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Alzheimer's disease and the impact of music therapy a systematic literature review

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Alzheimer's Disease and the Impact of Music Therapy

A Systematic Literature Review

An Honors College Project Presented to
the Faculty of the Undergraduate

James Madison University
School of Nursing

By Hayley M. Guess

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Dedication

To: Alberta Everly Showalter-Witzgall

An inspirational artistically gifted soul who joyfully conveyed her passion for musical solace until the end. Thank you for your inspiration and unconditional love.

Acknowledgements

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Abstract

Currently ranked as the sixth leading cause of death in the United States, Alzheimer's disease (AD) has become the most prevalent form of dementia, a term commonly associated with memory loss and other progressive cognitive deficits that compromise patients' lives. What may begin as a mindlessly misplaced object or momentary inability to recall newly learned information will eventually advance to a loss of personal identity, forgotten loved ones, and utter misperception of reality. Although a cure for AD has yet to be discovered, there are several non-pharmacological treatments that can improve patients' quality of life and provide temporary relief from the disabling manifestations, one of which is music therapy, the topic of this literature review. Music can be deeply connected with emotional processing and memory recall, and, when utilized as an interventional therapy for AD patients, can yield numerous cognitive and behavioral symptomatic benefits. The purpose of this project is to conduct a systematic literature review that evaluates the therapeutic relationship between AD and music therapy with a narrowed focus on familiar music therapy, the potential mechanisms of action that explain the efficacy of this intervention, and the resulting nursing implications that may be utilized in practice.

Methods

An exhaustive literature review was conducted using the database CINAHL (EBSCO). The search terms included: “Alzheimer’s disease AND music therapy”, “Alzheimer’s AND music therapy”, “Alzheimer’s disease symptoms AND music therapy”, “Alzheimer’s disease AND music therapy AND familiar music”, and “Alzheimer’s disease AND active music therapy.” The literature search included full text articles from academic journals in the English language, including international articles. Only articles published between 2007 through 2017 were reviewed, with the exception of one relevant article from 2005. From the initial search results, 35 articles matched the preliminary criteria, and were further reviewed if they addressed: a) Alzheimer’s disease, b) elements and types of music therapy, c) outcomes of music therapy, d) scientific explanation of music therapy efficacy and, e) nursing implications. A total of 13 articles met the inclusion criteria and were included in the literature review. Six of these articles focused on familiar music therapy, and are summarized in table 1.

Alzheimer's Disease

Alzheimer's Disease (AD), an irreversibly progressive brain disorder, has an unrelenting course, adversely impacting every aspect of a patient's reality, often beginning with the inability to perform the most mundane tasks and resulting in utter dependency on others for the totality of self care. However, what may be even more staggering than the relentless nature of this disease are the associated statistics, for the prevalence of new cases is growing at an alarming rate – every 66 seconds to be exact. Currently, AD is the sixth leading cause of death in the United States, affecting more than 5 million individuals; however, this number is estimated to more than triple by 2050 (Alzheimer's Association, 2017).

While this disease often progresses gradually through the three stages – mild, moderate, and severe – every patient endures the associated manifestations differently, which can make it difficult to discern which stage a person is experiencing. An individual displaying the early symptoms of AD may show signs of forgetfulness, possibly misplacing objects or failing to recall a friend's name, but will likely remain independent through the first stage of the disease. As the patient's condition progresses into the middle stage, personality and behavior changes will be noted, such as frustration, anger, refusing to shower, etc., as well as a greater need for assistance with daily activities. The most disabling manifestations of the disease appear in the final stage, including a loss of environmental awareness, severe communication impairments, crippling physical limitations, and the need for constant supervision and care (Alzheimer's Association, 2017).

Perhaps one of the most troubling aspects of AD lies in the inevitable imminence of death once the disease begins to unfold, despite the pharmacological options that exist. Treatment efforts for AD patient currently focus on symptom management utilizing a multidisciplinary

approach, combining both pharmacological and non-pharmacological interventions to achieve the highest possible quality of life. While somewhat beneficial, most pharmacological treatments yield limited improvement and may result in further patient deterioration due to the adverse effects associated with antipsychotic and/or psychotropic drugs (Guetin, 2013). However, various non-pharmacological therapies for symptom management have been identified and implemented to improve patients' quality of life, and universal research efforts vigorously continue in the pursuit of answers to better understand the disease, determine effective treatment options, and prevent its development entirely.

Music Therapy

The use of non-pharmacological strategies as a potential treatment method for cognitive and behavioral disorders has become a more prevalent occurrence in patient care plans, with a specific emphasis on music therapy as an exceptionally effective intervention for AD, as acknowledged by the French Agency for Health Accreditation and Evaluation (Narme et al., 2013). Music therapy, as defined by the World Federation of Music Therapy, is “the use of music and/or its musical elements (sound, rhythm, melody and harmony) by a qualified music therapist, with a client or group, in a process designed to facilitate and promote communication, relationships, learning, mobilization, expression, organization and other relevant therapeutic objectives in order to meet physical, emotional, mental, social and cognitive needs” (Guetin et al., 2013, p. 621).

While music therapy has gained popularity in recent years as an effective tool to manage a variety of health care needs, such as procedural pain control, behavioral disorder manifestations, and physical rehabilitation, this non-pharmacological intervention has ancient roots dating as far back as the sixth century BC (Cox, Nowak, & Buettner, 2011). There is hieroglyphic evidence suggesting the Egyptians treated a variety of ailments, such as pain, depression, and sleep disorders, with melodic hymns and incantations (Guetin et al., 2013). Plato, during ancient Grecian times, dubbed musical training a form of “mental hygiene,” as well as “medicine for the soul” (Guetin et al., 2013, p. 622). The 20th century brought about the scientific discovery of the physiological effects music can produce on blood pressure and heart rate, which helps explain the earlier findings detected by dental surgeons, who noticed their patients seemed to experience decreased pain and anxiety during procedures if a phonograph was playing simultaneously (Guetin et al., 2013).

Although primitive, these historical efforts laid the foundation to legitimize music therapy professionally. The National Association for Music Therapy, created in the U.S. during the mid-20th century, became the original representative professional organization and was shortly followed by the emergence of the American Association for Music Therapy in 1971. Since then, these two associations have been consolidated into the present-day American Music Therapy Association (AMTA), which is responsible for setting the educational requirements for aspiring music therapists. In order to become Music Therapist-Board Certified (MT-BC) in the United States, these individuals must receive a bachelor's, master's, or doctoral degree from an accredited program, complete a clinical internship, and partake in 1200 clinical training hours before sitting for the board certification examination (Ahn & Ashida, 2012). In order to maintain the quality of services provided by the music therapy profession, the AMTA also established professional competencies, standards of clinical practice, and a code of ethics. The standards of clinical practice outline the general order in which music therapy services are delivered: 1) referral and acceptance, 2) assessment, 3) treatment planning, 4) implementation, 5) documentation, and 6) termination (American Music Therapy Association, 2015).

Active vs. Receptive Music Therapy

Although the exact physiological mechanisms responsible for the efficacy of music therapy on Alzheimer's disease are not yet fully understood, the behavioral, cognitive, and physical improvements that have been noted during both therapy sessions and research studies are undeniably significant. The degree of improvement following musical intervention is primarily influenced by music therapists' understanding of how best to utilize the distinct elements within music, which is further based on their knowledge of how each aspect will impact a patient's cognitive and behavioral status (Guetin et al., 2009). The broader concept of music therapy encompasses two fundamental methods, active and receptive. Active music therapy requires the patient to be physically engaged, such as through the use of sound-producing objects, singing, dance-like movement, or playing instruments, for example. (Guetin et al., 2013). Receptive music therapy, considered a "controlled method for listening to music," is comprised of specifically selected songs or live music played for the patient, with song choice based on individually meaningful elements, such as generation, culture, or personal history (Guetin et al., 2009). Both active and receptive music therapy can be used to target specific AD symptoms, such as memory loss, language deficits, depression, anxiety, and/or agitation, with the degree of symptomatic improvement primarily dependent on which method is utilized. Therapists may use a single method individually or combine methods, depending on the desired outcome.

Active music therapy provides an opportunity for patients' continuation of self-expression, for although verbal skills are often inhibited early in the disease process, musical and rhythmic abilities endure. This method, especially when conducted within a group, prompts patient creativity and communication, which not only alleviate feelings of isolation through a

regained ability to socialize, but also enhance self-image (Guetin et al., 2013). Furthermore, this method is particularly useful for patients suffering from a language deficit. Singing, for example, can help compensate for speech loss following the onset of aphasia, maintain articulation, and support breath control. This type of music therapy heavily encourages physical engagement, purposefully exercising parts of the body through specific activities. Rhythm-based exercises pinpoint psychomotility (bodily movements influenced by mental processes), allowing patients to maintain a feasible level of mobility and coordination, and playing instruments assists in improving fine and gross motor skills (Guetin et al., 2013).

Receptive music therapy, generally considered to be a more passive approach, encompasses three distinct techniques: analytical, reminiscent, and relaxation. Analytical receptive music therapy is considered to be a type of psychotherapy in which the therapist utilizes music as a therapeutic tool to evaluate the patient before and after listening to carefully selected songs, with the intent of promoting expression and thought development. Reminiscent receptive music therapy involves playing meaningful and familiar songs unique to each patient; aims to improve short- and long-term memory, evoke forgotten memories, and boost patient confidence to facilitate social interactions. The objective of relaxation receptive music therapy is to overcome distressing symptoms, such as pain, depression, and anxiety, by providing a calming environment. Most commonly accomplished through use of the 'U' technique, comprised of "music sequences of 20-30 minutes, subdivided into several phases," this method guides the patient progressively towards a state of relaxation (Guetin et al., 2013, p. 625).

Flexibility and adaptability are key concepts the music therapist must consider during sessions in order to maximize patients' engagement and participation (Ahn & Ashida, 2012). Therefore, the musical techniques selected are tailored to patients' ability level, as well as

behavioral and cognitive status (Guétin et al., 2013). Specific therapeutic activities that hold meaning for these individuals, or that somehow relate to their earlier years of life, should be utilized since musical interventions that include an element of familiarity will elicit the most beneficial outcomes (Guétin et al., 2013).

Familiar Music & The Personal Playlist

Due to the “close links that exist between the elements that make up music and the subject’s individual history,” the use of meaningful, familiar songs with both active and receptive interventions often acts as a key, unlocking forgotten memories and allowing them to resurface to the patient’s conscious mind temporarily (Guetin et al., 2013, p. 623). In order to successfully determine familiar music, music therapists conduct a thorough patient assessment, following the previously listed standards of clinical practice. By exploring the patient’s cultural background, assessing aspects such as socioeconomic status, religion/spirituality, race, ethnicity, language, family experiences, etc., the music therapist is able to formulate an individualized music therapy program centered around music that is personally relevant to each patient (American Music Therapy Association, 2015). Selecting music, both active and passive, that is reflective of patients’ generation, personal experiences, and/or emotional associations will stimulate neural networks in several parts of the brain to regenerate affiliated memories through the auditory pathways. Based on this scientific understanding, researchers innovated the concept of a personal playlist, providing Alzheimer’s patients with instant access to personally evocative music through the use of a simplistic, inexpensive digital audio player, such as an iPod shuffle or MP3 player (Tomaino, 2011).

This idea originated from the “Well-Tuned: Music Players for Health” program, which was collaboratively created by *MusicandMemory.org* and the Institute for Music and Neurological Function, and sanctioned by licensed music therapists (Tomaino, 2011). The success of this program is rooted in the personalization of music, which is achieved by customizing playlists to incorporate songs related to personal “experiences, cultural backgrounds, and frame of reference” (Tomaino, 2011, p. 20).

Patients are encouraged to have access to multiple individualized playlists because the musical selections in each can be modified to elicit specific desired outcomes throughout the day, such as rousing patients early in the morning or soothing them as bedtime approaches (Tomaino, 2011). Furthermore, these uniquely tailored playlists can assist patients in achieving other therapeutic goals, such as relaxation or exercise, which become more difficult over time as the disease progresses (Tomaino, 2011).

Arroyo-Anlló, Díaz, & Gil (2013) examined the effects of familiar music therapy on AD patients' self-consciousness (SC), and, although the described methodology did not directly reference the term 'personal playlist,' a comparable approach was utilized during the study. The researchers focused on seven components of SC that deteriorate with the progression of AD: "personal identity, anosognosia (lack of insight or self-awareness), affective state, body representation, future memory, introspection, and moral judgments" (Arroyo-Anlló, 2013, p. 1). As music therapy has the ability to enhance these aspects in AD patients, the researchers selected this intervention to explore whether the use of familiar music would considerably improve parts of the participants' SC in comparison to unfamiliar music (Arroyo-Anlló, Díaz, & Gil, 2013).

The study's inclusion criteria mandated that all participants be in the mild to moderate stages of AD; they were then evenly divided to eliminate any age, gender, or educational discrepancies, and randomly assigned to either the experimental or control group. Both groups underwent the same pre- and post-intervention assessments, during which each participant completed two cognitive tests and a SC questionnaire. The SC questionnaire, previously devised by the same researchers for an earlier study, was comprised of 14 simple questions designed to assess the seven components of SC. The intervention phase introduced a 36-week period of musical stimulation, which was broken down into 2-4 minute sessions, 3 times a week. In a

manner equivalent to that of the personal playlist, each patient in the experimental group listened to pre-selected popular Spanish music in their homes via headphones, while those in the control group were assigned unfamiliar non-Spanish songs (Arroyo-Anlló, Díaz, & Gil, 2013).

Researchers determined from the pre-intervention questionnaire results that there were no significant differences in any aspects of SC between the experimental and control groups. However, following the musical interventions, a slight change was noted in the experimental group's overall SC questionnaire score, while the control group's score indicated further deterioration. Therefore, researchers found a significant difference in the pre- and post-intervention scores between the two groups. All SC aspects of the control group demonstrated further impairment or were left unchanged following musical intervention with the exception of body representation, which was shown to improve (Arroyo-Anlló, Díaz, & Gil, 2013). Additionally, the experimental group revealed significant improvements in personal identity, affective state, moral judgments, and body representation after familiar music stimulation, while anosognosia, prospective memory, and introspection remained unchanged (Arroyo-Anlló, Díaz, & Gil, 2013).

Arroyo-Anlló et al. (2013) concluded that the results confirmed their initial hypothesis, which surmised that exposing AD patients to familiar musical selections would lead to improvements in their SC. Although the control AD group demonstrated progressive mental decline throughout the study, it remains undetermined whether this symptomatic deterioration was due to the unfamiliar musical exposure, the progression of AD, or other potential explanations. Regardless, the findings of this study led these researchers to conclude that "familiar music could be considered as an enhancer not only of SC in AD, but also of the general cognitive state," suggesting that familiar music intervention could be an important therapeutic

tool to improve the quality of life of these unfortunate patients (Arroyo-Anlló, Díaz, & Gil, 2013, p. 6).

Therapeutic Indications: Symptom Relief

Due to the cognitive, affective, and behavioral stimulatory responses elicited through both active and passive familiar music therapy, there are a diverse number of indications for the use of this therapeutic intervention with AD patients (Guetin et al., 2013). Music therapy arouses the recollection of autobiographical memories, evokes conversation through speech facilitation, alleviates anxiety and depression, and diminishes the occurrence of agitated outbursts.

Memory Loss

Memory loss is one of the most distinguishing symptoms of AD, gradually stealing away individuals' personal identities, recognition of loved ones, and most cherished lifelong experiences. Fortunately, however, "emotionally charged memories are better encoded and remembered than those with a low affective valence," allowing patients to recall sentimental events more easily than unremarkable ones, reinforced through the stimulation of personally significant music (Guetin et al., 2013, p. 629). The temporary recollection of such meaningful autobiographical memories can help trigger patients' remaining cognitive abilities, potentially leading to a revival of verbal expression as they attempt to communicate these past experiences (Guetin et al., 2013).

Speech and Communication Deficits

Language deficits often develop as a result of deteriorating neurological capabilities, which can lead to the inability to generate spontaneous speech, naming difficulties, comprehension impediments, and discourse deficiencies. Discourse deficiencies are comprised of empty speech, ambiguous words, and useless repetitions. As the disease progresses, AD patients attempt verbal communication less frequently, indicating the need for therapeutic

interventions that address these manifestations. Singing lyrics, interestingly enough, seems to target the language centers in the brain, improving language capabilities through the promotion of verbal fluency, articulation, and speech production (Dassa & Amir, 2014).

In one study exploring the impact of familiar music on conversational abilities in patients with middle to late stage AD, the researcher encouraged the six participants to accompany her in singing carefully selected songs, each followed by conversation facilitated through the use of open-ended questions. As intended, the topics of each question evoked related memories that then spurred conversation pertaining to relevant concepts, experiences, or emotions. The results of this study revealed several other enlightening findings, especially about the unexpectedly enduring conversational abilities that remain well into the later stages of AD. The researcher discovered, for example, the act of singing elicited spontaneous remarks from the participants. These included comments expressing not only their individual enthusiasm and pride for successfully partaking in the interventions, but also the unity and sense of belonging they experienced as a group – an important revelation to note, for the inability of AD patients to communicate with others can result in feelings of isolation and loneliness (Dassa & Amir, 2014).

Depression and Anxiety

Depression and anxiety become apparent as the patient shows signs of disinterest and apathy towards social interaction and/or previously enjoyed activities (Guetin et al., 2009). As each manifestation of AD progressively worsens, the patient's sense of identity unravels, which according to theoretical literature is closely connected to escalated feelings of depression and anxiety. When researchers then explored this proposed connection between identity, mood, and quality of life, the resulting empirical evidence was corroboratory (Caddell & Clare, 2012). Thus,

interventions that preserve patients' sense of identity can lessen the burden of depressive and anxious symptoms.

In order to assess the efficacy of therapeutic musical intervention on both depression and anxiety, Guetin et al. (2009) conducted a randomized, controlled study utilizing receptive music therapy, in which the experimental group participated in weekly music therapy sessions guided by the 'U' technique, while the control group took part in reading sessions conducted under the same conditions. The music therapy group demonstrated significant symptomatic improvements in anxious and depressive behaviors, which was sustained for up to eight weeks following the cessation of treatment, confirming music therapy as an effective therapeutic tool for the short-term alleviation of anxiety and depression (Guetin, 2009).

Agitation

Agitated behaviors are a particularly troublesome manifestation of the disease, occurring in approximately 90% of AD patients. Agitation in AD patients can be exhibited aggressively or non-aggressively through both physical and verbal mannerisms (Cox, Nowak, & Buettner, 2011). The incidence of agitated behaviors tends to fluctuate intermittently throughout the course of the disease, with the severity of symptoms remaining fairly consistent over time. Often occurring simultaneously with unmet personal needs, periods of under- or over-stimulation, or interactions hindered by communication impediments, agitation is viewed as an expression "of despair, frustration, boredom, or loneliness" (Ledger & Baker, 2007, p. 331). Music therapy, however, has the ability to lessen agitated behaviors by heightening patients' level of arousal, redirecting their attention, creating a less fearful environment, providing an outlet for self-expression, and potentially reinstating meaning back into their lives (Ledger & Baker, 2007).

One study conducted in a Specialized Care Unit explored the impact of relaxing music on the overall agitation level commonly present during dinnertime. Using the Cohen-Mansfield Agitation Inventory (CMAI) to measure the participants' agitation behavioral level, Hicks-Moore et al. (2005) discovered there was a reduced incidence of agitated behaviors during the two weeks that relaxing music accompanied dinnertime, in comparison to music-free dinnertimes during the other observed two weeks. This musical intervention yielded not only a reduced level of agitation, but also an increase in socialization and communication among residents (Hicks-Moore, 2005).

Theories of Mechanisms of Action

While ample evidence exists that demonstrates the beneficial effects of music-based interventions for AD patients, there is an unfulfilled research gap which has yet to specify the potential mechanisms of action responsible for the witnessed effects of music therapy (Peck, Girard, Russo, & Fiocco, 2016). This specific body of knowledge, once better explored and established, would provide the means to legitimize music therapy as an evidence-based treatment for AD, rather than a non-pharmacological alternative intervention (Ahn & Ashida, 2012).

Through advances in medical imaging technologies, “music has been shown to activate regions associated with emotion, reward, and decision-making,” (Peck et al., 2016, p. 950). Both the ventral medial prefrontal cortex (VMPFC) and orbitofrontal cortex are deeply involved in emotional regulation and decision-making, and work closely with the limbic system to integrate emotional and sensory information (Peck et al., 2016). As the disease interrupts neural connections and leads to brain cell death, these structures eventually become comprised; however, these areas are some of the last to encounter these destructive effects, thus allowing the stimulatory properties of music to influence AD patients well into the final stages of the disease (Tomaino, 2011).

As hypothesized by Peck et al. (2016), there are three underlying mechanisms presumably responsible for the efficacy of music therapy, stemming from pathways that involve dopamine, the autonomic nervous system, and neuronal connectivity. While each independently plays a role in the neurocognitive responses to music, all three mechanisms of action are also closely intertwined (Peck et al., 2016).

Dopamine, a neurotransmitter vitally important in the regulation of reward and motivation, is partially responsible for learning, memory consolidation, and various aspects of

the reward system, such as acquisition and anticipation. Dopaminergic depletion is a damaging byproduct of AD, associated with cognitive impairment in patients due to the reduced availability of dopamine in limbic structures and decreased receptor binding. However, regions in the brain influenced by dopaminergic pathways, such as the hypothalamus and amygdala, have demonstrated responsiveness to music, leading researchers to ponder whether “music can be used to stimulate and strengthen dopaminergic pathways and interconnected brain structures that are commonly compromised in persons with AD” (Peck et al., 2016, p. 953). If proven scientifically effective, music therapy could then be utilized to specifically target these areas, ultimately enhancing AD patients’ reward systems and motivational drive (Peck et al., 2016).

Emotionally impactful music activates the autonomic nervous system, which induces physiological changes through sympathetic and parasympathetic activity. The sympathetic nervous system, responsive to louder, faster music, increases autonomic functions when aroused, such as blood pressure, heart rate, and respiration; whereas slower, relaxing music activates the parasympathetic nervous systems, sequentially slowing these physiological responses. In the case of AD patients exhibiting agitated behaviors, likely originating from heightened physiological arousal, studies have concluded that therapeutically relaxing music drastically reduces these symptoms – a result, researchers postulate, that may be attributable to the activation of the parasympathetic nervous system (Peck et al., 2016).

There is extensive neuronal connectivity throughout the brain, including the default mode network (DMN) which “is a system of interconnected brain regions that are active during resting state when individuals are awake and alert, but not actively engaged in directed attentional task” (Peck et al., 2016, p. 954). Many of the self-referential processes influenced by the DMN, such as introspection and autobiographical memory recollection, become impaired with the

progression of AD. Research suggests that the damaging effects of AD cause brain regions connected by the DMN to atrophy, leading to the network's dysfunction in areas of cognitive functioning, such as memory retrieval. Fortunately, studies have revealed that high activity music can activate the DMN, thus stimulating the network connectivity to an optimal level, allowing the patient's introspective ability, autobiographical memory retrieval, and memory processing to improve (Peck et al., 2016).

Nursing Implications

Due to the rapidly increasing prevalence of AD in the elderly population, there are limitless opportunities to integrate therapeutic music interventions into the scope of nursing practice, potentially including interdisciplinary collaboration between music therapists and nurses, educating family members and/or caregivers about the benefits of music therapy, or simply a bedside intervention to alleviate bothersome symptoms.

In both long-term care facilities and acute care settings nurses are frequently tasked with the responsibility of ensuring patients receive adequate nutrition, regular baths, and other daily self-care needs. The findings of the study conducted by Hicks-Moore et al. (2005), researching the effects of relaxing music on agitation levels during dinner time, may be applicable to nursing practice in a broader sense, perhaps demonstrating how the use of receptive music therapy with AD patients can facilitate a more alert and oriented state of mind, thus allowing nurses to perform activities of daily living (ADLs) without the agitation and resistance that often hinder the fulfillment of such tasks. Caregivers, for example, have reported instances of engaging patients through singing while simultaneously assisting with ADLs – a tactic that bedside nurses might implement when performing similar activities (Carson, 2012).

When verbally and physically aggressive behaviors arise from agitation, such as shouting, kicking, punching, etc., nurses must consider their own safety and the patient's risk of self-harm. Utilizing therapeutic music techniques to subdue an agitated individual may not only decrease the need for physical and chemical restraints, but can also provide the facility with a noninvasive, cost-effective alternative (Witzke, Rhone, Backhaus, & Shaver, 2008). Even with potentially provocative situations, such as painful blood draws or wound dressings, the nurse can use music as preventative tool to avoid aggressive encounters altogether (Carson, 2012).

The interdisciplinary teamwork that transpires between music therapists and nurses may be potentially beneficial, particularly during group sessions where continued assessment of patients' responses would, of course, be required. The nurse would likely assume this responsibility, additionally monitoring for any unsatisfactory or objectionable reactions elicited in the participants. During an exercise utilizing headphones, for example, the nurse would adjust the volume for each individual to ensure the optimal level of auditory stimuli was being provided (Witzke et al., 2008).

Another potential way in which music therapy could be integrated into the scope of nursing practice might be through the initial assessment of newly admitted AD patients into nursing homes, where nurses would examine any existing need for music therapy. Furthermore, nurses could play a role in the implementation of music therapy as well, possibly utilizing this therapeutic intervention as a means to engage the individual while providing patient-centered care, or while partaking in interdisciplinary teamwork, as discussed above. If nurses were to become this involved in the implementation of music therapy at the bedside, they could then educate patients' family members and/or caregivers on the numerous benefits of including music therapy in patients' treatment plans.

Limitations

Overall, the greatest limitations of this literature review include 1) a lack of clinical research aimed at understanding how music interacts with the underlying bodily systems, and 2) a lack of research studying the long-term effects of music therapy. A full list of limitations of the six articles that address familiar music therapy included in the review are listed in Table 1 below. The common limitations included small sample size (Dassa et al., 2014; Cox et al., 2011), participant variability (Ledger et al., 2007), no control group (Dassa et al., 2014; Cox et al., 2011), research bias or role conflict (Dassa et al., 2014; Cox et al., 2011), and a lack of standardized measurement instruments (Cox et al., 2011).

Conclusion

Music therapy offers AD patients an escape – a means through which these individuals can regain their sense of personal identity, recall their most significant life experiences, and once again recognize their beloved family and friends. Despite the progressive and incurable nature of AD, the continual utilization of therapeutic music intervention provides these patients with an opportunity to not only maintain a grasp on reality, but to reminisce on everything that brings joy and meaning into their lives. As sustained symptomatic improvement requires routine exposure to music therapy, caregivers, family members, nurses and other healthcare professionals must take it upon themselves to implement this uniquely beneficial intervention into all aspects of AD patients' lives, especially as they lose the means to do so themselves. For, the therapeutic use of music seems to present an unparalleled opportunity to enrich these individuals' quality of life once more – an invaluable gift, one that provides real comfort to the affected individual as well as his or her family. For humans at the end of life, our abilities having failed us, our best work and offerings long since past, it is but our memories and the love we share with others that provides a sense of self and satisfaction; any retrieval of these experiences, even if only momentary, is a blessing. That music can conjure such blessings is a wonder. It well behooves nursing professionals to facilitate this process through the application of music therapy.

Table 1: A Review of the Literature on the Effects of Familiar Music Therapy on Alzheimer's Disease

Author, Year, Level of Evidence (LOE)	Intervention	Sample	Outcomes Assessed	Results	Limitations
Guetin, S., Portet, F., Picot, M, Pommié, C., Messaoudi, M., Djabelkir, L., Olsen, A., et. al., 2009 LOE II	Individual receptive music therapy	N=15 treated group (individual, receptive music therapy) N=15 control group (reading sessions)	Anxiety and Depression	Patients in the treated group showed significant improvements in anxiety and depression, sustained up to 8 weeks after discontinuation of music therapy sessions.	Only studied patients in mild to moderate stages of AD.
Arroyo-Anlló, E., Díaz, J., Gil, R., 2013 LOE III	Familiar music stimulation	N=20 experimental group (familiar music stimulation) N=20 (unfamiliar music stimulation)	Impact of familiar music on self-consciousness (SC) in AD patients	Familiar music therapy can significantly maintain or improve aspects of SC in AD patients.	Music stimulation conducted in patient homes by caregivers. Length of each session questioned (2-4 min).
Dassa, A., Amir, D., 2014 LOE VI	Singing familiar songs	N=6 participants	Conversation	Familiar songs elicited past memories. Singing generated related conversation. Group singing elicited spontaneous verbal responses.	Small sample size. Researcher role conflict. No control group.
Cox, E., Nowak, M., Buettner, P.,	Live, familiar violin music played one-	N=7 participants	Agitated behavior	This intervention reduced short-	Small sample size. No control

2011 LOE IV	on-one			term agitated behaviors, and the total number of agitated behaviors decreased significantly.	group. Potential bias by the investigator. No suitable standardized measurement instrument available. Standardized measurement instrument designed for this specific study has yet to be validated.
Ledger, A., Baker, F., 2007 LOE III	Group music therapy	N =26 experimental group (group music therapy) N=19 control group (usual nursing and therapy care)	Agitation	The experimental group showed short-term reductions in agitation. There were no long-term significant differences between the groups.	Inter- and intra-participant variability. Low endorsement of CMAI (Cohen-Mansfield Agitation Inventory) behaviors.
Peck, K., Girard, T., Russo, F., Fiocco, A., 2016 LOE V	Music exposure	95 articles providing anecdotal and empirical evidence	Cognitive function, memory, potential mechanisms of action	This paper identifies three potential underlying mechanisms that may be responsible for music's effects on AD.	Limited existing research articles.

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