



Does music therapy enhance behavioral and cognitive function in elderly dementia patients? A systematic review and meta-analysis



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ABSTRACT

Demographic aging is a worldwide phenomenon, cognitive and behavioral impairment is becoming global burden of nerve damage. However, the effect of pharmacological treatment is not satisfying. Therefore, we analyzed the efficacy of music therapy in elderly dementia patients, and if so, whether music therapy can be used as first-line non-pharmacological treatment. A comprehensive literature search was performed on PubMed, EMBASE and the Cochrane Library from inception to September 2016. A total of 34 studies (42 analyses, 1757 subjects) were included; all of them had an acceptable quality based on the PEDro and CASP scale scores. Studies based on any type of dementia patient were combined and analyzed by subgroup. The standardized mean difference was -0.42 (-0.74 to -0.11) for disruptive behavior and 0.20 (-0.09 to 0.49) for cognitive function as primary outcomes in random effect models using controls as the comparator; the secondary outcomes were depressive score, anxiety and quality of life. No evidence of publication bias was found based on Begg's and Egger's test. The meta-analysis confirmed that the baseline differences between the two groups were balanced. Subgroup analyses showed that disease sub-type, intervention method, comparator, subject location, trial design, trial period and outcome measure instrument made little difference in outcomes. The meta-regression may have identified the causes of heterogeneity as the intervention method, comparator and trial design. Music therapy was effective when patients received interactive therapy with a compared group. There was positive evidence to support the use of music therapy to treat disruptive behavior and anxiety; there were positive trends supporting the use of music therapy for the treatment of cognitive function, depression and quality of life. This study is registered with PROSPERO, number CRD42016036153.

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1. Introduction

Demographic aging is a worldwide phenomenon. The total number of people aged 60 or over increased from 9.2% of the population in 1990–11.7% in 2013 and is expected to more than double from 841 million (2013) to over 2 billion in 2050; this would reach the equivalent of 21.1% of the world's population. In addition, the increasing percentage of people aged 80 years or over within the older population is predicted to grow in the same time period from 14% to 19% (392 million) (United Nations, 2013). The number of aged people with dementia is anticipated to increase from 44.4 million to 135.5 million (Alzheimers Disease International, 2013). Declines in behavioral and cognitive function are part of aging. Dementia is an acquired status; it is characterized by decline in at least two cognitive domains (e.g., loss of memory, attention, language or executive functioning) that is severe enough to affect social or occupational functioning (Aarsland et al., 2009). Patients with dementia may also exhibit behavioral and psychological symptoms (Lin et al., 2013).

Behavioral and cognitive dysfunctions are managed by both pharmacological (Herrmann et al., 2012) and non-pharmacological treatments (Brodaty and Burns, 2012). Currently, pharmacological therapy is essentially symptomatic and does not have a satisfactory impact on symptoms related to neurodegenerative disease progression. A systematic review (Livingston et al., 2014) reached the conclusion that non-pharmacological management decreased overall agitation and that sensory intervention immediately decreased clinically significant agitation. Consequently, several health institutions recommended non-pharmacological complementary interventions as first-line treatment (Vink et al., 2003). However, intensive cognitive training can improve important cognitive function in early stage dementia; in recent years, more attention has been placed on the effectiveness of non-pharmacological approaches to dysfunction therapy. (Irish et al., 2006).

The power of music and its nonverbal nature provides a privileged communication medium when language is diminished or abolished, yet the effects of music remain unclear (Samson et al., 2015). Music easily elicits movements that stimulate interactions between the perception and action systems (Zatorre et al., 2007). The definition of music therapy by American Music Therapy Association (American Music Therapy Association, 2011) is ‘the 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’; using this definition, therapeutic included music can be include. In music therapy, recipients can be actively engaged in making music and singing, which defines an ‘interactive’ method, or they can listen to music that a therapist plays or sings or to a CD player, which is considered a ‘passive’ method. In studies, we used activity controls and individuals receiving usual care as the comparators. The intriguing sensitivity to music exhibited by persons with dementia has been shown to have therapeutic purposes.

Due to the numerous classifications of music therapy and the small sample sizes, the effects of music therapy are still inconsis-

tent. To further explore these issues, we performed a meta-analysis of all available clinical trials of cognitive and behavioral therapy in elderly dementia patients. No previous reviews (Chang et al., 2015; Li et al., 2015; Ueda et al., 2013; Vasionyte and Madison, 2013; Vink et al., 2011) have provided a comprehensive overview with meta-regressions and meta-analyses.

2. Methods

This review was performed using a prespecified protocol. It was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement (PRISMA; Moher et al., 2009). The project was prospectively registered with the PROSPERO database of systematic reviews, number CRD42016036153 (PROSPERO, 2009 <http://www.cdr.york.ac.uk/prospéro>).

2.1. Study selection criteria

Eligible clinical trials were in any language and included elderly dementia patients experiencing behavioral and/or cognitive dysfunction, regardless of study design. We evaluated all studies that compared any form and intervention method of music therapy with no music care and excluded studies that did not provide comparative or missing outcomes. The age at diagnosis of any type of dementia in each individual study was accepted. We systematically reviewed three electronic databases, PubMed, Embase and the Cochrane library, from inception to September 2016. The search strategy included keywords and MeSH terms relating to music therapy and disruptive behavior; cognitive function; or other outcomes and diseases (see details in Supplementary Table 1). We also reviewed the reference lists of relevant publications for additional studies.

2.2. Data collection, extraction and quality assessment

Two investigators (ZYS and CJY) examined the eligibility of the studies. Both of them independently extracted and compiled data from the studies using a standardized data extraction form, and disagreements were resolved through consensus or referral to a third reviewer (ZQC). Discrepancies and unobtainable data were resolved by group discussion between at least three investigators. Randomized controlled trials (RCTs), controlled clinical trials (CCTs) and randomized crossover trials (RCT/crossover, before-after studies without control groups) were eligible for the meta-analysis.

We extracted baseline information from the individual studies, including publication year, country, study design, participants (n, age, male%), disease type, education level, and delivery. Moreover, outcome measure scale scores were also extracted at baseline. The design of each individual study was also included in the baseline information, such as the intervention method, frequency and duration and the outcome assessment time.

We assessed the quality of the included studies using the Physiotherapy Evidence Database (PEDro) scale score (Maher et al., 2003)

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