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Systematic review and meta-analysis reveal positive therapeutic effects of music in brain damage rehabilitation

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ADMINISTRATIVE INFORMATION

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Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 12 January 2026 and was last updated on 12 January 2026.

INTRODUCTION

Review question / Objective Review question What are the effects of music-based interventions on clinical, cognitive, emotional, and functional outcomes in patients with brain injury compared with standard care or non-music interventions?

Objectives
1. To systematically review the effects of music interventions on patients with brain injury.
2. To quantitatively synthesize (meta-analyze) the effects of music interventions on cognitive, functional, emotional, and neurological outcomes where data permit.
3. To assess the methodological quality and risk of bias of included studies using Joanna Briggs Institute (JBI) critical appraisal tools.

Rationale Brain injury, including traumatic brain injury (TBI), acquired brain injury (ABI), stroke-related brain injury, and hypoxic-ischemic injury, is a major cause of long-term disability worldwide. Patients often experience impairments in cognition, motor function, emotional regulation, consciousness, and quality of life. Rehabilitation strategies that are effective, safe, and accessible are therefore essential.
Music interventions—including music therapy, listening to music, rhythmic auditory stimulation, and active music engagement—have been increasingly applied in neurological rehabilitation.

Emerging evidence suggests that music may promote neuroplasticity, enhance cognitive recovery, improve mood, and support motor and functional outcomes through multisensory stimulation and emotional engagement.
However, the evidence remains heterogeneous in terms of intervention type, patient population, outcome measures, and study design. A comprehensive systematic review and meta-analysis is needed to synthesize current evidence, evaluate the effectiveness of music interventions in brain injury populations, and inform clinical practice and future research.

Condition being studied Individuals of any age diagnosed with brain injury.

METHODS

Search strategy A comprehensive search strategy will be developed in consultation with an information specialist. Keywords and controlled vocabulary (e.g., MeSH terms) will include combinations of:
• brain injury, traumatic brain injury, acquired brain injury, stroke
• music, music therapy, music intervention, auditory stimulation
The following databases were searched:
• PubMed
• Embase
• Cochrane Central Register of Controlled Trials (CENTRAL)
• Web of Science
• Scopus
Additional sources:
• Reference lists of included studies
• Relevant systematic reviews
• ClinicalTrials.gov.

Participant or population Individuals of any age diagnosed with brain injury, including:
o Traumatic brain injury (mild, moderate, or severe)
o Acquired brain injury
o Stroke-related brain injury
o Hypoxic-ischemic brain injury.

Intervention Music-based interventions.

Comparator
• Standard care or usual rehabilitation
• No intervention or wait-list control
• Non-music interventions (e.g., physical therapy, cognitive therapy)
• Placebo or attention control.

Study designs to be included • Randomized controlled trials (RCTs)• Quasi-experimental studies• Case reports• Case-control studies.

Eligibility criteria Population:brain damage patients (traumatic and non-traumatic brain injuries, stroke)
Intervention(s) or exposure(s): Music-based interventions (listening, playing instruments, music therapy…)
Excluded: Combined interventions (music with other interventions, ex: music and physiotherapy).

Information sources
• PubMed
• Embase
• Cochrane Central Register of Controlled Trials (CENTRAL)
• Web of Science
• Scopus
• Reference lists of included studies
• Relevant systematic reviews
• ClinicalTrials.gov.

Main outcome(s) • Cognitive function (e.g., memory, attention, executive function)
• Emotional and psychological outcomes (e.g., mood, depression, anxiety)
• Motor function (gait and upper extremity function)
• Communication
• Behavioral and social outcomes
• Quality of life.

Quality assessment / Risk of bias analysis Methodological quality and risk of bias will be assessed independently by two reviewers using Joanna Briggs Institute (JBI) Critical Appraisal Tools, selected according to study design (e.g., JBI checklist for RCTs, quasi-experimental studies, or cohort studies).
Any disagreements will be resolved through discussion or by a third reviewer.

Strategy of data synthesis A narrative synthesis will be conducted for all included studies. Where sufficient homogeneity exists in terms of study design, population, interventions, and outcomes, a meta-analysis will be performed.
• Effect sizes will be calculated using mean and standard deviations differences for continuous outcomes.
• A random-effects model will be used due to expected clinical and methodological heterogeneity.
• Statistical heterogeneity will be assessed using the I^2 statistic and Chi-square test.

Subgroup analysis Not applicable.

Sensitivity analysis Not applicable.

Country(ies) involved Spain.

Keywords Brain Damage; Acquired Brain Injury; Traumatic Brain Injury; Music-based interventions; Meta-analysis.

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