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THE EFFECT OF MUSIC ON THE MEMORY OF INDIVIDUALS WITH ALZHEIMER'S DISEASE

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Elizabeth is a sophomore Communication Sciences and Disorders major from Orange, Texas. She is immensely interested in topics concerning how clinical research can be applied to practical practice, especially among the geriatric population, which was a motivating factor for her to research into non-pharmaceutical treatments of Alzheimer's disease.

ABSTRACT

Alzheimer's disease is a degenerative cognitive condition. Recent research has explored non-pharmaceutical treatments such as music therapy for those affected by this illness. This paper aims to consolidate current knowledge related to music therapy and aspects of memory (long-term, short-term, and mnemonic) in patients with Alzheimer's disease. This paper also highlights some shortcomings in current research, as there is much work to be done before music therapy can be used as a viable treatment for Alzheimer's disease.

The most common form of dementia, Alzheimer's Disease, is an ailment that currently affects approximately fifty million people, a figure that is expected to triple by 2050 due to prolonged life expectancy (Moreira et al., 2018). The disease does not currently have a cure, but many resources are being used to find methods to slow the effects of the disease, with hopes that these treatments will eventually lead to a cure. One such non-pharmaceutical treatment is the use of music therapy, which studies have revealed to be more effective at promoting memory than spoken word, in addition to being a more effective treatment for memory than other forms of cognitive stimulation (Palisson et al., 2015). Some studies prove that long-term memory is improved through the use of music therapy, helping patients access memories of events that happened long ago. Music therapy has the ability to be used as a mnemonic device for these patients, serving to facilitate the learning of patterns and gestures both immediately and in delayed recall. Additionally, short-term memory may be vastly improved by music therapy. Research on music therapy as an intervention for Alzheimer's is a more recent topic of study that still requires further research for complete understanding. Although more research is needed on the subject, ultimately music therapy is a device that is able to increase cognitive function in individuals with Alzheimer's Disease, improving these patients' memories, and acting as steps towards discovering a cure for the disease.

While all experiments and studies considering music therapy as a treatment for Alzheimer's differ, many researchers agree that short-term memory can be improved for patients with the disease. In a study designed by Moussard et al. (2014), eight Alzheimer's patients and six healthy individuals learned different sets of gestures to music before being prompted to recall the information. The intervention of music in the study organized by Moussard et al. (2014) "showed a modest advantage for the music condition, as seen in the significantly greater percentage of gestures recalled in immediate recall" (p. 7). When the results of immediate recall after music was played were compared to the other conditions, the authors uncovered "an advantage in the music condition compared to the metronome condition" (Moussard et al., 2014, p. 6). An improvement in short-term memory can also be seen in the research study written by Simmons-Stern et al. (2010). To examine how music affects the recognition of associated verbal information, Simmons-Stern et al. (2010) presented thirteen Alzheimer's patients and fourteen control individuals with song lyrics on a computer screen that were spoken or sung with full accompaniment and then asked both groups to recall the lyrics. This study demonstrates how music furthers the short-term memory of individuals with Alzheimer's as "patients with [Alzheimer's] performed better on a task of recognition memory for the lyrics of songs when those lyrics were accompanied at encoding by a sung recording than when they were accompanied by a spoken record" (Simmons-Stern et al., 2010, p. 3166).

Although these studies are designed effectively and provide clear associations between music therapy and improved short-term memory for individuals with Alzheimer's, each study has limitations that have the potential to influence the results of the studies. Moussard et al. (2014) acknowledge that the largest source of bias for their study is their small sample size. They explain the significance of this limitation, specifically due to the fact that larger sample groups allow for the "generalization of results to the [Alzheimer's] population" (p. 8). Simmons-Stern et al. (2010) describe their limitations in accordance with a result of their study that surprised them. While patients with Alzheimer's had improved performance on a recognition task, "contrary to [their]

hypothesis, healthy older adults showed no such benefit of music ... [which] suggest[s] a fundamental difference in the encoding and retrieval processes ... between patients with [Alzheimer's] and healthy older adults" (Simmons-Stern et al., 2010, p. 3166). This peculiarity creates space for much conjecture on the cause behind this difference, prompting Simmons-Stern et al. (2010) to consider if, due to attentional deficits in individuals with Alzheimer's, music heightens arousal which would "account for the effect of condition in the patient group" (p. 3166).

Studies on non-pharmaceutical treatments of the disease may also focus on the effect of using music as a mnemonic tool to increase learning ability in individuals with Alzheimer's disease over other associate accompaniments. Palisson et al. (2015) designed a study examining twelve Alzheimer's patients and fifteen controls in which participants learned texts that were presented through song, film, or without association to see whether specifically music assists with verbal learning or if any associate context allows for increased learning abilities for individuals with Alzheimer's. The article demonstrates that music truly is the ideal form of treatment, as a "musical association during the encoding stage facilitates learning and ... this advantage is enhanced ... since the nonmusical association provided a benefit ... but to a lesser extent" (Palisson et al., 2015, p. 510-511). A similar study was conducted by Moussard et al. (2014). As priorly mentioned, Moussard et al. (2014) aimed to "investigate the potential of music as an aid for learning and retention of non-verbal information" by examining groups of individuals with Alzheimer's disease and comparing them to a healthy control group (p. 7). The study demonstrates that music can be used as a mnemonic tool to learn gesture-sequences in patients with Alzheimer's, explaining that "the fact that [Alzheimer's] participants showed a modest increase in performance in the music condition ... while controls ... did not seem to be influenced by accompaniment (either music or metronome) suggest that music is of greater benefit" (Moussard et al., 2014, p. 8).

Despite both of these studies helping to increase knowledge on the subject of music therapy for patients with Alzheimer's, certain limitations arise from the articles. The limitations presented by Moussard et al. (2014) are presented earlier and circulate around the issue of the small sample sizes in the study, ultimately increasing bias. Palisson et al. (2015) have a number of limitations, which they identify can likely be accounted for if future studies replicate and improve upon the study that they designed. The main limitations that they describe are "the small sample size, the homogeneity of the [Alzheimer's] group, ... [and] the characteristics of the texts" (Palisson et al., 2015, p. 512). Some of the patients with Alzheimer's had more advanced progression than only individuals with moderate Alzheimer's, meaning the results of the study lose some validity. Additionally, the texts used in this study rhymed, which Palisson et al. (2015) explains could possibly have been easier to learn by their nature, so some of the learning could be attributed to the rhyming nature of the texts. Finally, "since the same text was always presented in the same condition, the possibility that the text associated to the music condition was inherently easier to remember cannot be totally ruled out," but as Palisson et al. (2015) describes, further research studies could likely help to resolve or prove this specific limitation (p. 512).

Studies on the positive potential held by music therapy for individuals with Alzheimer's also support the idea that long-term memory is improved in individuals with the disease when they are treated with music therapy. El Haj et al. (2015) demonstrate this through their studying of

involuntary memories associated to music as seen in sixteen individuals with Alzheimer's, sixteen older adults, and sixteen young adults. The results of the study were explained to demonstrate “the enhancement of autobiographical recall of [Alzheimer's] patients in music exposure conditions” (El Haj et al., 2015, p. 245). Not only were more memories caused by the presence of music, but “music-evoked autobiographical memories were found to be more specific ... and to induce less executive control than memories evoked in silence” (El Haj et al., 2015, p. 243). Another study that strengthened the correlation was conducted by Arroyo-Anlló et al. (2013) in which forty Alzheimer's patients would listen to music before filling out a questionnaire on self-consciousness. The questionnaire that each patient had to answer after their music therapy is a really interesting indicator of self-consciousness, because all of the questions would be extremely easy to answer for individuals without Alzheimer's, such as the first name of one's spouse or mother (Arroyo-Anlló et al., 2013, p. 2). The answers to the questions are basic enough information that they are an effective indicator of the patients' states. Additionally, to be completely self-conscious of their situation, Alzheimer's patients must remember their diagnosis or at the very least know that something is not right. Overall, due to “the beneficial effect on [self-consciousness] ... the results confirmed [their] hypothesis that patients with [Alzheimer's] who listened to familiar songs had an enhanced self-consciousness” (Arroyo-Anlló et al., 2013, p. 6).

Despite the positive results of the research studies that support the idea that music therapy improves long-term memory, there are limitations in these studies that cause the results to have a certain amount of bias, ultimately reducing the reliability of these results. In the study by El Haj et al. (2012), they identify the absence of a full episodic memory assessment as a limitation. This is because “the evaluation of this subjective experience is of great importance ... to attribute the specificity and the mood enhancement accompanying involuntary memories to the state of auto-noetic consciousness” (El Haj et al., 2012, p. 244). Additionally, the claims that music evokes involuntary memories is a claim that is indirect, meaning that “an alternative explanation could be that music-evoked memories were generated through a strategic search that benefited from the music cues ... [so they] cannot be sure whether [the] results are due to cued recall versus non-cued recall or to involuntary versus voluntary recall” (El Haj et al., 2012, p. 244). A final limitation discussed by El Haj et al. (2012) is the interpretation of the specificity variable, which causes a ceiling effect “in the young and older groups, which renders the specificity interaction between age groups and condition difficult to interpret” (p. 244). Arroyo-Anlló et al. (2013) also identify many limitations within their study. One such limitation is the fact that their “results did not permit [them] to distinguish whether cognitive deterioration in the control group was due to the course of the disease or the music intervention, to both, or even to other aspects” (Arroyo-Anlló et al., 2013, p. 6). Another limitation pointed out by the authors considers the music chosen for the study. Participants listened to “a famous music score ... but the authors did not explain whether this music was familiar or unfamiliar to all participants,” a variable that has the potential to disrupt the reliability of the article due to inconsistencies of knowledge on the piece by the participants (Arroyo-Anlló et al., 2013, p. 7).

Through many studies examining the effects music therapy has on the cognitive abilities of individuals with Alzheimer's, the ultimate consensus of researchers is that, despite the positive

association between music therapy and cognition, further research must be done to eliminate limitations and better understand how Alzheimer's is improved through this non-pharmaceutical treatment. Future research should aim to be extremely intentional with sample sizes, making sure they do not eliminate too many individuals in the research, but continuing to make sure that additional unwanted variables change the results of the research. Additionally, future research should examine topics that have already been examined, but go into further examination, improving upon previous studies by attempting to eliminate limitations. A major problem in many current research studies on music therapy and Alzheimer's is that so many studies are being conducted on so many ideas, but no research is completely explored. Therefore, future studies should focus on continuing the work of existing research instead of delving into new ideas.

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