

Assessments of music perception in pediatric population with hearing impairment and hearing technology. A Systematic Review

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Abstract

Research on music perception in the pediatric population with hearing technology is still considered a pioneering area introducing different assessment methods. But how are these assessments measuring music perception? And what different assessments have been used in previous research? This systematic review summarizes all the published studies assessing music perception in the pediatric population with hearing technology and provides an overview of the identified factors associated with music perception.

Method

Systematic review of peer reviewed published studies based on the below PICO model.

Findings are summarized in the following:

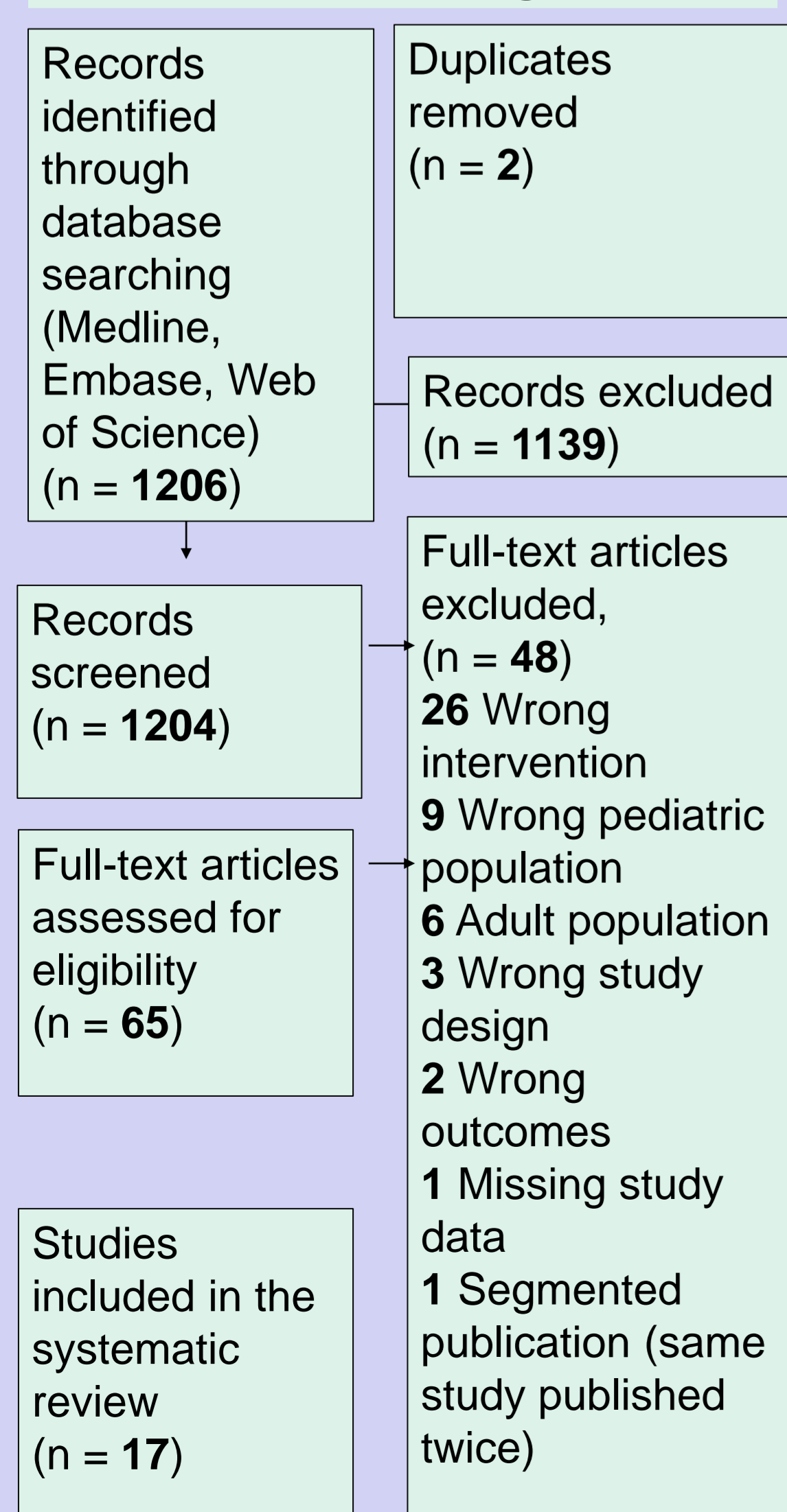
- Study Characteristics
 - Baseline characteristics
 - Assessment areas
 - Factors associated with music perception
- Quality assessment of the studies has not yet been conducted but will be done using the ROBINS-I tool in a future publication.

The PICO model

Population	Inclusion: Pediatric users (<18 years) of hearing technology with mild-profound hearing loss, exclusion: Other diagnosed disabilities/difficulties
Intervention	Any assessment/measurement aiming at testing the auditory ability to perceive music
Comparator /Controls	Any controls (normal hearing children or pediatric users of hearing technology without intervention or users with different hearing technology)
Outcomes	Any quantifiable measures comparable between study participants or between study participants and controls.

The below PRISMA flow diagram shows the study selection process.

PRISMA 2009 Flow Diagram



Findings

Study characteristics

The number of study participants in each study range from 11 to 78 children and the year of publication range from 2002 to 2017. Half of the study designs are Case Control studies (8 studies), and the other study designs are: Comparative Feasibility studies (3 studies), Non-Randomised Controlled Trials (2 studies), Multiarm Before-After Studies (2 studies), Retrospective Case Series (2 studies). The following countries are represented (number of studies):

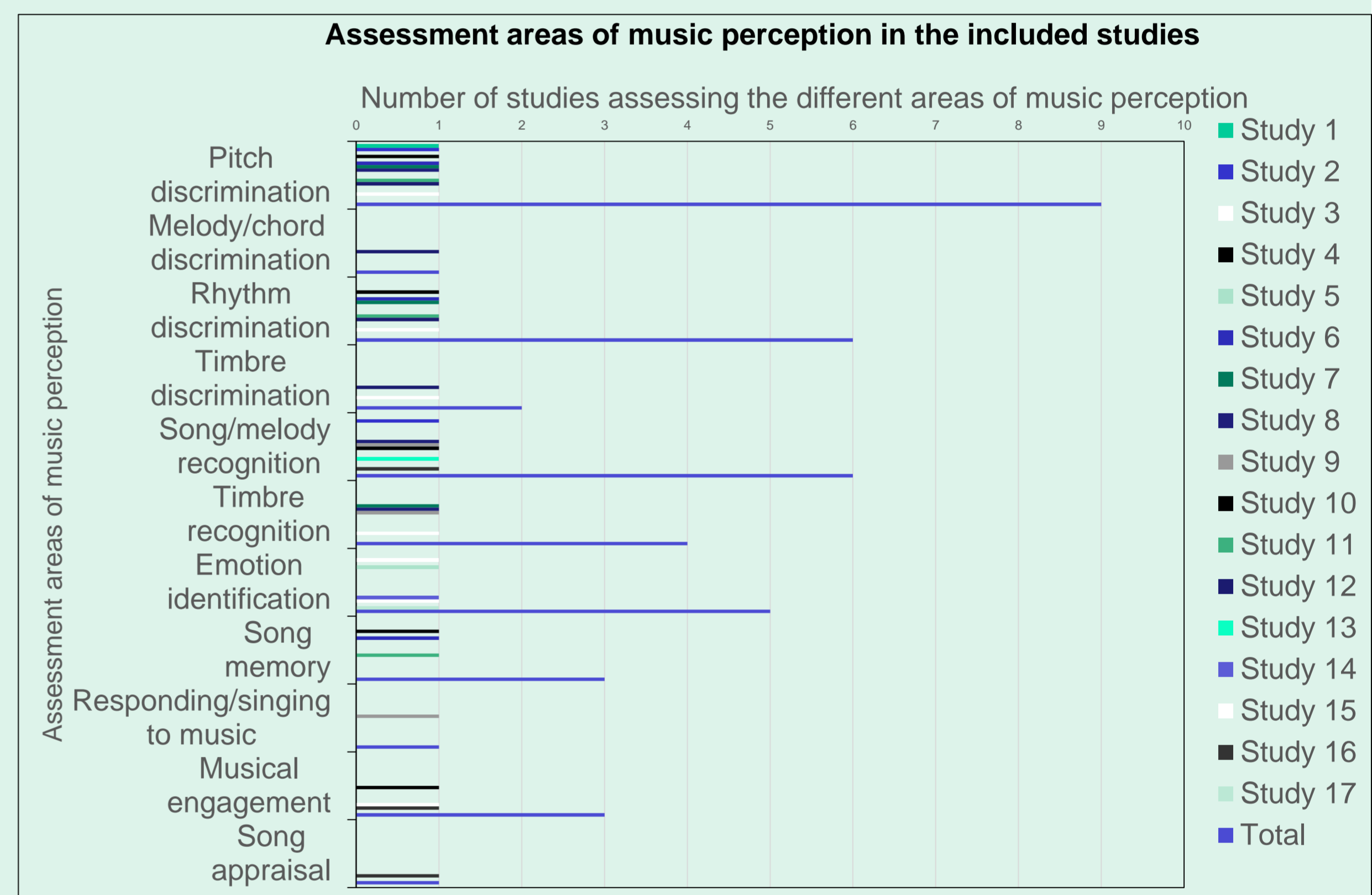
Canada (6 studies), USA (3 studies), Italy (2 studies), Taiwan (1 study), Turkey (1 study), Japan (1 study), Iran (1 study), Slovenia (1 study), Australia (1 study)..

Baseline characteristics

The types of hearing technology represented in the studies are hearing aids, bilateral cochlear implants and unilateral with/without contralateral hearing aid. No bone conduction hearing systems (BAHS) or Auditory Brainstem Implant are identified in the studies. The age of the study participants range from 1,6 years to 18 years but the mean age of the majority of the studies is approximately 10 years. Most of the cochlear implant users have devices from Cochlear (274 children), and devices from both Advanced Bionics and Med-EL are represented in 26 children each. Age at implantation range from 0,8 – 13,6 years and both sequential and concurrent implantation is identified in the study participants.

Assessment areas of music perception

The assessments focus on different areas of music perception and several assessment areas can be included in one assessment, i.e. pitch discrimination and song memory. The figure to the right shows all the different assessment areas and the number of studies they appear in. Pitch discrimination is the most assessed area appearing in 9 studies followed by rhythm discrimination in 6 studies.



Factors associated with music perception

The majority of the studies conducted correlation analysis to identify which factors are associated with different assessment areas of music perception and which factors are not. The below figure shows how many studies found or did not find these associations. In example: 4 studies have found musical training to be associated with pitch discrimination, but 2 studies did not find this association.

