Music for pain and anxiety in children undergoing medical procedures: a systematic review of randomized controlled trials
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CRD summary
This well-conducted review concluded that music therapy was effective in reducing anxiety and pain in children who underwent medical and dental procedures. The results appeared promising, but as they were based on largely poor quality studies the authors’ conclusions should be considered provisional.

Authors’ objectives
To review the efficacy of music therapy in reducing pain and anxiety in children undergoing medical procedures.

Searching
MEDLINE, ERIC, Cochrane Central Register of Controlled Trials (CENTRAL), The Cochrane Library, Online Computer Library Center, Articles First, Abstracts of Music Literature, Computer-Assisted Information Retrieval Service System for Music, PsycINFO, AMED, EMBASE, Latin American and Caribbean Health Sciences Literature and Web of Science were searched. Grey literature was accessed via searches in doctoral dissertations in musicology, dissertation abstracts, Online Computer Library Center Proceedings and Papers First. Subject bibliographies and reference lists of relevant studies were checked. Ongoing trials were identified via Current Controlled Trials and the National Research Register. Search terms were not reported, but strategies are available from the authors on request. No language restrictions were applied.

Study selection
Randomised controlled trials (RCTs) were eligible for this review if they compared a music intervention in a clinical setting against a control. The population of interest was children/young people aged one month to 18 years. Relevant outcomes included any measure of pain or anxiety.

The included RCTs were drawn from various countries, including USA, Australia, Germany, Poland, Israel, China and Canada. Participant ages ranged from eight months to 20 years. Interventions included passive (listening) and active (communication via music) music therapy. The types of music varied widely. In some studies music therapy was combined with other modalities (such as relaxation exercises). Control groups most often received standard care; some trials used other active interventions or pharmacological treatments. A range of outcome measures were reported, both self-reported and observed; these were variable in terms of known reliability and validity.

Two independent reviewers assessed studies for inclusion. Any disagreements were resolved through discussion.

Assessment of study quality
Two independent reviewers carried out quality assessment using the Jadad scale. Any disagreements were resolved through discussion and consensus.

Data extraction
Changes from baseline measures of pain and anxiety were extracted for each study where possible. Otherwise, final data points were used. Where studies reported both pain and anxiety outcome measures, the primary outcome was chosen. Where multiple outcomes were presented for each variable, the main measure or first listed were extracted.

One reviewer extracted data and a second reviewer checked the extraction. Any disagreements were resolved through discussion.

Methods of synthesis
A narrative synthesis was presented according to type of music therapy (active or passive) and outcomes (pain or
anxiety). A random-effects model was used to quantitatively pool eligible studies and produce standardised mean differences (SMD) and 95% confidence intervals (CI) for pain and anxiety. Statistical heterogeneity was assessed using the I² statistic. Publication bias was checked using the Begg and Egger tests and a funnel plot. Subgroup analyses were conducted to investigate possible sources of heterogeneity as follows: type of music therapy; self-report versus observed outcome measures; type of control group; intervention details; quality score; outcome assessor blinding; and publication language. Deeks' X² test was used to test for statistical heterogeneity within the subgroups.

Results of the review

Nineteen RCTs were included in this review (total n=1,513). Overall study quality was low (16 studies scored 1 on the Jadad scale). None of the trials reported allocation concealment. Outcome assessors were blinded in only four studies.

Quantitative meta-analysis based on nine trials (n=704) found a small to moderate statistically significant reduction in levels of pain/anxiety in music therapy patients over controls (SMD -0.35, 95% CI -0.55 to -0.14). Analyses of pain (five trials) and anxiety (five trials) separately found significant reductions in favour of music therapy, although significant statistical heterogeneity was found for the anxiety analysis (I²=52.4%).

Subgroup analyses indicated that the effect was significant for passive but not active music therapy and only where music therapy was compared with standard care (not placebo or an active control). Subgroup analysis by type of outcome measure (self-report or observed) indicated that only observed measures showed a significant benefit of music therapy. Music therapy was more effective when combined with other modalities rather than given in isolation.

There was no significant statistical heterogeneity in any of the main analyses and no evidence of publication bias. Further sensitivity analyses related to type of music and therapist effects were reported.

Authors' conclusions

Music was effective in reducing anxiety and pain in children undergoing medical and dental procedures.

CRD commentary

This review addressed a clear question with detailed inclusion criteria. The searches were extensive without language restrictions and unlikely to have missed relevant studies. The methodological processes were clearly described. Use of multiple reviewers in selection, extraction and quality assessment reduced the risk of reviewer error and bias. The narrative and quantitative analyses were clearly described and appeared appropriate; however, the conclusions may have been overstated. The results appeared promising, but as they were based on largely poor quality studies the authors' conclusions should be considered provisional.

Implications of the review for practice and research

Practice: The authors stated that music should be considered as an adjunctive therapy for children in clinical situations that produce pain or anxiety.

Research: The authors stated that future studies should as a minimum require blinding of outcome assessors, adequate concealment of allocations and use of control conditions similar to the intervention. Research within particular clinical scenarios and populations would be particularly valuable. All studies should use consistent valid outcome measures.

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