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Music Therapy to Reduce
Agitation Among Persons with Alzheimer's Disease: A Review of Literature

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Abstract

According to the Alzheimer's Association (2016), Alzheimer's Disease (AD) is diagnosed every 66 seconds resulting in this disease being the 6th leading cause of death in the United States. Among other signs and symptoms, agitation is one of the most challenging symptoms that patients and caregivers must try to control using nonpharmacological therapies or prescribed pharmacological treatments. Among many professions, music therapy has been used to specifically lower the levels of agitation in AD patients. Live music, "sing a long's", using instruments, and listening to a song of the patients' choice have all been shown to reduce agitation behaviors as measured by the Cohen-Mansfield Agitation Inventory (CMAI) scale. As it is estimated that by the year 2050, that 16 million people will have been diagnosed with AD, it is important to look at how to reduce agitation levels without the additional side effects of pharmaceutical medications. This literature review will explore evidence based literature supporting how music therapy is an effective treatment of lowering agitation levels for adults with Alzheimer's Disease. In addition, personal experiences using music to reduce agitation is presented with a description of the role of a music therapist, and the settings in which they practice.

The Effectiveness of Music Therapy to Reduce
Agitation Among Persons with Alzheimer's Disease

Different Types of Dementia

The Diagnostic and Statistical Manual of Mental Disorders, 5th Edition, (DSM-V) is used to help physicians in diagnosing an individual with dementia. Classified as a neurocognitive disorder, it may fall under a major or mild neurocognitive disorder (Alzheimer's Association, 2016). For a mild neurocognitive disorder, the person must have some cognitive decline, but not enough to interfere with every day activities. In comparison to a major neurocognitive disorder, a person in this category has had a significant cognitive decline, needing more assistance in everyday activities (Alzheimer's Association, 2016). There are many different types of dementia's, and the 2016 Alzheimer's Disease Facts and Figures guide overviews all the similar and different types.

Vascular cognitive impairment (VCI), previously called multi-infarct or post-stroke dementia, accounts for ten percent of dementia cases. This is caused by blood vessels being blocked or damaged, leading to a stroke. Initial symptoms are the inability to make decisions, as well as the inability to plan or organize (Alzheimer's Association, 2016).

Lewy bodies are abnormal clumps of the alpha-synuclein proteins that grow in neurons (Alzheimer's Association, 2016). Once they start accumulating in the cortex of the brain, Dementia with Lewy Bodies (DLB) occurs. Persons with DLB are more likely to show initial symptoms of sleep disturbances visual hallucinations, and imbalance (2016).

Another type of dementia is called frontotemporal lobar degeneration (FLTD). This is when the early symptoms consist of changes in personality and behavior, accompanied with difficulty producing and comprehending language (Alzheimer's Association, 2016). Nerve cells

from the frontal lobe and temporal lobes shrink, causing the upper layers of the cortex to become spongy (Alzheimer's Association, 2016).

Although Parkinson's disease (PD) is not a type of dementia, the symptoms of dementia can occur in a person with PD (Alzheimer's Association, 2016). Those with PD become slow paced, rigid, and have tremors. Similar to DLB, alpha-synuclein appears deep in the brain in an area called the substantia nigra. It is believed that these are the cause of degeneration of the dopamine producing nerve cells (Alzheimer's Association, 2016).

Another type of dementia is called Creutzfeldt-Jakob disease. This is a rare and rapid fatal type of dementia that roots from a misfolded protein, causing other proteins to misfold and malfunction (Alzheimer's Association, 2016). The cause of this dementia is hereditary or unknown, but a strong belief is that it could be caused by eating from cattle that had mad cow disease (Alzheimer's Association, 2016).

Alzheimer's Dementia

According to the National Institute of Neurological Disorders and Stroke (2015), Alzheimer's dementia affects 5 million Americans age 65 and older, expected to double every five years. Along with brain changes, different signs and symptoms are shown throughout each stage of AD. According to Dr. William C Shiel (2017), "A symptom is a phenomenon that is experienced by the individual affected by the disease, while a sign is a phenomenon that can be detected by someone other than the individual." The difference between signs and symptoms will be clearly identified throughout the paper.

Etiology

The causation of AD starts with malformation of structures in the brain. There are three features of the brain that are most affected in a person with Alzheimer's; amyloid plaques,

neurofibrillary tangles, and the connection between brain cells (Alzheimer's Association, 2016). In a healthy aging brain, cells' axons and dendrites are responsible for transmitting messages from neuron to neuron (Alzheimer's Association, 2016). Found in between brain neurons are amyloid plaques, which develop at a slow rate. In persons' with AD, a toxic protein peptide called beta-amyloids begin to deposit into the plaques. Once there is an overproduction of these plaques, the cells begin to lose the ability to function and transmit messages (Alzheimer's Association, 2016).

The second contributor in the development of Alzheimer's are neurofibrillary tangles (Alzheimer's Association, 2016). In a healthy brain, neurons are supported by microtubules, that help neurotransmitters transfer information down the axons. A protein called tau binds to the microtubules to help them stabilize, with a certain number of phosphate molecules attached. In AD, an increased amount of phosphate molecules become attached, causing the tau to separate from the microtubules and join with other tau threads. Once enough tau threads are combined, tangles are formed in the cell, also known as neurofibrillary tangles. Because of the lack of support in microtubules, the neuron's internal transport network collapses, damaging the ability of neurons to communicate (Alzheimer's Association, 2016).

With the combination of amyloid plaques and neurofibrillary tangles disrupting the communication of neurons, this leads to the loss of connection between cells, and ultimately cell death and brain atrophy (Alzheimer's Association, 2016).

Mild Cognitive Impairment

Mild cognitive impairment (MCI) is a disease that affects memory and thinking skills, but in this stage, do not experience the personality changes of a person with AD. There are two types of MCI: amnesic and non- amnesic. A symptom of a person with amnesic MCI is forgetting

information that was previously recalled easily, while a symptom of a person with non-amnesic MCI lacks the ability to make sound decisions. A sign of both are motor function problems such as moving the legs and feet (Alzheimer's Association, 2016). According to the National Institute of Aging (2008), 8 out of 10 people diagnosed with amnesic MCI develop AD within 7 years.

Early-Onset Alzheimer's (Mild Alzheimer's Dementia)

Those with Mild Cognitive Impairment may develop early-onset Alzheimer's (Mild Alzheimer's dementia). This typically will be diagnosed before the age of 65 and accounts for 5% of AD (Alzheimer's Disease Education & Referral Center, 2003). Signs of early on-set Alzheimer's can include memory loss, confusion of familiar places, taking longer to accomplish normal daily tasks, trouble handling money, poor judgement, loss of initiative, mood and personality changes, and increased anxiety and aggression (Alzheimer's Association, 2016). Some symptoms are disorientation, difficulty speaking, swallowing and walking. This is caused by the increased number of plaques and tangles leading to further continuation of brain and destruction of the cerebral cortex (Alzheimer's Association, 2016).

Middle Stage (Moderate Alzheimer's Dementia)

The middle stage is known as moderate Alzheimer's Dementia (moderate AD), the next level in which a person with Alzheimer's progresses. At this stage, language control, reasoning, sensory processing, and conscious thought are affected (Alzheimer's Association, 2016). Some symptoms are increased memory loss and confusion, shortened attention span, inappropriate outburst of anger, problems recognizing friends and family members, difficulty organizing thoughts and thinking logically, and inability to learn new things or to cope with new situations. Signs can include restlessness, agitation, anxiety, tearfulness, wandering, repetitive statements,

suspiciousness, irritability, loss of impulse control, and the inability to carry out activity that involve multiple steps (Alzheimer's Association, 2016).

Late on-set Alzheimer's (Severe Alzheimer's Dementia)

The last state of AD is called late onset Alzheimer's, also known as severe Alzheimer's dementia. Brain atrophy is at its highest as plaques and tangles have caused an increased amount of enlarged ventricles (Alzheimer's Association, 2016). The ability to recognize loved ones is diminished, and care is completely dependent on another person. Further symptoms are weight loss, seizures, skin infections, difficulty swallowing, groaning, increased sleeping, and lack of bowel control (Alzheimer's Association, 2016).

Agitation

One of the hallmark symptoms of AD is agitation, that typically starts to show in moderate AD. The medical definition of agitation according to Medline Plus (2014) is the "unpleasant state of extreme arousal. An agitated person may feel stirred up, excited, tense, confused, or irritable". According to Cohen-Mansfield and Billig (2008), in relation to dementia, agitation is characterized by verbal, vocal, or motor activity resulting from perceptible needs from the individual. Behaviors a person with AD may exhibit as a result of agitation is sleep disturbances, hallucinations, pacing, constant movement and restlessness, rechecking door locks and appliances, tearing tissues, displaying general emotional distress, uncharacteristic cursing and threatening language. Not only does agitation affect the person with AD, but the behaviors also affect the caregivers' ability to care for the person. According to a study done by Chapman and others (2012), agitation adds an increased rate of patient decline and adds to caregiver distress.

Treatment for Agitation

Currently there are two categories for treatment of agitation: behavioral interventions and prescription medications (Alzheimer's Association, 2004). Identifying the triggers for agitation should be completed first in order to select the best behavioral intervention. Often, the changes in the persons' environment could be the cause of agitation. This may include a change in the primary caregiver, living arrangements, traveling, hospitalizations, presence of unknown people, bathing, or being asked to change clothing. Recommended interventions by the Alzheimer's Association (2004) is to simplify the environment, simplifying the routine and task, allowing rest between multi step events, using labels for reminders, equipping doors with safety locks, and using night lights to reduce restlessness at night.

When behavioral interventions are not enough, medications can be prescribed to reduce agitation levels. Examples of these medications are citalopram, fluoxetine, paroxetine, sertraline, lorazepam, oxazepam, olanzapine, and risperidone (2004). Side effects of medications may include incontinence, instability, falls, or increased agitation.

Assessment of agitation levels: Cohen Mansfield Agitation Inventory

Although originally created in 1989, a common instrument currently used to assess agitation in a person with AD is the Cohen Mansfield Agitation Inventory (CMAI; Cohen-Mansfield et al. 1989). This instrument consists of 29 behaviors separated into four categories; physically aggressive, physically non-aggressive, verbally aggressive, and verbally non-aggressive. An AD person is evaluated by their caregiver based on the frequency of agitation behaviors exhibited on a 7 point ranging scale (CMAI; Cohen-Mansfield et al. 1989). There are many different scales within the inventory that doctors, nurses, caregivers, and researchers have modified to fit their needs. See appendix A for a copy of the original scale.

Music Therapy

According to the American Music Therapy Association (AMTA), music therapy is “a clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program” (AMTA, 2016). In the 1800s, the first recorded music therapy intervention in an institutional setting was used. Shortly after, the use of music to influence health and behavior started after World War I and II, where musicians played music for veterans suffering from physical and emotional trauma. Following in the 1900s, the National Society of Musical Therapeutics, National Association for Music in Hospitals, and the National Foundation of Music Therapy were created. In 1940, the first music therapy training program was created at Michigan State University (AMTA, 2016).

Music Therapist

To be a certified music therapist a bachelor’s degree or higher must be obtained from an AMTA approved program. Clinical skills are developed through 1,200 hours of fieldwork. Students will learn how to assess the needs of clients, develop and implement treatment plans, and evaluate and document clinical changes. Then the student must pass the exam through the Certification Board for Music Therapist, being recertified every five years. Graduate programs and doctoral degrees can be further obtained if the students want to learn more in depth knowledge in clinical skills and research (AMTA, 2016).

Uses of Music Therapy in Healthcare

In addition to an effective therapy for convalescing veterans, music therapy can help those with an Autism Spectrum Disorder (ASD). A study completed by Whipple (2012), suggested that music therapy for young children with ASD improved communication,

interpersonal skills, personal responsibility, and play. Music therapy has also been shown to help those who have been through a crisis by understanding and expressing feelings of anxiety and helplessness, supporting feelings of self-confidence, and providing a safe environment for relaxation (American Music Therapy Association, 2016). For hospital patients, the use of music therapy has resulted in improved respiration, lower blood pressure, improved cardiac output, and reduced heart rates.

Music therapy has been effectively applied to those diagnosed with Alzheimer's population. Research has demonstrated that it reduces depression, enhances social and emotional skills, assists in recall and language skills, and is used to assess cognitive ability (American Music Therapy Association, 2016)

The following literature review will focus on how music therapy reduces agitation among those with AD.

Literature Review

A total of 8 studies were reviewed to examine the short and long term effects of the use of music therapy with persons with AD in different settings. As stated earlier, music therapy can only be implemented by a professional holding board-certification in music therapy, as well as licensure where applicable. Although all studies claim to use "music therapy" as the treatment, only four of them include procedures implemented by appropriately credentialed and/or licensed professionals, thus, extreme caution should be used when attempting to draw inferences from the studies whose procedures were implemented by non-music therapists.

Jennings and Vance (2002) studied the short term effects of music therapy on different types of agitation in adults with AD. Sixteen AD participants from an adult day care center were given the CMAI assessment by a day care staff person to measure levels of agitation. A week

later, patients were given 30-minute music classes once a week for four consecutive weeks. The CMAI assessment was then given to the patient 45 minutes to one hour after music class. The music therapist sang familiar old songs, encouraged sing-alongs, and gave the patients instruments to increase engagement. At the end of four music classes, the CMAI agitation scores were found to have been significantly reduced. More specifically, there was a reduction in pacing, aimless wandering, cursing or verbal aggression, unwarranted request for attention, complaining, and repetition mannerisms. This study strongly suggests that music therapy can reduce agitation levels.

A study completed in a private residential care facility in north Queensland in 2005 sought to determine the impact of live music on agitation in persons with AD. Seven participants received three individualized, live, 18-minute violin performances. Each participant was video recorded before, during, and after each session. A researcher and an observer viewed the tapes while completing the CMAI to note scores before, during, and after the performance. The songs played were composed between 1898 and 1950, and included common tunes such as Home Sweet Home, Jingle Bells, Hokey Pokey, Singin' in the Rain, and more. Pacing and aimless wandering was displayed by four participants before the performance. When the music began, wandering stopped. Restlessness was displayed for all subjects before the performance, but during the performance, stopped as well. A total median number of 5 agitation behaviors decreased to a median of 1 during and after the performance suggesting that live music may reduce agitation levels in persons with AD (Cox, E., Nowak, & Buettner., 2011).

Zare, Ebrahimi, and Birashk (2010) completed a study consisting of 26 persons with AD between four nursing homes. Persons in the experimental group were divided into sub-groups; listening to preferred music individually, listening to preferred music as a group, listening to

non-preferred music as a group, and a group signing preferred music. The non-preferred music chosen was Vivaldi's *Four Seasons*. The CMAI was used to score each persons' behavior before the therapy and a month after the therapy was conducted. In summary, the results were statistically significant with the conclusion that music therapy reduced agitation levels in AD patients (Zae, Ebrahimi, Birashki, 2010).

Another type of music shown to reduce agitation is "flash song therapy." This was examined by Makamura & Iizuka (2013) on eight patients with AD at home setting. Flash song therapy is a method of music therapy developed by the experimenters' consisting of favorite songs sung by the patients one after another, totaling more than 20 songs used per session. The idea was that the quick changes of songs and rhythms stimulated the brains and the patients felt pleasure and satisfaction afterwards. Nurses and caregivers reported that after each session, the immediate effects of the songs were that those with AD were joyful, spoke about themselves confidently, were calmer, and less agitated (Nakamura & Iizuka, 2013).

A pilot study was completed to evaluate the effectiveness of individualized music to manage the agitation levels of eight elderly individuals with AD in a long term care facility. Gerdner (2005) used the CMAI to record baseline data, then again after the 3 month intervention period to determine if there was a reduction in agitation levels. Each participating staff and family member willing to play music for one of the eight individuals were given \$15 to purchase music of the persons' choice. For two months, each person was played their selected music for 30 minutes daily depending on the time of the day agitation levels were at their highest. Along with the 30 minutes a day, the same music was played on an as needed basis. Within the two months of intervention, agitation levels decreased by 23.6 percent during the day time and 15.4 percent during the night time. When staff and family interviews were conducted, CNA's reported

that playing the individualized music “calmed them down,” “They were more cooperative- instead of fighting,” and “When a patient started to cry, I did about 5 minutes of the music- she stopped crying.” (Gerdner, 2005) Being able to choose music to make the therapy more individualized.

In 2013 a study conducted in a nursing home aimed to examine the effect of individual music therapy on agitated levels as well as the effect on psychotropic medication and quality of life. Forty-two residents with AD were split into 2 groups; one group receives six weeks of individual music there while the other group gets six weeks of standard care. Individuals that received music therapy were seen by clinicians (trained to give music therapy) on an average of 33.80 minutes, every other week, totaling to 12 sessions. Categories of music played were vocal or instrumental improvising, singing, dancing/moving, listening, or other activities. Baseline data was taken a week 0, using the CMAI scale to measure agitation, a list of prescription medications used, and a quality of life assessment. By the end of week 14, agitation levels decreased in those who were assigned music therapy, while agitation levels increased in those assigned to standard care. Quality of life was also increased in the music therapy group, while decreasing in the standard care group (Ridder, Stige, Qvale, & Gold, 2013)

Brotons and Marti (2003) ran a pilot project in Spain to measure the applications of music therapy on those with AD and other related disorders for agitation, communication, and memory. The participants lived at home, had to be mobile, and have never had exposure to music therapy prior to the investigation. Along with the CMAI scale, the Barthel Index, the Philadelphia Geriatric Centre Instrumental Activities of Daily Living, and Neuropsychiatry Inventory and Dementia Scale were used to determine the effects of music therapy. Participants were given a total of 10 sessions of music therapy including music listening, singing, instrument

playing, and movement/ dance. By the end of 12 days it was recorded that the patient's social behaviors and emotional states improved, and as expected, agitation levels decreased (Brotons & Marti, 2003)

The final article reviewed is a case-control study in Iceland conducted by Svansdottir and Snaedal (2006). In a psychotic ward and nursing home setting, thirty- eight participants with AD were assigned randomly to a music therapy group and a control group. The music therapy group received 18 sessions of music therapy, 30 minutes long, three days a week for six weeks, while the control group continued with no change in care. The music used was chosen based on familiarity, sang with a guitar and various instruments the participants could use. Along with paranoia and hallucinations being decreased, activity disturbances, aggressiveness, and agitation were significantly reduced after the six weeks of treatment (Svansdottir & Snaedal, 2006).

Personal Experiences and Reflections with Persons with AD

Assisted Living and Live Music

Starting in December 2013 I worked at an assisted living facility. About twice a week there was live music entertainment that the residents could choose to attend which began at 6:30 pm, following their dinner hour. . The session was scheduled for one an hour and a half, with the performer providing musical entertainment by singing, accompanied with a guitar, piano, harmonica, or without any instrument. As a caregiver, it was my job to assist the residents to their room afterwards, helping them get ready for bed. After working there for about a few months, I was able to identify when a patient was agitated, the triggers that led to the behaviors and methods to providing a calming environment. I noticed that during the performances, the residents would clap along, socialize with one another, smile, and would thank the caregivers and performer for playing. Once assisted back to their bedrooms for a shower, a decrease in

physically aggressive behaviors such as scratching, hitting, and kicking was noticed. Patients that were known to wander out of rooms would wander less then days without the live entertainment. A verbal non-aggressive behavior that noticeably decreased was complaining for attention. My co- workers and I would document a change in their behaviors to later review as a group at the end of the week. We consistently concluded that agitation behaviors occurred less frequently on days that live music entertainment was provided.

In-home Caregiving and Classical Music

In 2014 I started caring for a bed bound 75-year-old man who was diagnosed with AD a year prior. With physical therapy, occupational therapy, and nursing visits all being done at the home and in the same room, he was confined to this room unless his daughter took him outside. I believe that being confined added to his increase in agitated behaviors. He exhibited behaviors such as scratching himself, trying to get out of bed, general restlessness, screaming, verbal aggression, repetition, complaining, negativism, and constant unwarranted request for attention daily. His daughter told me that a long time favorite artist was Frank Sinatra. One afternoon after the occupational therapist left, the patient continuously tried to get out of bed. I turned the volume up on a Frank Sinatra song and noticed a change in the patient's behavior, He asked, "Hey, is this Fly me to the Moon, by Frank Sinatra?", and started singing along, with a noted decrease in agitated behavior. From that day forward I played a Frank Sinatra CD during times I knew he would display agitated behaviors including the morning during a bed bath, while waiting breakfast to be made, before and after therapies, and at night to listen to before sleep. Playing music allowed for easier time with therapists, and less stress on the caregiver and patient.

My future use of using music in a variety of settings

As a caregiver for persons with AD and a behavioral technician for children with ASD, a staff instructor who works with foster kids with behavior problems, and a future occupational therapist, music therapy has captured my interest. As a caregiver, I saw firsthand how music reduced agitation behaviors in persons with AD. As a behavioral technician, music is used in a child's behavior plan to help with refocusing. As an instructor I can see how playing music reduces angry outbursts from children with behavior problems. If a patient experiences pain while performing an exercise during my future occupational therapist visit, I can test if playing music reduces the pain level. Music therapy has shown to benefit many different types of health populations, and will continue to play an important role in therapy.

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Appendix

THE COHEN-MANSFIELD AGITATION INVENTORY - Long Form

Please read each of the 29 agitated behaviors, and circle how often (from 1-7) each was manifested by the resident during the last 2 weeks:

	Never 1	Less than once a week 2	Once or twice a week 3	Several times a week 4	Once or twice a day 5	Several times a day 6	Several times an hour 7
1. Pace, aimless wandering	1	2	3	4	5	6	7
2. Inappropriate dress or disrobing	1	2	3	4	5	6	7
3. Spitting (include at meals)	1	2	3	4	5	6	7
4. Cursing or verbal aggression	1	2	3	4	5	6	7
5. Constant unwarranted request for attention or help	1	2	3	4	5	6	7
6. Repetitive sentences or questions	1	2	3	4	5	6	7
7. Hitting (including self)	1	2	3	4	5	6	7
8. Kicking	1	2	3	4	5	6	7
9. Grabbing onto people	1	2	3	4	5	6	7
10. Pushing	1	2	3	4	5	6	7
11. Throwing things	1	2	3	4	5	6	7
12. Strange noises (weird laughter or crying)	1	2	3	4	5	6	7
13. Screaming	1	2	3	4	5	6	7
14. Biting	1	2	3	4	5	6	7
15. Scratching	1	2	3	4	5	6	7

	Never 1	Less than once a week 2	Once or twice a week 3	Several times a week 4	Once or twice a day 5	Several times a day 6	Several times an hour 7
16. Trying to get to a different place (e.g., out of the room, building)	1	2	3	4	5	6	7
17. Intentional falling	1	2	3	4	5	6	7
18. Complaining	1	2	3	4	5	6	7
19. Negativism	1	2	3	4	5	6	7
20. Eating/drinking inappropriate substances	1	2	3	4	5	6	7
21. Hurt self or other (cigarette, hot water, etc.)	1	2	3	4	5	6	7
22. Handling things inappropriately	1	2	3	4	5	6	7
23. Hiding things	1	2	3	4	5	6	7
24. Hoarding things	1	2	3	4	5	6	7
25. Tearing things or destroying property	1	2	3	4	5	6	7
26. Performing repetitious mannerisms	1	2	3	4	5	6	7
27. Making verbal sexual advances	1	2	3	4	5	6	7
28. Making physical sexual advances	1	2	3	4	5	6	7
29. General restlessness	1	2	3	4	5	6	7