Is music therapy an effective intervention for dementia: a meta-analytic review of literature
Koger S M, Chapin K, Brotons M

Authors' objectives
To update a previous review and to quantify the relationship of music or music therapy as an effective intervention for dementia. In addition, to investigate the extent to which methodological variables influenced the effectiveness of treatment.

Searching
The authors used the literature that had been identified for a qualitative review (see Other Publications of Related Interest no.1). In addition, MEDLINE (1975 to present) and PsycLIT (1974 to present) were searched using 'music and dementia' and 'music and Alzheimer's' as the keywords.

Study selection
Study designs of evaluations included in the review
The majority of the studies selected were within-patient (repeated measures) designs; these included comparisons of pre- and post- intervention performance. Studies were excluded if they were theoretical or philosophical papers, or were case studies of one or two individuals. Only articles published in refereed journals and written in English were reviewed.

Specific interventions included in the review
Music and music therapy. Studies which did not include a control condition were excluded. Studies where music was used in the context of testing an alternate hypothesis, such as the effect of intergenerational interaction or comparative recall of song lyrics and spoken material, were also excluded.

Specific therapeutic techniques used in the included studies were: singing; instrument playing; dance or movement; listening to music (live or taped); musical games; and composing or improvising.

Participants included in the review
Participants with dementia were included. Studies evaluating the caregivers rather than the participants were excluded. The diagnostic test used to diagnose dementia varied between the included studies and was not specified in seven studies. The specific tests used were: Reisberg (Global Deterioration Scale, scores ranged from 5 to 7); Mini-Mental State Examination (scores ranged from less than 14 to less than); Clinical Dementia Rating (score of 2 or 3); and the Multidimensional Dementia Assessment (score of 3).

Two studies also based the inclusion of patients on behavioural aspects: one on the presence of disruptive vocalisations and the other on the presence of agitated behaviours.

Outcomes assessed in the review
The included studies assessed a variety of different outcomes. Studies that did not provide quantification of the dependent variable were excluded. The specific outcomes (dependent variables) measured in the included studies were: agitation; face-name recognition; disruptive vocalising; alert responses; participation; seating, wandering; sleeping; interaction, mood; sitting; social behaviour; amount of food consumed, irritability, fear-panic, depression; time with dinner; cooperative behaviour; general mini-mental status examination; reality orientation; and relaxation behaviour, pulse. The authors also examined the effect of the length of treatment on its effectiveness.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.
Assessment of study quality
The authors do not state that they assessed validity.

Data extraction
Study statistics, and qualities with potential moderate influence, were coded by two independent analysts. Any disagreements were resolved by consultation with a third analyst. In all cases, an agreement between the analysts was reached following discussion.

The specific information extracted from the included studies was: author and year; the number of participants; study statistic; effect size (Cohen's d); effect size (Pearson's r); treatment duration (minute); therapeutic technique (independent variable); coding of the independent variable; music type (live or taped); diagnostic test and range; dependent variable; and coding of the dependent variable.

Independent variables were coded as either active or passive. Dependent variables were coded as either behaviour management, social or emotional, or cognitive.

Methods of synthesis
How were the studies combined?
The effect sizes were computed from the reported study statistics and combined using DSTAT software (see Other Publications of Related Interest no.2). The difference in the within-group variability (in standard deviation units) between music and non-music conditions from each study was weighted by the reciprocal of its variance. The resulting d-statistics were then averaged, providing a mean effect size that was expressed along with its 95% confidence interval (CI).

Publication bias was addressed by calculation of the fail-safe N.

How were differences between studies investigated?
The authors conducted a test of homogeneity using the Q statistic. The following 'moderating variables' were assessed for homogeneity: treatment length in minutes; therapist's training, i.e. music therapist versus other professional; therapeutic intervention, i.e. active or passive exposure to music; type of music presentation, i.e. live or taped music; and dependent variable, i.e. social or emotional, cognitive, or behavioural measure.

Results of the review
Twenty-one studies with a total of 336 participants were identified and included.

The mean effect size (d) was 0.7879 (95% CI: 0.62, 0.95). The test for homogeneity (Q(20)=51.485, p=0.0001) indicated that the effect sizes were not consistent across the studies. The fail-safe N was calculated as 622. No evidence of heterogeneity was found when the studies were subdivided, and the authors were unable to determine the source of the variability.

For the 16 studies that specified the amount of treatment, treatment length was not significantly correlated with the effect size (r=-0.185, p=0.5)

Authors' conclusions
The published literature demonstrated that music or music therapy is an effective method overall for treating symptoms of dementia. However, systematic variation of treatment protocols is necessary to identify the underlying mechanisms and delineate the most effective techniques.

CRD commentary
Overall, the methodological quality of this meta-analysis was reasonable. The authors undertook an adequate literature
search but only included English language publications. However, they did assess the possibility of publication bias. The authors did not undertake a quality assessment of the included studies; as low-quality study designs were included in the review, it is essential that study quality be addressed. The statistical methods were adequately described and the authors assessed heterogeneity between the included studies. The authors’ conclusions follow on from the findings, but should be interpreted with caution due to the presence of heterogeneity between the pooled studies.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors reported a number of suggestions for future research. In summary, they suggested that future studies should: be blinded; include direct, experimental comparisons of potential moderating variables; correlate severity of dementia with responsiveness to treatment; and have longer follow-up.

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