

University of Copenhagen Faculty of Health & Medical Sciences



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

Nille Elise Kepp, PhD.student, Speech & Hearing Pathology, Decibel Research Unit E-mail: blm127@alumni.ku.dk

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

**P**opulation Inclusion: Pediatric users (<18 years)

### Study characteristics

The number of study participants in each study range from 11 to 78 children a 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.



		of hea profo Other	aring technology with und hearing loss, exe diagnosed disabilitie				
	Intervention	Any a at tes perce	assessment/measure sting the auditory abil eive music				
	<b>C</b> omparator / <b>C</b> ontrols	Fac The per 4 st	<b>tor</b> ma cep tudi	<b>s as</b> ajori tion es h			
	Outcomes	Any c comp partic partic	quantifiable measures arable between stud ipants or between st ipants and controls.		16	Fac	
T sl	he below PRI hows the stud PRISMA 20	s included in review	12 10 8	0 2			
	Records identified through database searching (Medline, Embase, We	eb	Duplicates removed (n = 2) Records excluded	Studies	6 4 2 0	2 4	
	(n = <b>1206</b> ) Records screened (n = <b>1204</b> )		Full-text articles excluded, (n = 48) 26 Wrong				Associate
	Full-text article assessed for eligibility $(n = 65)$	les –	<ul> <li>intervention</li> <li>9 Wrong pediatric</li> <li>population</li> <li>6 Adult population</li> <li>3 Wrong study</li> <li>design</li> <li>2 Wrong</li> </ul>				uise
	Studies included in th systematic review (n = <b>17</b> )	ne	outcomes 1 Missing study data 1 Segmented publication (same study published twice)				

# actors associated with music perception

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



		$\cap$			$\cap$												
Not associated	Associated	Not associated o	Associated	Not associated	Associated o	Not associated	Associated	Not associated c	Associated	Not associated o	Associated o	Not associated	Associated	Not associated	Associated	Not associated o	
Pitch mination	Melody/chord discrimination		Rhy discrin	/thm nination	Tim discrim	bre ination	Song/n recogi	nelody nition	Tim recogi	bre nition	Emo identif	otion ication	Song memory		Responding/ singing to		
		Auditory performance (CAP scale)													music		
Right vs. left unilateral CI																	
Unilateral CI vs. bilateral CI																	
	Speech perception performance																
		Cror	Cronological age at testing														
		Younger age at CI implantation															
Longer CI use, years																	
	<ul> <li>Lower level of hearing loss (mild vs. severe/HA vs. CI)</li> </ul>																
		Residual hearing: 250 and/or 500 Hz. before CI implantation or in unimplanted ear															
Musical training																	

University of copenhagen

Faculty/Dept. name



University of copenhagen

Faculty/Dept. name

