

The Efficacy of Music Therapy and Specific Musical Stimuli on People with Dementia: A Critical Review

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ABSTRACT

This essay sets out to examine the efficacy of music therapy as treatment for people with the diagnosis of dementia, in particular Alzheimer's Disease, with an aim to determine which therapeutic methods are most effective. It considers how the use of various musical stimuli in music therapy sessions can help improve symptoms of dementia. Three main pairs of contrasting types of stimuli are studied: familiar versus unfamiliar music, receptive versus interactive therapy, and group versus individual therapy sessions. The possible symptoms of dementia are numerous and can affect all aspects of day to day life for a patient. However, this essay focusses on the symptoms of memory loss, mental health, and behavioural changes. Difficulties with scientific research in this area are identified and considered for each mentioned study. The conclusions drawn are that there is significant evidence to suggest that music therapy is effective in treating some symptoms of dementia in general, but, only for familiar music was a strong case made for this being the most effective musical stimulus. No conclusions could be drawn for the other two pairs, showing that there remains a limited understanding of the most effective techniques that should be applied.

1. INTRODUCTION

This essay will examine what therapeutic effect music has on people with the diagnosis of dementia, and in particular Alzheimer's Disease (AD). AD is the most common form of Dementia, accounting for at least 60% of dementia diagnoses (Dementia UK n.d.; Gaugler et al. 2018). AD is a chronic degenerative disease of the cortical area of the brain, with symptoms including the insidious onset of memory loss, personality changes, loss of executive functioning and in its later stages, it can lead to significant physical disablement including incontinence and loss of mobility (Gaugler et al. 2018). Whilst there is no cure (as yet discovered) for Alzheimer's Disease (ibid), some pharmacological treatments can be used to counter some of the symptoms. However, there are some undesirable side effects of these which may hinder quality of life for patients (Franco and Messinger-Rapport 2006), and considering the lack of a cure, treatment for dementia patients essentially becomes a form of palliative care, in which quality of life is paramount. Therefore, non-pharmacological interventions have been developed and increasingly turned to over the past 20 years, such as cognitive training (Spector, Orrell, and Woods 2010), sensory stimulation (Hansen, Jørgensen, and Ørtenblad 2006), motor stimulation (Teri et al. 2003), and music therapy (Vink et al. 2004). Of these, music has been found to be one of the least expensive (Murphy et al. 2018), least harmful (Arroyo-Anlló,

Díaz, and Gil 2013), and most effective forms of therapy (this finding is to be further explored in this essay).

It has been established that the exposure of people with AD to music can help in many forms: improve their memory in a variety of ways (Simmons-Stern, Budson, and Ally 2010; Tsoi et al. 2018; Zhang et al. 2017; Ménard and Belleville 2009), improve mental health symptoms (Zhang et al. 2017; Sung, Chang, and Lee 2010), and increase interaction with the world (Tsoi et al. 2018; Tang et al. 2018). These themes will be explored in further detail in this essay, along with the differences in nature of various musical stimuli and the consequent responses. Three main pairs of contrasting types of musical stimuli seem to present themselves through analysing a variety of studies. These are: 1) familiar versus unfamiliar music, 2) receptive versus interactive therapy (regarding the level of active participation with the music), and 3) group versus individual therapy sessions. A focal point of this essay will be on further elucidating which therapeutic method, and which type or types of musical stimuli, are most effective in improving dementia symptoms, as well as to identify possible areas for further study.

Several review studies have been undertaken to attempt to quantify the relationship between exposure to music and its effectiveness in the treatment of dementia. The studies vary in the specific aspects of the topic, which symptoms are being focused on, and in their analytic approaches, but the conclusions reached are very similar. A few pertinent examples of these studies, which cover almost 15 years of research in the area of music and dementia, provide a helpful summary of the current level of understanding of this relationship.

An early study, by Koger et al. in 1999, conducted a meta-analysis of literature from previous years, including 21 empirical studies with a total of 336 subjects suffering from dementia symptoms in the review, with a focus on whether music therapy was effective in improving symptoms such as emotional and cognitive skills, and behavioural problems. They found that the effect of music therapy was highly statistically significant, but they were unable to determine the source of variability between studies – that is to say, they were unable to identify what exactly about the therapy was most effective.

A more recent review, by Sung et al. in 2005, focussed more specifically on the symptom of agitated behaviours in patients with dementia. They also specifically investigated the efficacy of the use of 'preferred music' in therapy sessions. Using

electronic databases with specified search terms, they identified eight research-based articles on which to base the review, and found relatively consistent results, indicating that preferred music is effective in improving agitated behaviours. However, this review also found that methodological limitations, such as the small sample sizes, hindered their ability to draw reliable conclusions from these results.

One final review, by McDermott et al. from 2013, attempted to address the need for insight into the mechanisms behind music therapy. Using a similar method to the previous study; conducting searches electronically but also by hand, significantly more studies were able to be included in their review, in total 18, which enabled them to identify distinctive strands of investigations: behavioural and psychological aspects, hormonal and physiological changes, and social and relational aspects. Once again, the musical interventions and the forms of therapy taken were diverse, which seems to be the recurring challenge in trying to identify what exactly in music therapy is effective on patients with dementia. This review found evidence for short-term improvement in several symptoms, but found a significant lack in long-term studies, and so it was unable to determine any possible long-term benefits of music therapy.

These three reviews show that throughout the years in which the relationship between music therapy and dementia has been studied, there has been plenty of evidence found for the efficacy of music therapy on improving the symptoms of dementia overall. However, there is still a significant gap in the research regarding the identification of what specific aspects of the therapy cause these improvements, and utilising them more deliberately for the long-term benefit of patients.

2. METHODOLOGICAL CONSIDERATIONS

There are several difficulties with scientific research in this area. Many studies are forced to rely on small sample sizes, and it is also difficult to run them to the gold standard of double blind randomised controlled trials; as whilst it may be possible for those patients receiving the therapy to be blind to the experiment, the health professional administering the therapy must be aware that they are doing so. Some experiments are still thorough with their scientific measures where possible. For instance, in Gallego and García's (2017) study on the effects of music therapy on cognitive, psychological and behavioural symptoms in AD patients, it was made sure that the professional performing the statistical analysis of the data was blind to the variable of the severity of the AD in the patients. There have been a range of both quantitative and qualitative studies carried out, allowing insight into both causal effects through statistical significance, and also giving greater understanding of the subjective experiences of individuals, which is of great importance considering the aim of improving quality of life through this therapy.

3. LIMITS OF SCOPE

Dementia-like symptoms may present in individuals who do not have a degenerative brain disease like AD, with causes such as depression, side effects from medications, and alcohol or other substance abuse. In these instances, these conditions may be reversed with treatment (Gaugler et al. 2018). The scope of this essay will be limited to dementia caused by degenerative diseases, as it is a study on the short-term effects of music therapy, rather than long-term effects or curative capabilities of music, and it is well established that any possible cure for the vast majority of dementia cases either does not exist or has not yet been discovered. Within this category of degenerative diseases, the scope will be limited to AD, and will not explore how the efficacy of therapy may differ for patients whose dementia is caused by other diseases such as Parkinson's or Huntington's. The essay will also be limited on its discussion of symptoms, mainly focussing on this specific set of symptoms: memory loss (amnesia), mental health, and behavioural changes. Other symptoms such as difficulty with language (aphasia), difficulty with motor tasks (apraxia), and psychotic symptoms, such as delusions or hallucinations, will be omitted. A brief introduction to these three groups of symptoms and the research around them follows.

Memory loss is perhaps the most well-known symptoms of dementia. Indeed, it is often one of the first symptoms to present in adults developing the condition (Heindel and Salmon 2004). However, until more recent years, the majority of research into music therapy as a treatment for dementia primarily focussed on the behavioural level, rather than the cognitive (Irish et al. 2006). There are several different types of memory: as well as long-term and short-term, there is implicit (or 'procedural') memory, and explicit memory, which is split into two further types, 'episodic' and 'semantic'. Any of these types may be affected by dementia. Several studies have been carried out regarding the efficacy of music therapy on these symptoms. Studies using both familiar music (Gómez Gallego and Gómez García 2017) and unfamiliar music (Simmons-Stern, Budson, and Ally 2010) stimuli have been carried out, as well as a variation of receptive and interactive therapies. Earlier studies (e.g. Sambandham and Schirm 1995) suggested the efficacy of music therapy as a memory trigger and means of communication, paving the way for further research, where memory is indeed often found to be impacted and improved by music therapy, with some studies finding statistical significance in their results to support this. However, there are some studies which claim to have established more fundamental limits of mnemonic benefit from music (Simmons-Stern et al. 2012), which must be considered when looking at the merits of therapy.

The deterioration of mental health in people with dementia is all too common a symptom, which has a significant and detrimental effect on quality of life. Depression has a high rate of occurrence, affecting up to 60% of dementia sufferers (Muliyala and Varghese 2010), and ostensibly has a relationship with the apathy and detachment from

surroundings which is so commonplace in care homes for elderly people. Anxiety is also often frequently observed (Gómez Gallego and Gómez García 2017), which may sometimes manifest itself in physical behavioural forms, such as agitation and aggression (Roy et al. 2009). There may be the occurrence of euphoria, though this is rare, and there is little research into the effect which music may have on this. There is a comparatively large amount of research into depression and anxiety, both in general reviews and more in-depth experimental papers. Both qualitative and quantitative studies have found evidence suggesting that music therapy is effective at treating and improving these symptoms, using a variety of musical stimuli. However, there is rarely follow up of the patients in these studies, meaning that it is impossible to tell whether the benefit from the therapy decreased once the therapy was stopped, and if so, for how long the patients continued to be in improved mental health.

4. DISCUSSION AND ANALYSIS

Memory Loss. Procedural memory is the unconscious ‘knowing how’ type of memory (Finn et al. 2016), for instance, knowing how to ride a bike. Episodic and semantic memory are both ‘knowing that’ types (ibid) in that they allow conscious recall of memories; the former regarding autobiographical experiences and events, for instance, remembering the first time you rode a bike; and the latter regarding facts, for instance, knowing the year Bradley Wiggins won the Tour de France. In healthy adults, episodic memory will usually become impaired over time through ageing, but semantic and procedural memory remain unaffected (Frisoni et al. 2017). However, in adults with dementia, all of these types of memory can begin to deteriorate (Arroyo-Anlló, Díaz, and Gil 2013).

Before considering studies which look specifically at the effect of music on memory in dementia patients in a therapeutic context, it is important to look at studies which investigate the relationship of music and memory on a more fundamental level, in order to establish the baseline upon which therapeutic measures have been developed. A particularly significant pair of studies should be considered first. The first study was carried out in 2010 by Simmons-Stern, Budson & Ally, and it laid the groundwork for research on this particular topic. The follow up in 2012 was conducted by Simmons-Stern et al., which further investigated the topic and highlighted limitations of the previous study.

The initial study had the objective to discover the effect of music, at the point of encoding of memories, on the later recognition of associated information. It has a focus on music as a tool for enhancing the learning of new information, rather than restoring memory or alleviating some of the symptoms of dementia, but the discoveries are nonetheless relevant. The sample size of AD patients is unfortunately small at only 13, with a control group of 14 healthy older adults. Here, the stimulus was unfamiliar music, specifically 80 children’s songs, which were screened to check for familiarity in both groups. Any songs which were later recognised were excluded from the data analyses. 40 of these songs were presented in a

combination of two of three possible ways: a visual, written version of the text, paired with either a spoken recording of the text (n = 20), or a sung recording with musical accompaniment (n = 20). After the participants had been presented with all 40 stimuli, they were then re-presented with all 80 original songs in ONLY the visual, written format, and asked to make an ‘old or new’ recognition judgement. ANOVA (analysis of variance) was carried out to evaluate accuracy within the AD group versus the control group, and to compare the efficacy of sung versus spoken stimuli. As expected, the results of the study confirmed that healthy older adults performed better on the recognition task as a whole ($p < .001$), and that, in agreement with the original hypothesis, AD patients performed better on the recognition task for the song lyrics accompanied by a sung recording ($p = .003$) than with a spoken recording. However, in contrast to the original hypothesis, the control group showed no statistically significant difference in recall of spoken rather than sung words. Two explanations for the cause of this outcome were proposed: firstly, that musical mnemonics allow dementia sufferers to compensate for impairments in areas where standard mnemonic methods would be applied by healthy adults, and alternatively, that music heightens arousal and engagement, therefore allowing for better concentration and thus, retention.

A small sample size is widely acknowledged in the world of scientific research as a limiting factor in study usefulness and validity, both in that it has a lower chance of finding a true effect, but also that any statistically significant result that is found is less likely to reflect a true effect (Button et al. 2013; Faber and Fonseca 2014). It is important that both papers by Simmons-Stern et al. are understood in this context (n = 13, and n = 12 respectively). However, this does not mean that the studies discussed do not raise important points and identify, despite a small sample size, statistically significant trends that merit further investigation.

The second study, carried out in 2012, used a similar but altered experiment to test the effect of music specifically on episodic memory. This was achieved by adding a test where the content of the song lyrics was relevant to the daily life of an older adult. Possible issues with the methodology of this study include: an even smaller sample of AD patients (n = 12), with a clinical diagnosis of only ‘probable’ AD, and the length of each session. 90 minutes, compared to the 30 minutes of the previous study, seems like a very long time, particularly for more elderly participants, to be expected to concentrate at a consistent level, which may skew the data to some extent. However, with the nature of the experiment being memory-based, spreading out the session may also affect the results, to the disadvantage of the earliest stimuli presented, so it is difficult to say how it may have been done better. In the general lyric content test, the findings were much the same as in the 2010 study, with the sung condition tasks having a higher rate of recognition across the board. However, in the specific lyric content test, participants, regardless of whether they were in the control group of healthy older adults or those with a probable diagnosis of AD, performed equally well in recognising sung versus spoken

lyrics, suggesting that music in fact did not enhance or improve participants' abilities when utilising episodic memory. Simmons-Stern et al. attribute this outcome to the difference between familiarity and recollection in the process of recognition, and specifically that musical encoding may affect and enhance familiarity significantly more than true recollection.

The outcomes of these two studies strongly suggest that music may have some impact on the memory of AD patients in a general manner, but that for episodic memory specifically, music does little to enhance or improve this. This is important to consider when looking at further studies into music therapy for improving the memory loss symptoms of dementia, as it establishes the limitations of what this therapy may be able to achieve. One such study comes from Gallego and Garcia (2017), which has a far broader investigative aim; looking at a wide variety of dementia symptoms and the clinical improvement profile of patients after undergoing six weeks of music therapy (some of the other tests applied and results found in this study will be discussed later on in this essay, here we will only draw on the information regarding memory). A larger sample size of patients ($n = 42$), with a range of mild ($n = 25$) to moderate ($n = 17$) AD symptoms, is used. The Mini Mental State Examination (MMSE), which evaluates orientation in time and place, attention, memory, language, and motor skills (Folstein, Folstein, and McHugh 1975), was administered at the beginning of the experiment, at three weeks of therapy, and at the end, after six weeks and twelve sessions, each time by the same health care professional. The music used in the sessions had been analysed by a questionnaire on musical preferences to rule out genres which the group might find unpleasant. The questionnaire is a validated tool, which may have provided an insight into important confounding factors, however much of the literature in this area is in Spanish (Sequera et al. 2015), so it is difficult to assess. Sessions were twice a week and comprised group therapy, with each group containing no more than twelve people; the sessions included a series of music based activities, of which the majority were interactive rather than receptive; varying from a welcome and farewell song, to playing along with instruments, to movement in time with the rhythm.

One issue with this methodology is the limits of group therapy; one-on-one sessions, as are typical of other common mental-health therapies, will be more tailored to the individual, and potentially therefore more successful, or perhaps just as successful but in a shorter timeframe. However, this issue is acknowledged, along with the possibility that their use of short tests administered several times (beginning, middle and end) may have artificially enhanced recall. The results from the MMSE portion of this experiment showed that memory had one of the most significant score improvements over the course of this treatment regimen, with a large effect size, and $p < .001$. The variation in severity of the dementia seemed to have no impact on this improvement, supporting the case for music therapy at any point during the development or later stages of the disease. However, little to no detail is explored within the

topic of 'memory', so it is very possible that the findings of this study align with the conclusion from Simmons-Stern et al. (2012); that music therapy may extend as far as improving general memory, but little further than that. These studies contrast in several ways regarding the use of musical stimulus. Contrast between these studies is the use of individual vs group sessions, and between receptive and interactive types of music participation.

This idea of episodic memory not being enhanced by music is supported by a 2009 study, the findings of which suggested that procedural memory may remain unaffected in patients with AD (in other words, their ability to play a musical instrument may remain), but that episodic memory, being their ability to recall and recognise both familiar and unfamiliar music, was impaired (Baird and Samson 2009). However, several studies into the benefits of music therapy on autobiographical memory give evidence to the contrary of this, including Foster and Valentine (2001), Irish, Cunningham and Walsh et al. (2006) which partially replicated the method of the previously listed study, and successfully replicated the findings, and El Haj, Fasotti and Allain (2012).

Irish et al. (2006) carried out a quantitative study to investigate the enhancing effect of music on autobiographical memory recall in individuals with mild cases of AD. The small sample size of patients with AD ($n = 10$) was explained by the fact that this was a preliminary study (this number later changed to 9 due to a technical failure during one of the tests, rendering the data for that participant null). A control group of healthy adults was also $n = 10$. The MMSE was used to assess the cognitive function of all participants prior to the experimental phase. They employed the AMI (Autobiographical Memory Interview) (Kopelman, Wilson, and Baddeley 1989) which is a validated measure of memory in elderly populations. This interview was carried out for each participant, under two conditions which alternated, the first was with background music, and the second was silence. The music used was the first movement of Vivaldi's 'Four Seasons'; 'Spring' (this is one of the main differences from the methodology of Foster and Valentine 2001, who used four conditions: Vivaldi, novel cafeteria noise, and silence). The exact methodology is somewhat unclear; the SART (Sustained Attention to Response Task) was used as a measure of sustained attention, but it is difficult to establish from the report at what point in the experiment this was carried out, and if the conditions of music and silence were in effect during this. However, the order of music and silence conditions were counterbalanced to reduce order effects. They also acknowledge that, whilst this is a quantitative study, the AMI is a largely interview-based measure, creating room for some amount of subjectivity, and potentially allowing for bias effects, such as participant expectations (considering that the sample consisted of individuals with AD, who by default have memory impairment, it should be expected that any effect this might have on skewing the data will be negligible). Data were analysed through SPSS (Statistical Package for the Social Science) and using ANOVA. The results were in agreement with the original hypothesis; in individuals with AD, results

from the AMI were significantly improved in the music condition compared to the silence condition ($p < .005$). This is in comparison with the control group of healthy individuals, where there was no improvement on total AMI in the music condition as compared to the silence condition ($p > .05$), as they achieved near ceiling scores across the board. Irish et al. use these findings to support the theory that music therapy has a positive effect on autobiographical memory recall.

The memory processes underlying this phenomenon, however, were not explored, either in Irish et al. in 2006, nor in the study which preceded it, from Foster and Valentine in 2001. This is something which El Haj et al. (2012a) aimed to address. They investigated what they called the 'involuntary nature' of autobiographical memories evoked by music, using another variation on the methodology of Foster and Valentine's original study. In this instance, there were three conditions: Vivaldi, silence, and the participants' own chosen music. This study came to the same fundamental conclusion, that music exposure enhanced autobiographical recall in AD patients, but furthermore that the music-evoked memories were more specific, and accompanied by a greater emotional impact. It was also found that retrieval time for memories increased for AD patients under the music condition.

It is important to note that all three of these experiments are conducted with a sample of participants with mild to moderate (a.k.a. early stage) cases of dementia, and that it has been found that in more advanced stages of the condition, music has less significant positive effect. This could lead to an area of further study, perhaps considering the role of music therapy in influencing the trajectory of the disease if implemented from an early stage.

Mental Health and Behavioural Symptoms. A review by Otera, Horike and Saito (2013) provides a good example of the effect of music, particularly familiar or meaningful music, on the spiritual and mental well-being on people with dementia. Based on the qualitative two case studies of two elderly Japanese women with dementia, which used a theoretical framework called the 'Musical Life Review' model (Sato 2011) to analyse the functions of the clients' meaningful songs, Otera et al. were able to illustrate the therapeutic method of simply guiding dementia sufferers through what they called a 'spiritual journey', through nine weekly sessions, of 30-45 minutes each, which were tailored to the individual's needs. Music was used both as a receptive and interactive tool, whereby, in some sessions, music would be listened to or discussed (regarding the historical significance and emotional relevance), and at other times, would be sung. In this instance, however, the music was not the focal point of the therapy but used instead as a method of enhancing and assisting the patients in the process of articulating their needs. This was done through the musically triggered emotions and memories, allowing the participants to recall more about their past and who they are, and bringing them more lucidity and orientation in the current time and place. This achieves both a furthering of the therapist's understanding of the client, and a reduction of anxiety symptoms. In healthy adults, any personal psychological conflicts may be tackled with regular therapy.

However, in adults with dementia, it may be far more difficult to access these conflicts in order to resolve them, due to symptoms such as memory loss. Therefore, whilst the music therapy in this case is not being used with the aim of alleviating the memory loss itself, it may help to bring these memories to the surface thereby providing an opportunity to, albeit temporarily, work through any unresolved internal problems and thus alleviate the symptoms of depression. These sessions were apparently successful, as both cases ended with what the study's authors describe as the 'appropriate level of task completion', although what specifically these tasks were is not explicitly stated.

A more specific study into the statistical significance of music in alleviating mental health deterioration symptoms is the previously mentioned Gallego and García experiment (2017). An explanation of the methodology of this paper in testing memory has already been given. Here the process undertaken for studying the mental health and behavioural profiles of the participants will be briefly described. The tool chosen for assessing behavioural function was the Neuropsychiatric Inventory (NPI) (Cummings et al. 1994), which assesses delusions, hallucinations, depression, agitation, irritability, aberrant motor behaviour, anxiety, aggressiveness, apathy, and disinhibition. To better study anxiety and depression, the Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith 1983) was utilised. This is a well validated and widely used tool. The data collected after three weeks and then six weeks of therapy showed some mixed results. Whilst NPI scores decreased in total, none of the differences between baseline and follow up scores for any of the individual symptoms showed any statistical significance ($p > .05$ on each example). However, scores on the HADS test improved, with a large effect size for depression. Anxiety and depression were shown to be amongst the symptoms most positively impacted by the music therapy.

5. CONCLUSION AND FURTHER RECOMMENDED RESEARCH

This essay has been an investigation into the efficacy of music therapy in patients suffering from Alzheimer's dementia, in particular in relieving the symptoms of memory loss, depression, and anxiety. The musical stimuli used in these therapeutic sessions varies, with three main categories of options established; being the familiarity of the music, level of active participation with the music, and whether sessions are individual or as part of a group. In the first category, there is a strong case to suggest that familiar music is more effective, both for memory recall, and for reducing stress or anxiety levels in patients. Several studies suggest this, such as Otera et al. (2013), Gallego and Garcia (2017), and also some studies not explored here, such as Arroyo-Anlló, Díaz, and Gil (2013), which observe that not only familiar music showed improvements in aspects of self-consciousness, but also that unfamiliar music showed a deterioration in these same aspects. There is also evidence to suggest that music which shows sensitivity to the patient's cultural background is particularly effective (Good et al. 2000). In the second category, regarding level or participation, whilst there are

several studies into this, there are far less conclusive results as to which is more effective. A paper dedicated to establishing if receptive or interactive music therapy is more effective at relieving behavioural symptoms came to the conclusion that receptive was the most successful (Tsoi et al. 2018), but there are too many studies which show successful examples of therapy which involved interaction with the music to dismiss this as a therapeutic method, both in terms of interacting musically (e.g. singing along) or interacting with movement. Perhaps this is an area where further study could be useful, into the specifics of movement therapy (perhaps dance) in combination with music therapy, taking classes involving movement as a condition, compared to a control group where no movement is involved. The third category, of individual or group study, does not seem to have been studied in its own right. The studies discussed here use a variety of group sizes, from individual up to 12 in a group, but none have explicitly taken this into account or tested which method has more significant effects. The conclusions it is possible to draw from this essay are very much in line with those found in the review studies discussed earlier on; there is plenty of evidence to suggest that music or music therapy is effective in treating some of the symptoms of dementia, but there is a lack of understanding of the most effective techniques, due to the fact that few studies systematically vary the treatment protocols in order to identify the underlying mechanisms of the therapy, and other methodological limitations (Koger et al. 1999).

Another area which seems to be lacking in research is the idea of possible moments of lucidity in dementia patients upon listening to music. It may be possible that in some cases, the memories stimulated may be strong enough for the patient to temporarily gain a greater awareness of themselves as a person and of their current situation/surroundings. Research exploring this notion has been carried out on dementia patients in general (Normann et al. 2006) but the effect of music on this phenomenon could be valuable knowledge. Given the significant support provided by the body of research that music therapy is effective in alleviating symptoms of memory loss in dementia, it could also be a worthwhile endeavour to investigate music therapy in other clinical populations suffering from autobiographical memory decline caused by other illnesses (e.g. depression and schizophrenia), to determine whether these patients may also benefit from music exposure.

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