Lewy Bodies	DLB
Galvanic Skin Response Technique	GSR
Mild Cognitive Impairment	MCI
Mini-Mental State Exam	MMSE
Nordoff-Robbins Approach	NR-MT
Personal Semantic	PS