MUSIC INTERVENTIONS FOR ACQUIRED BRAIN INJURY: FINDINGS FROM AN UPDATED COCHRANE REVIEW

Royal Hospital for Neuro-disability, London

Open lecture

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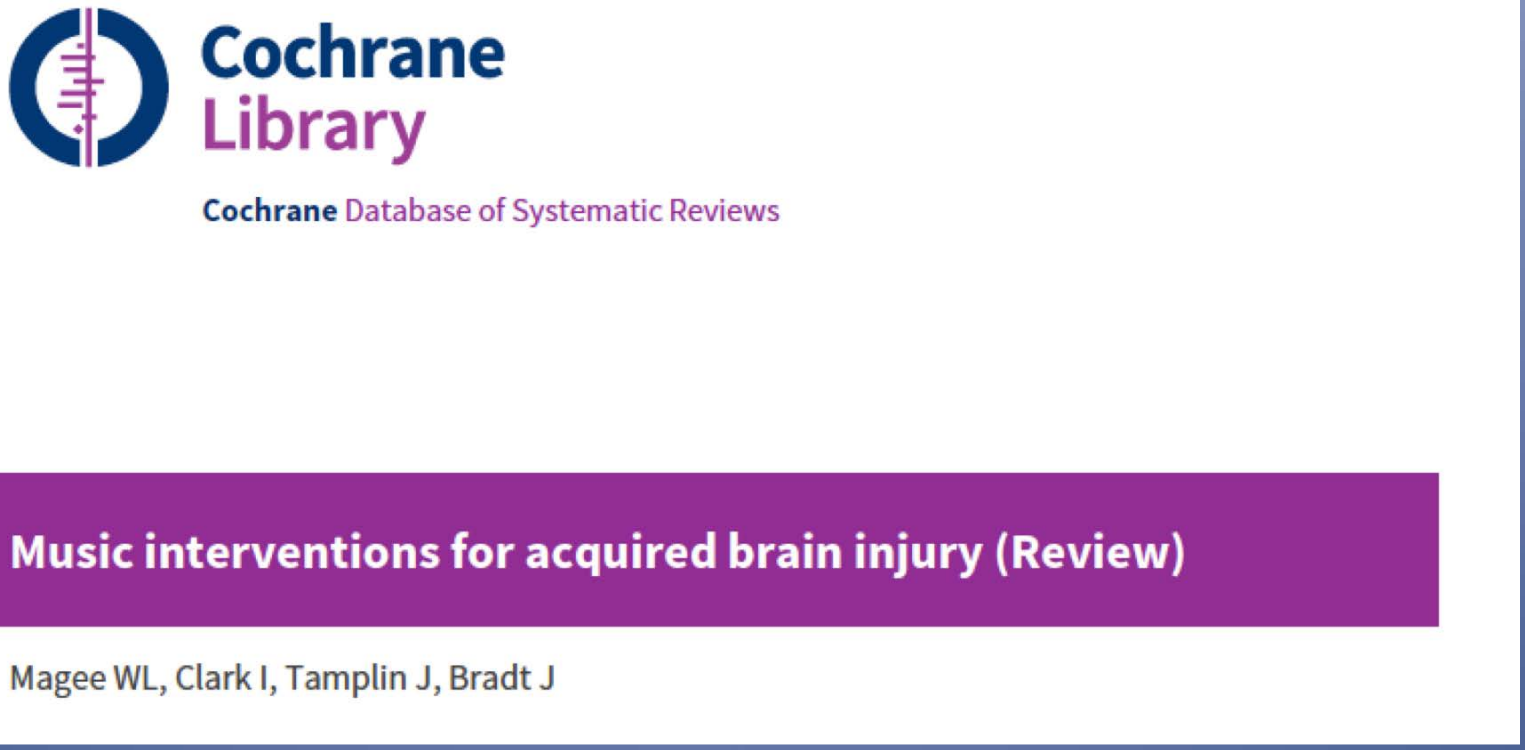
Cochrane Collaboration

http://www.cochrane.org/



- This is an update of the previous review,
- *Music* **therapy** *for ABI* (Bradt, Magee, Dileo, Wheeler & McGilloway, 2011).
- We modified the inclusion criteria to include studies that used music interventions ***without*** the involvement of a music therapist.
- We also expanded our outcomes of interest.

Objectives

1. To identify randomized controlled trials (RCTs) and controlled clinical trials (CCTs) examining the efficacy of music interventions ABI

Objectives

2. To compare the efficacy of music interventions and standard care with
    a. standard care alone
    b. standard care and placebo treatments
    c. standard care and other therapies

Objectives

3. To compare the efficacy of different types of music interventions

   a. Music with rhythmic stimulus vs rhythmic stimulus alone

   b. interventions delivered by trained MTs vs other professionals

Outcome Measures

- Primary outcomes
  - Improvement in gait
  - Improvement in upper extremity function
- Secondary outcomes
  - Communication
  - Mood and emotions, social skills and interactions
  - Pain
  - Behavioral outcomes
  - Cognitive functioning
  - Activities of daily living
  - Adverse events

Types of Participants

- Acquired brain damage of a non-degenerative nature
- Includes traumatic brain injury, stroke or hemorrhagic accident, anoxia, infection and any mixed cause
- > 16 years
- Male / female
- Hospital, outpatient, or community
- Progressive conditions excluded

Types of Studies

- Eligible designs
  - Prospective RCTs
    - Parallel group designs
    - Cross-over trials
- Other aspects
  - Any language
  - Published and unpublished
  - Treatment allocation
    - Randomized
    - Quasi-randomized
      - Systematic assignment
      - Alternate assignment

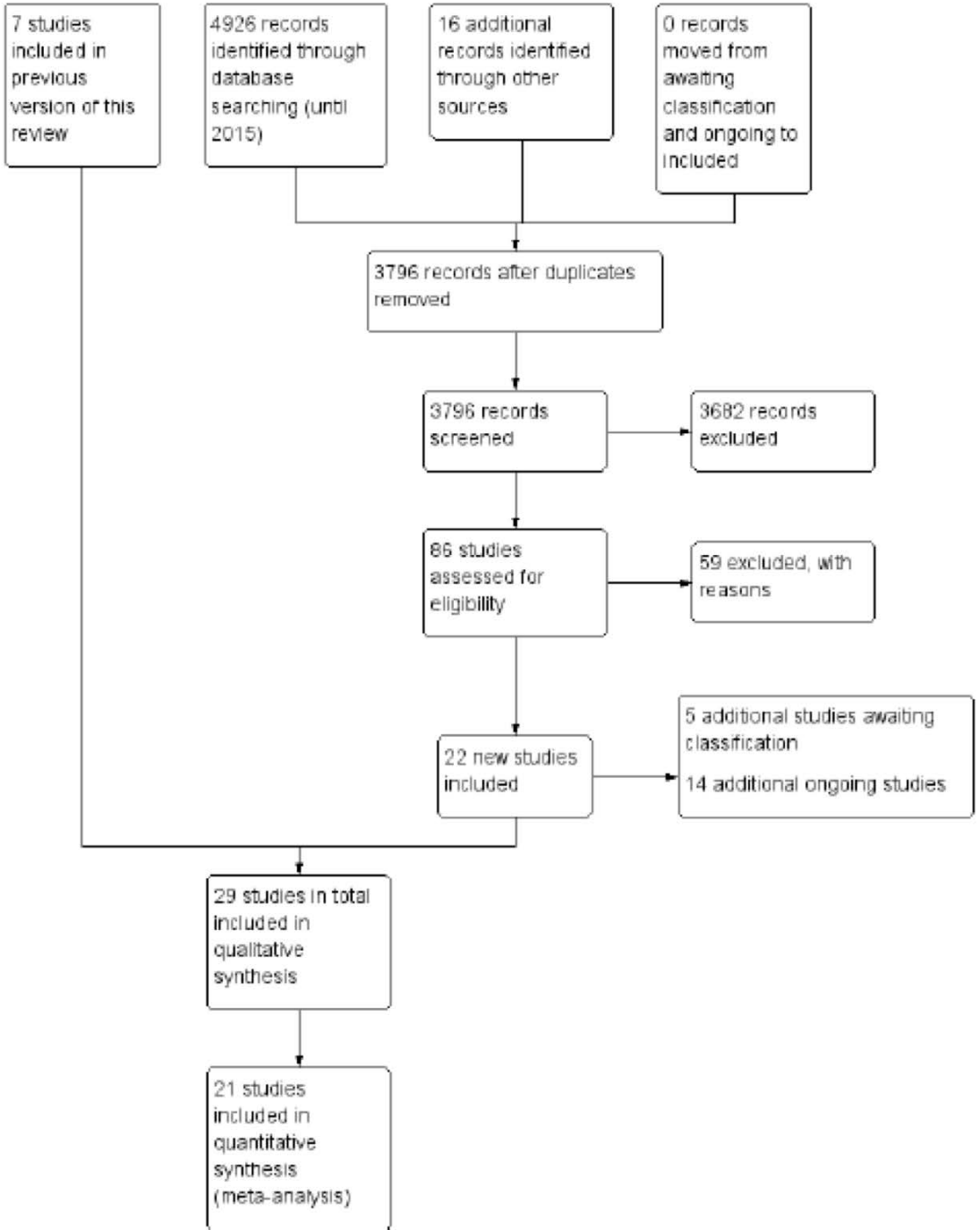
Procedures for Analysis

- Criteria for quality assessment (risk of bias)
  - Method of randomization
  - Allocation concealment
  - Blinding
  - Intention-to-treat analysis
- All assessed on 3 tier risk criteria
  - Low risk (reported adequate methods)
  - Unclear risk (inadequately reported)
  - High risk (unacceptable methods and/or not reported

Electronic Databases and Trials Registers Searched

- All available years of the following:
  - Trials registers of the Cochrane Stroke Group
  - Cochrane Central Register of Controlled Trials (CENTRAL)
  - MEDLINE
  - EMBASE
  - CINAHL
  - PsycINFO
  - LILACS
  - AMED
- Handsearched:
  - MT journals; conference proceedings; dissertation and music databases; trials and research registers; reference lists; consulted experts

Figure 1. Study flow diagram for the updated review.



Magee et al., 2017, p. 12

Results: Included Studies

- Twenty-nine studies met all inclusion criteria and included in qualitative synthesis
- Twenty-one included in quantitative synthesis (meta-analysis)
- Included 775 participants, 90% with stroke

Gait

- Number of studies: 10
  - Rhythmic Auditory Stimulation (RAS) vs gait training without rhythm OR standard neurodevelopmental therapy
  - 298 people with stroke
- Outcomes
  - Gait velocity (9 studies)
  - Stride length (8 studies)
  - Cadence (7 studies)
  - Stride symmetry (3 studies)
  - General gait (2 studies)
  - Balance (3 studies)

Music interventions to address gait disorders

Rhythmic Auditory Stimulation *(RAS):*

A specific technique of utilizing rhythmic cueing to facilitate intrinsically biologically rhythmical movements (i.e. walking).

Evidence for practice

RAS may improve gait velocity, stride length in both affected and unaffected legs, and general gait in stroke patients and it may be beneficial for gait cadence.

Gait velocity: m/min

- Mean gait velocity in RAS group: **11.34 metres more** ($p<0.00001$))
- 268 participants with stroke
- 9 RCTs
- Quality of evidence: moderate

Stride length (affected side): metres

- Mean stride length (affected side) in RAS group was **0.12 metres more** (p=0.003)
- 129 participants with stroke
- 5 RCTs
- Quality of evidence: moderate

Stride length (unaffected side): metres

- Mean stride length (unaffected side) in RAS group was **0.11 metres more** (p=0.03)
- 99 participants with stroke
- 4 RCTs
- Quality of evidence:

Gait cadence: steps/min

- Mean gait cadence in intervention group was **10.77 steps/minute more**
- 223 participants with stroke
- 7 RCTs
- Quality of evidence: low

Stride symmetry

- Mean stride symmetry in RAS group was **0.94 standard deviations more**
- 139 participants with stroke
- 3 RCTs
- Quality of evidence: low

General gait

- Mean general gait in RAS group **improved 7.67 units on Dynamic Gait Index** (p=0.00001)
- 48 participants with stroke
- 2 RCTs

Metronome versus beat in music
Music therapist versus other interventionist

Evidence for practice

RAS may improve gait velocity, stride length in both affected and unaffected legs, and general gait in stroke patients and it may be beneficial for gait cadence.

Intervention for gait may be enhanced when a trained music therapist delivers the intervention and the rhythmic auditory stimulus is embedded in music.

Interventionist

Subgroup analyses for gait velocity

1. Using trained music therapists to deliver the music interventions resulted in significantly greater improvements in gait velocity
2. Results of studies that used a trained music therapist were consistent across studies.

Music vs metronome beat

Subgroup analyses for gait velocity

1. Embedding metronome beat within music more effective than using non-music rhythmic auditory stimulation alone
2. Music with a strong and consistent beat rather than rhythmic auditory stimulation without music may have a greater effect

Quality of Life

People receiving music interventions perceived a better quality of life than those receiving standard therapy without music interventions (RAS)

- Improvements in quality of life were **0.89 standard deviations more for the music intervention** group (p=0.002)
- Measure: Stroke Specific Quality of Life Scale
- 53 participants with stroke
- 2 RCTs
- Quality of evidence low

Upper extremity function (UEF)

- Number of studies: 9
  - 6 RCTs; 3 quasi-RCTs
  - 308 people with stroke
  - Interventions: RAS, mBATRAC, MST, instrument playing
- Outcomes
  - Changes in UEF (5 studies)
  - Timing of UEF movements (2 studies)
  - Range of motion (shoulder flexion) (2 studies)
  - Hand function (2 studies)
  - Upper limb strength (2 studies)
  - Manual dexterity (2 studies)
  - Elbow extension angle (2 studies)

Interventions used for arm function

- Rhythm-based instrument-playing tasks with and without music
- RAS within music-making and using rhythmic pulse without music
- Bilateral arm training with RAC (BATRAC) or a modified version of BATRAC
- Music-supported training

Music interventions improve the timing of arm movements

Music interventions may improve the timing of UEF after stroke by approximately 1 second

- Pooled effect indicated a statistically significant reduction in time in the music intervention groups (P = 0.0006, I^2 = 52%)
- 122 participants
- 2 RCTs

Music interventions for communication

Interventions used:

- Melodic intonation therapy (and modified version)
- Music listening
- SIPARI

Music interventions for communication

Music interventions may have a moderate effect on overall communication for people with stroke

- 3 RCTs, 67 participants with stroke; Quality of evidence very low

The pooled estimate of two small studies suggest that music interventions may have a beneficial effect on speech repetition and naming

Other secondary outcomes

We could not perform meta-analyses for any other outcomes

Cognitive Functioning

- Number of studies:
  - 4 studies
  - 78 people with stroke/ABI
  - Methods: music listening, instrument playing, singing
- Outcomes:
  - Memory
  - Attention
  - Mental flexibility
  - Orientation

Memory & Attention

Two studies examined memory and attention, but pooled estimates indicated no strong evidence for an effect

Mood and emotions

- 3 studies included
- Meta-analysis not possible due to:
  - Use of different versions of the same measure
  - Reporting of subscales or total score only
- Särkämö 2008 found improvements in depression and confusion, after music listening with the positive effects sustained at six months
- Jeong 2007 found significant improvements
- In mood following rhythmic movement to music and active music-making

Summary of findings

- Moderate level quality of evidence that RAS improves gait velocity and stride length in people with stroke
- Low quality of evidence that RAS improves gait cadence and stride symmetry in people with stroke
- General gait may also improve after stroke
- Very low quality of evidence that music interventions improve the timing of arm movements after stroke
- Overall communication, naming and speech repetition may improve for people with ABI
- Low quality of evidence that music interventions may improve quality of life may after stroke

Implications for future research

What is needed:

- More research for all secondary outcomes
- Consistency in the choice and use of outcome measures chosen
- Improved blinding of outcome assessors
- Research on dosage
- Use of power analysis for adequate sample size

Thank-you!

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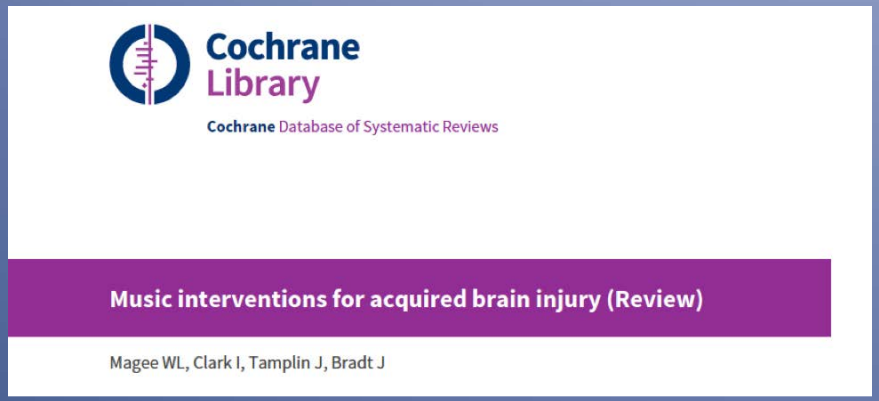

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