The impact of music therapy on the cognitive, behavioral and psychological symptoms of dementia: a literature review

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ABSTRACT

This review explored the existing literature on the topic of music therapy and dementia. Specifically, the review considered publications that assessed the impact of music therapy on the cognitive, behavioral and psychological symptoms of dementia. PubMed, Google Scholar and the McMaster Library databases were used to access publications via keyword searches. Terms used included: cognition, music therapy, behavior, psychological, dementia, and MMSE. Selection was limited to studies incorporating music therapy approaches to improve dementia symptoms. As such, music-based interventions and integrated approaches were excluded from this review. Additionally, studies that assessed long term effects of music therapy were excluded. A total of 12 studies were reviewed in this paper. Outcomes found that music therapy had significant impact on cognitive abilities in persons with dementia (PWD) in 5 out of 9 studies. Results also indicated that 9 out of 10 studies found music therapy to be an effective non-pharmacological intervention for improving psychological and behavioral symptoms of dementia. While considering the results revealed through this search, methodological implications and limitations are also investigated.

OBJECTIVE

To assess the existing literature on the impact of music therapy on cognitive, behavioral and psychological symptoms of dementia.

DEMENTIA
Background

According to the World Health Organization (WHO), dementia is defined as "a syndrome in which there is a deterioration in memory, thinking, behaviour and the ability to perform everyday activities" (2017). The deteriorations induced by dementia are far more severe when compared to those accompanied by normal aging. Symptoms of dementia include forgetfulness, feeling lost in familiar areas, having difficulty in communicating, and wandering. Dementia is described as a syndrome that has a chronic or progressive course, resulting in increasingly severe symptoms over time. Individuals in late stage dementia may become unable to recognize loved ones and may also require a great deal of assisted self care (WHO, 2017).

Dementia presents itself in multiple forms, Alzheimer's disease (AD) being the most common (WHO, 2017). The WHO estimated that in 2017, AD was involved in 60-70% of dementia cases (2017). Aside from AD, other forms of dementia include vascular dementia and dementia with Lewy bodies, where unusual amounts of protein build up inside neurons (WHO, 2017).

Awareness and concern about dementia is warranted given its alarming prevalence worldwide. In 2017, the WHO found that 50 million individuals were affected by dementia globally (2017). Additionally, around 10 million cases cropped up each year. Future approximations suggest that in 2030, 82 million people will be affected by dementia; this value is expected to almost double by 2050, with an estimate of 152 million individuals (WHO, 2017).

Figure 1.1: Section of Dementia Infographic (WHO, 2017)

Interventions

In the face of high prevalence rates and nonoptimal life outcomes, the need for effective dementia interventions has become more urgent than ever. Treatments for PWD tend to be centered around early diagnosis and optimized quality of life (WHO, 2017). Physical illnesses that co-occur with dementia may also be treated (WHO, 2017).

Current methods can be divided into pharmacological or non-pharmacological treatments. Pharmacological therapy used for dementia tends to show only short term ameliorations to symptoms, usually spanning 6-18 months (Tanna, 2013). It is important to note that even such temporary improvements can greatly improve quality of life for PWD and their loved ones. Examples of such therapies include cholinesterase inhibitors and memantine, two drugs that mitigate the impact of loss of neural cells that send signals via acetylcholine (Tanna, 2013).

On the other hand, non-pharmacological treatments aim to improve dementia or related symptoms without the use of medication. A few examples include cognitive behavioral therapy, interpersonal therapy and integrative therapeutic techniques (mhGAP). Additionally, as explored in this review, music therapy has also been proposed as a non-pharmacological method of improving dementia symptoms.

Music Therapy in Dementia Care

Music therapy is a healthcare discipline practiced worldwide. Music therapy involves using music and musical elements professionally to improve and optimize quality of life (World Federation of Music Therapy(WFMT), 2011). This encompasses physical, social, communicative, emotional, intellectual and spiritual health. Music therapy can be used in medical, educational and ordinary daily environments. Examples of music therapy goals include improving social skills, emotional expression, increasing self confidence, improving fine and gross motor skills and increasing concentration. With respect to dementia, music therapy has aimed to improve cognitive, behavioral and psychological symptoms (WFMT, 2011).

DATABASE SEARCH

This review explored existing literature on the impact of music therapy on cognitive, behavioral and psychological symptoms of dementia. Publications focused on music-based interventions or integrated approaches were excluded in order to isolate results obtained from solely music therapy interventions. Additionally, literature focused on the long term impacts of music therapy on dementia symptoms was also excluded. PubMed, Google Scholar and McMaster Library databases were used. Keywords included: music therapy, dementia, cognition, behavior, psychological and MMSE. A total of twelve publications were included:

1. The Effect of Reminiscence Music Therapy Sessions on Changes in Depressive Symptoms in Elderly Persons with Dementia. Sato Ashida, 2000, USA

2. The Impact of Music Therapy on Language Functioning in Dementia.
   Brotons and Kroger, 2000, USA

3. The Temporal Limit of Cognitive Change from Music Therapy in Elderly Persons with Dementia or Dementia-Like Cognitive Impairment: A Randomized Controlled Trial.
   Bruer et al., 2007, Canada

4. STAM Protocol in Dementia: A Multicenter, Single-Blind, Randomized, and Controlled Trial
   Ceccato et al., 2012, Italy

5. Effects of Group Music Intervention on Behavioral and Psychological Symptoms in Patients with Dementia: A Pilot-Controlled Trial. Choi et al., 2009, South Korea

6. The Impact of Group Music Therapy on Depression and Cognition in Elderly Persons With Dementia: A Randomized Controlled Study (Chu et al.). Chu et al., 2014, Taiwan

7. A Preliminary Study of Music Therapy Programming for Severely Regressed Persons With Alzheimer's-Type Dementia. Clair and Bernstein, 1990, USA

8. Effect of Music Therapy on Anxiety and Depression in Patients with Alzheimer's Type Dementia: Randomised, Controlled Study (Guétin et al.). Guétin et al., 2009, France

9. Efficacy of Music Therapy in the Treatment of Behavioral and Psychiatric Symptoms of Dementia. Raglio et al., 2008, Italy

10. Behavioral and endocrinological evaluation of music therapy for elderly patients with dementia. Suzuki et al., 2004, Japan

11. Music therapy-induced changes in behavioral evaluations, and saliva chromogranin A and immunoglobulin A concentrations in elderly patients with senile dementia. Suzuki et al., 2007, Japan

12. Music therapy in moderate and severe dementia of Alzheimer's type: a case–control study Svansdottir and Snaedal, 2006, Iceland

METHOD

Each study utilized its own respective method for assessing the impact of music therapy on PWD. Below is a summary chart:

Figure 1.2: Table of research designs of reviewed studies, listed alphabetically.

Study	Year	Research Design
Ashida	2000	Experimental design with each participant serving as own control.
Brotons and Kroger	2000	Within subjects design, with counter-balancing of music and group conversation conditions.
Bruer et al.	2007	Randomized control trial.
Ceccato et al.	2012	Multicenter, single-blind, randomized and controlled trial.
Choi et al.	2009	Non-random selection to music intervention or usual care group.
Chu et al.	2014	Prospective, parallel-group design with random assignment to experimental or control conditions.
Clair and Bernstein	1990	Randomized selection, experimental research design.
Guétin et al.	2009	Single-centre, comparative, controlled, randomized study, with blinded assessment of results.
Raglio et al.	2008	Random assignment to experimental and control conditions.
Suzuki et al.	2004	Experimental design with music therapy and control group. Randomization unmentioned.
Suzuki et al.	2007	Experimental design with music therapy and control group. Randomization unmentioned.
Svansdottir and Snaedal	2006	Case-control study with random assignment.

INTERVENTIONS

Each study utilized unique music therapy interventions. These schedules are summarized below:

Figure 1.3: Table of music therapy interventions amongst reviewed studies.

Study	Number of Subjects	Intervention Schedule	Type of Music Therapy Intervention
Ashida, 2000, USA	N= 30	5 blocks of music therapy treatment. *Group therapy.*	Reminiscence focused music therapy.
Ceccato et al. 2012, Italy	N= 51	45 minute sessions, twice weekly for 12 weeks (24 total). *Group therapy.*	STAM-Dem protocol: for rehabilitation of cognitive functions in individuals with dementia. Four phases: stimulus-movement association, reaction to acoustic stimuli, shifting attention and orderly and inverted repetition.
Clair and Bernstein 1990, USA	N= 3	30 minute sessions weekly for a 15 month period. *Group therapy.*	Two music therapists facilitated sessions of music, rhythm playing and singing. Improvements in gross and fine motor movements were prioritized.
Bruer et al. 2007, Canada	N= 28	Sessions were administered for 45 minutes, once a week. *Group therapy.*	Music therapy was accessible to subjects for 7 years prior. More than 90% of ward members participated in weekly music therapy programming. Interventions included: hello songs, singing, movement components such as instrument playing.
Brotons and Kroger 2000, USA	N= 26	30 minute sessions, twice a week, for a total of 8 sessions. *Group Therapy*	Music therapy interventions were done according to sessional topics: animals, flowers, spring, St.Patrick's day/United States. Pictures utilized to encourage discussion and reminiscence in conversation controls. Hello song, topical songs, conversation, goodbye songs.
Choi et al. 2009, South Korea	N= 20	50 minute sessions, thrice weekly for a consecutive 5 week period. *Group therapy.*	Singing songs, making and playing instruments and song drawing and writing. Four phases: establishing rapport, improving cognitive functions, playing musical instruments (assisting in muscle ability), and enjoyment for subjects.
Chu et al. 2014, Taiwan	N= 104	30 minute sessions, twice a week for 6 weeks (total= 12). *Group therapy.*	Themed sessions: musical instrument activity, therapeutic singing activity, music listening, hand function/attention rehabilitation, music activity, traditional festival music, and group improvisation.
Guétin et al. 2009, France	N= 30	18 months of sessions with a 6 month follow up period.	Receptive music therapy method utilized: music chosen from personal tastes. Music listening via headphones, mask given to avoid visual stimuli.
Raglio et al. 2008, Italy	N = 59	30 music therapy sessions for 30 minutes each over a 16 week period. *Group therapy.*	Non-verbal music therapy: rhythmic and melodic instruments, sound-music performances.
Suzuki et al. 2004, Japan	N= 10	1 hour sessions, twice a week, for 8 weeks (16 total). *Group therapy.*	Singing songs (Japanese music from periods earlier in subjects' lives), playing percussion instruments. Opening and ending song including names of patients.
Suzuki et al. 2007, Japan	N= 8	1 hour sessions, twice per week for a three month period (25 sessions in total). *Group therapy.*	Greeting song (with date), singing of familiar nursery rhymes and songs, hand-bell performance, flute and piano accompaniment, Furusato song to end session. High consistency between sessions in terms of music therapy programming.
Svansdottir and Snaedal 2006, Iceland	N= 47	6 weeks of therapy followed by 4 week observation period. *Group therapy.*	Icelandic songs were played by the music therapist. Participants listened to and sang songs, with room to play music or dance if desired.

COGNITIVE ASSESSMENTS

Selected studies in the review examined the impact of music therapy on the cognitive abilities of PWD. Though not all studies listed below looked at cognition primarily, they did include cognitive evaluations through at least one measure. The most commonly utilized assessment tool was the Mini Mental State Exam (MMSE). In the study by Chu et al., a Chinese specific modified version of the MMSE was used.

Often referred to as the Folstein test, the MMSE is utilized in assessing cognitive capacity (Kurlowicz, 1999). The standard version includes five areas of cognitive evaluation:
1. Orientation
2. Registration
3. Attention and calculation
4. Recall
5. Language

The maximum obtainable score on the MMSE is 30 points. Ranges have been designated within these 30 points in order to categorize level of cognitive impairment in PWD. Scores lower than 23 suggest cognitive impairment (Kurlowicz, 1999). The MMSE is widely used given its high validity and reliability (Kurlowicz, 1999). Scores are most accurate when the test is administered multiple times by trained individuals. However, it should be noted that given the nature of the MMSE test, individuals who have visual or auditory deficits may show lower scores (Kurlowicz, 1999). Similar issues present themselves when individuals with communication disorders or those who lack literacy in the English language complete the MMSE. Given these potential barriers, the MMSE assessment should be used carefully in order to obtain a valid measurement of cognitive ability (Kurlowicz, 1999).

Studies below also incorporated alternative evaluation techniques, such as the Western Aphasia Battery (WAB) (Bruer et al., 2007), attention matrices, digit span exercises and prose memory tests (Ceccato et al., 2012). An overall summary of the cognitive measures utilized within this review are summarized on the following page:

Figure 1.4: Table of cognitive measures utilized to assess PWD in 9 studies, listed alphabetically.

Study	Country	Year	Cognitive Measure Utilized
Brotons and Kroger	USA	2000	MMSE Western Aphasia Battery (WAB) for language assessment
Bruer et al.	Canada	2007	MMSE
Ceccato et al.	Italy	2012	* MMSE * Attentional matrices: selective attention assessments within a visual scanning task * Forward and reverse digit span exercise: reproduction and reversal repetitions * Immediate and Deferred Prose Memory test (MPI and MPD): prose read to subject, recall once and after 10 minutes.
Choi et al.	South Korea	2009	MMSE
Chu et al.	Taiwan	2014	MMSE: Chinese adaptation, developed by Guo et al. in 1988. Total of 11 items.
Clair and Bernstein	USA	1990	No specific assessment tool mentioned.
Raglio et al.	Italy	2008	MMSE
Suzuki et al.	Japan	2004	MMSE
Suzuki et al.	Japan	2007	MMSE

BEHAVIORAL AND PSYCHOLOGICAL SYMPTOMS

This review also included studies that surveyed the impact of music therapy on behavioral and psychological symptoms of dementia. Given that this is quite a broad category, a few specific behaviors were considered:

1. Overt behaviors
2. General well-being (mental health, quality of life)
3. Clinical symptoms (relating to anxiety and depression)

Behavioral and psychological symptoms were considered together in this review. This was due to the fact that both areas were difficult to tease apart given their bi-directional effects on each other.

In assessing psychological symptoms, some measures commonly utilized were the Geriatric Depression Scale (GDS) and the Geriatric Quality of Life (GQoL) tool. The GDS provides a consistent and reliable method to identify depression in elderly individuals (Choi et al.). The GDS

scale is composed of yes or no questions, making it an easy assessment to administer and understand (Choi et al.). The GQoL aims to assess psychological and physical health, as well as social relationships and life satisfaction (Choi et al.).

The Neuropsychiatric Inventory-Questionnaire (NPI-Q) was also used often within these studies. It was developed from the standard NPI in order to assess neuropsychiatric symptoms in clinical cases (Cummings). The NPI-Q is composed of yes/no questions and 3 or 5 point scale evaluations (Cummings). It is a quick assessment tool which covers behaviors including but not limited to delusions, agitation, anxiety and appetite (Cummings).

The Behavior Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD) was also utilized in studies by Suzuki et al. (2007) as well as Svansdottir and Snaedal. This instrument evaluates disturbances in PWD, specifically those diagnosed with Alzheimer's disease (Svansdottir and Snaedal). A few other assessment tools were also utilized and are listed below.

Figure 1.5: Table of behavioral and psychological measures used in 10 papers, listed alphabetically.

Study	Country	Year	Behavioral measure used
Ashida	USA	2000	* Video tapes recorded. * Cornell Scale for Depression in Dementia
Ceccato et al.	Italy	2012	Cohen Mansfield Agitation Inventory (CMAI): 29 items, completed by caregiver to evaluate agitation in elderly individuals. Ranges from 1-7 points. * GDS
Choi et al.	South Korea	2009	Neuropsychiatric Inventory-Questionnaire (NPI-Q)
Chu et al.	Taiwan	2014	Chinese Version of Cornell Scale for Depression in Dementia (C-CSDD)
Clair and Bernstein	USA	1990	Behavior categories established, recorded by observer through video footage.
Guétin et al.	France	2009	Hamilton scale (anxiety measure) and GDS.
Raglio et al.	Italy	2008	* NPI * BPSD (behavioral and psychological symptoms of dementia) scores
Suzuki et al.	Japan	2004	* N type Mental States Scale (NM scale) * N type Activities of Daily Living (N-ADL) * Multidimensional Observation Scale for Elderly Subjects (MOSES)
Suzuki et al.	Japan	2007	* Behavior Pathology in Alzheimer's Disease Rating Scale (BEHAVE-AD) * Gottfries-Brane-Steen Scale: qualitative differences evaluated in individuals with dementia.
Svansdottir and Snaedal	Iceland	2006	BEHAVE-AD

COGNITIVE BASED RESULTS

Significant Cognitive Impact (5/9)

In assessing cognitive impact, 5 out of 9 studies indicated positive changes through the use of music therapy with PWD. The study done by Chu et al. suggested that group music therapy sessions were effective in slowing the deterioration of cognitive abilities, specifically short term recall capacity (Chu et al., 2014). Similarly, Ceccato et al.'s work indicated that music therapy, through the STAM-Dem protocol, was effective in improving cognitive functioning in elderly PWD (Ceccato et al., 2012). One such change in cognition was increased episodic verbal long term memory capacity (Ceccato et al., 2012). In the study by Bruer et al., significant improvements were found in MMSE scores calculated immediately after music therapy intervention and the next morning.

Furthermore, 2 out of 5 studies found significant positive impact to assessment subcomponents. First, the study by Brotons and Kroger indicated that music therapy significantly impacted speech content and fluency components of the spontaneous speech subscale in the Western Aphasia Battery (WAB) (Brotons and Kroger, 2000). However, no significant differences were found in the overall Aphasia Quotient score between music and conversation groups (Brotons and Kroger, 2000). In the same vein, the study by Suzuki et al. (2004) found that the language subcomponent of the MMSE showed improvement, although overall scores did not. These were still counted as significant positive impact given that they improved subcomponents of the WAB and MMSE tests.

No Significant Cognitive Impact (4/9)

Conversely, 4 out of 9 studies concluded that there were no significant cognitive changes before and after music therapy interventions with PWD. In the study by Choi et al., results showed that MMSE scores did not significantly differ between experimental and control groups (Choi et al., 2009). Similarly, the study done by Clair and Bernstein suggested that music therapy had no effect on the cognitive abilities of PWD. Throughout the intervention period, deteriorations in cognitive and social abilities continued (Clair and Bernstein, 1990). The study by Raglio et al. also found no significant change in MMSE scores post music therapy intervention (Raglio et al., 2008). Lastly, the study by Suzuki et al. found that there were no significant MMSE score differences immediately after intervention (Suzuki et al., 2007).

BEHAVIORAL AND PSYCHOLOGICAL BASED RESULTS

Significant Behavioral and Psychological Impact (9/10)

Overall, 9 out of 10 papers that focused on these aspects of dementia found significant positive changes post music therapy. Results from the paper by Chu et al. indicated that group music therapy was consistently effective in reducing depressive symptoms in elderly PWD (Chu et al., 2014). Choi et al. found that music therapy significantly impacted GDS, GQoL and NPI-Q values in PWD (2009). Similarly, Raglio et al. found that NPI scores were improved in the music therapy groups, as individuals with moderate to severe dementia showed reduced behavioral and psychiatric symptoms (Raglio et al., 2008).

Suzuki et al.'s first paper (2004) found that Multidimensional Observation Scale for Elderly Subjects (MOSES) scores improved in the irritability section (Suzuki et al. 2004). Additionally, Suzuki et al.'s (2007) paper found that BEHAVE-AD scores with respect to paranoid and delusional ideation were reduced significantly in PWD post intervention. Similarly, Svansdottir and Snaedal found that group music therapy resulted in significant decreases in activity disturbances, aggressiveness, and anxiety in the treatment group (Svansdottir and Snaedal, 2006). The study by Guétin et al. found improvements in Hamilton Scale scores for anxiety and GDS scores (Guétin et al, 2009).

Clair and Bernstein's study found sustained maintenance of music therapy participation. This was often the only time subjects were able to properly interact with others during the week (Clair and Bernstein, 1990).

Lastly, Ashida's paper suggested that reminiscence focused music therapy improved depressive symptoms in elderly subjects with dementia. Mood and social skills of subjects were also significantly better following music therapy sessions (Ashida, 2000).

No Significant Behavioral and Psychological Impact (1/10)

Results from Ceccato et al. found no significant changes in GDS or Cohen Mansfield Agitation Inventory scores post-music therapy (Ceccato et al., 2012).

A more comprehensive table of results is available on the next page.

Figure 1.6: Summary of overall results.

1	Ashida	Significant decrease in depressive symptoms following 5 days of reminiscence focused music therapy.
2	Brotons and Kroger	WAB test scores (speech content and fluency within spontaneous speech subscale) improved with music therapy compared to conversation control sessions (facilitated by therapist). No significant change between pre and post treatment MMSE scores.
3	Bruer et al.	MMSE scores showed significant next morning improvement in music therapy group. Effects had dissipated by following week, showing no difference in cognitive abilities between experimental and control.
4	Ceccato et al.	No significant changes in GDS or CMAI scores (caregiver completed). Attentive skills, episodic verbal long term memory capacity, deferred components MPI and MPD all showed improvement in subjects who were involved with the STAM-Dem.
5	Clair and Bernstein	Deteriorations in cognitive and social abilities through treatment. Maintenance of music therapy participation was observed, which often was the single time subjects were able to properly interact with others.
6	Choi et al.	No significant difference between MMSE scores when comparing baseline and after treatment. GDS and GQoL scores improved. NPI-Q: significant improvements to agitation, aggression, severity and distress, hallucination, irritability for the music therapy subjects compared to baseline and control group.
7	Chu et al.	C-CSDD: decreases in depression observed with group music therapy. Group music therapy stalled cognitive deterioration (Effects observed 1 month post intervention). MMSE improvements shown slightly in individuals with mild and moderate dementia, though not severe dementia. Most improvement was in recall function in group music therapy.
8	Guétin et al.	Improvements in Hamilton Scale scores (anxiety) and GDS scores (depression).
9	Raglio et al.	Improved NPI scores in experimental group. BPSD scores relating to delusions, anxiety, irritability, aberrant motor activity were ameliorated. MMSE scores did not change significantly.
10	Svansdottir and Snaedal	BEHAVE-AD scores improved: decreases in aggressiveness and anxiety. Temporal effects: BEHAVE-AD scores did not last well past four weeks.
11	Suzuki et al. (2004)	No significant change to MMSE total scores. Subscale of language showed significant amelioration. MOSES: irritability scores were reduced.
12	Suzuki et al. (2007)	GBS: "different symptoms common in dementia" scores showed significant amelioration in the music therapy group. BEHAVE-AD scores for paranoia and delusion improved. No significant MMSE differences post music therapy intervention.

OVERALL RESULTS

Given that 5 out of 9 studies found improvements in cognition of PWD, music therapy may be an effective non-pharmacological intervention to use in dementia care. However, more research should be done in order to confirm its efficacy in improving cognitive capacity. This review suggested that positive changes to cognition currently seem to be centered around memory capacity and general MMSE scores, which points to further hypotheses that should be tested. It may be possible that music therapy as an intervention works best in targeting certain areas of cognitive functioning. If researched, this could be leveraged to improve outcomes for PWD. Further research would also build credibility for music therapy as a non-pharmacological intervention for dementia, especially given that the current literature found 4 out of 9 studies to show no positive improvement to cognition. These 4 studies included Choi et al., Raglio et al., Suzuki et al. (2007), and Clair and Bernstein. The first three studies found no significant differences in MMSE scores between control and music therapy intervention groups. Clair and Bernstein found no significant results that supported the ability of music therapy to delay deterioration of cognitive abilities in PWD.

Another avenue for further research may be to investigate the improvements of subcomponents in the presence of unchanged overall test scores. For example, both Brotons and Krogers, as well as Suzuki et al. (2004), found that although music therapy did not impact MMSE/WAB scores entirely, there was significant impact found on language and speech subcomponents. These findings suggest that in future studies, the impact of music therapy on language and communication in PWD should be researched further.

Results from behavior and psychology based studies showed much more consistency than cognitive results from studies mentioned above. Of the publications reviewed, 9 found that music therapy interventions had a significant impact on behavioral and psychological symptoms of dementia. These studies incorporated a variety of scales, which provided greater support for the benefits of music therapy for PWD. GDS, GQoL, MOSES, BEHAVE-AD and Hamilton Scale scores were used to assess behavior and psychological state. Outcomes within these 9 studies were positive and encouraged implementation of music therapy within the lives of PWD.

While the majority of studies found a positive impact, Ceccato et al. found no differences in GDS and Cohen Mansfield Agitation Inventory scores in PWD post music therapy. There is a possibility that music therapy is not as effective in improving agitation in PWD, when compared to general improvements in quality of life, depression (as found in other reviewed studies), aggressiveness and mood. These findings pave the way for more specific hypotheses to be tested in future research. By carefully sorting out aspects of behavior and psychological state that music therapy *can* influence, interventions can be tailored better to PWD in order to bring about positive outcomes.

Though the paper by Ceccato et al. brings the impact of music therapy into question, the overwhelming positive outcomes of intervention in the first nine studies prompt belief that music therapy is indeed effective for PWD. Music therapy is suggested to be an effective non-pharmacological intervention in dementia care, specifically with respect to improving behavioral and psychological symptoms in these individuals.

FURTHER CONSIDERATIONS

This review highlighted a few important avenues for future research in music therapy and dementia. One major consideration for research revolves around what makes music therapy worth implementing in dementia care. For example, in the study by Clair and Bernstein, subjects continued to deteriorate in their cognitive, physical and social capacities during music therapy intervention. However, these PWD retained the ability to interact with people throughout the program. It was noted that for most PWD, this was the only time during the week where they could acceptably and effectively interact with others (Clair and Bernstein, 1990). Though this appears to be a relatively small change in light of other deteriorating faculties, it highlights the importance of perhaps considering music therapy as a supplemental intervention to improve outcomes for PWD.

Another important consideration in studies is comorbidity between dementia symptoms and mental health disorders. Interactions between dementia and other disorders may affect progression of dementia, and perhaps even responsiveness to interventions such as music therapy. An article by Fischer-Terworth and Probst suggested that depression symptoms can manifest differently in mild versus moderate dementia (Fischer-Terworth and Probst, 2012). As such, are assessment tools able to capture various manifestations of the same disorder? This calls into question the validity of psychological and behavioral measures used in studies. Understanding the relationship between dementia and other comorbid disorders, and their progression together, is an important consideration in research.

LIMITATIONS

A major limitation of this review was that the studies lacked methodological rigour. In order to obtain generalizable and consistent results, research should aim to create structure within studies that ensures reliability and validity. Otherwise, methodology may fail to assess the true cognitive, behavioral and psychological states of PWD. For example, given that dementia is a progressive neural degeneration affecting many functional capacities, measures used in research should ideally be clear and concise for PWD to respond to. Complicated or verbose measures may lack reliability and validity when assessing PWD, as they may have greater symptoms and capacities than what can be assessed. One such concern was voiced in the study by Ashida, where the Cornell Scale for Depression in Dementia was used (Ashida, 2000). Many researchers had suggested that depression symptoms in dementia were nearly impossible to assess, given that subjects simultaneously experienced deteriorating cognitive abilities and capacity to communicate those thoughts (Ashida, 2000). Such an example indicates the importance of utilizing carefully chosen measurement tools to accurately represent the true state of subjects.

Additionally, research should ideally involve randomization to protect validity while promoting generalizability of a study. For instance, Choi et al. was unable to utilize randomisation and thus used a non-randomised design to collect data. There are issues with this methodology, as we cannot be sure that those placed in the experimental condition are as similar as possible to those subjects in the control condition. This affects the outcomes of the study and the validity of the data. To support the use of music therapy in dementia care, randomized and strict research designs should be used.

Another limitation was that the trajectories of dementia patients could not be matched equally with each other. Given that dementia may present and progress differently in various individuals, the impact of music therapy may vary greatly between one PWD to the next. Further research is needed to understand the limits of music therapy in treating individuals of various dementia severity levels and ages. One step in the right direction was taken by Svansdottir and Snaedal, as they ensured most participants had shown stability with regards to their dementia symptoms for three weeks prior to music therapy intervention. This worked toward mitigating the issue of pre-existing differences in PWD, which inherently make it difficult to assess the impact of music therapy between control and experimental groups.

Another potential constraint was the impact of cultural expectations and norms on receptivity and willingness to engage with music therapy interventions. This was not elaborated upon in the reviewed articles and may have affected how open subjects were to participating in music therapy. Although this is an external consideration outside of the scientific methodology, it would still be an interesting factor that could have limiting effects on outcomes.

This review has only elaborated upon a few of the limitations found within these studies. However, in reality, there are multiple variables that must be accounted for in order to conduct rigorous studies with effective methodologies. The broader implications of sociocultural and personal aspects should also be considered when designing a study evaluating the use of music therapy in dementia care.

CONCLUSION

The twelve articles assessed within this review focused on music therapy and its potential in improving the cognitive, behavioral and psychological symptoms of dementia. A total of 5/9 articles showed significant positive cognitive outcomes of music therapy interventions with PWD. Additionally, 9/10 articles found significant positive impact of music therapy on behavioral and psychological symptoms of dementia. Research regarding cognitive symptoms requires further consensus and reliability, whereas outcomes for behavioral and psychological symptoms showed agreement but still require further investigation as well. Through improved methodological design, future research should aim to assess the impact of music therapy on carefully selected samples. Through increased cognizance and focus on controlled research methods, especially those most suited to dementia, the true impact of music therapy on PWD can be understood. Consequently, research can support and encourage the use of music therapy to improve outcomes for millions across the globe.

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