

# Music Therapy with CI Recipients

Mag. Wirthner Bianca, MSc



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Hearing Devices, St. Pölten, Austria

EUROCIU, April 5<sup>th</sup> 2024

## Overview

- Rehab program at our department, especially MT
- Publications in the *Journal of Personalized Medicine*
- Listening exercises



## Implant team

**Head: Prim. Univ.-Prof. Dr. Georg M. Sprinzl**



- Surgical team
- Nurse team
- Audiologists
- Speech therapists
- Music therapist



## Mag. Bianca Wirthner, MSc

Music therapist & music teacher

Music - *University of Music and Performing Arts Graz*

Music therapy - *IMC University of Applied Sciences Krems*

Since 2015 specialized in  
music therapy with CI users



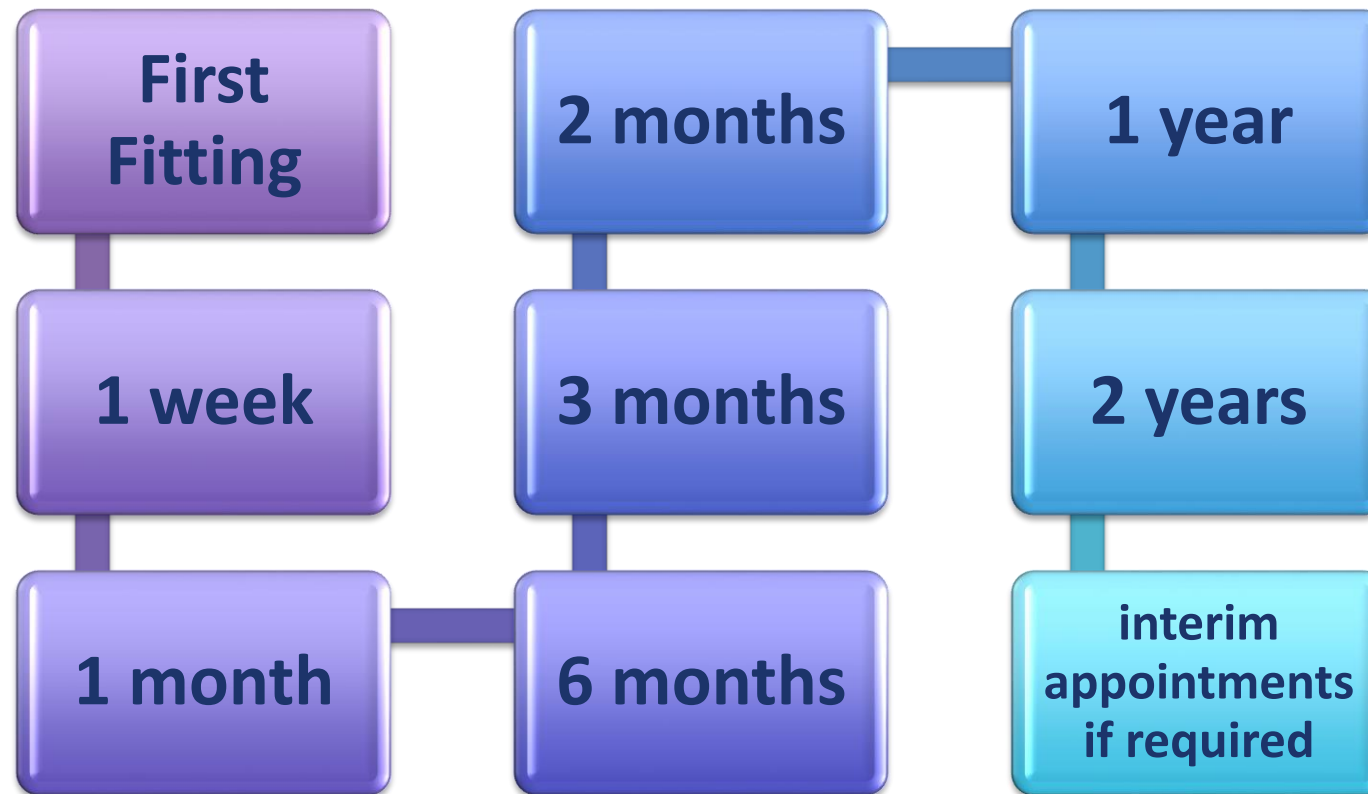
## Multidisciplinary Rehab and Aftercare

- Medical aftercare
- Audiological check-ups
- Technical support
- Speech therapy
- Music therapy



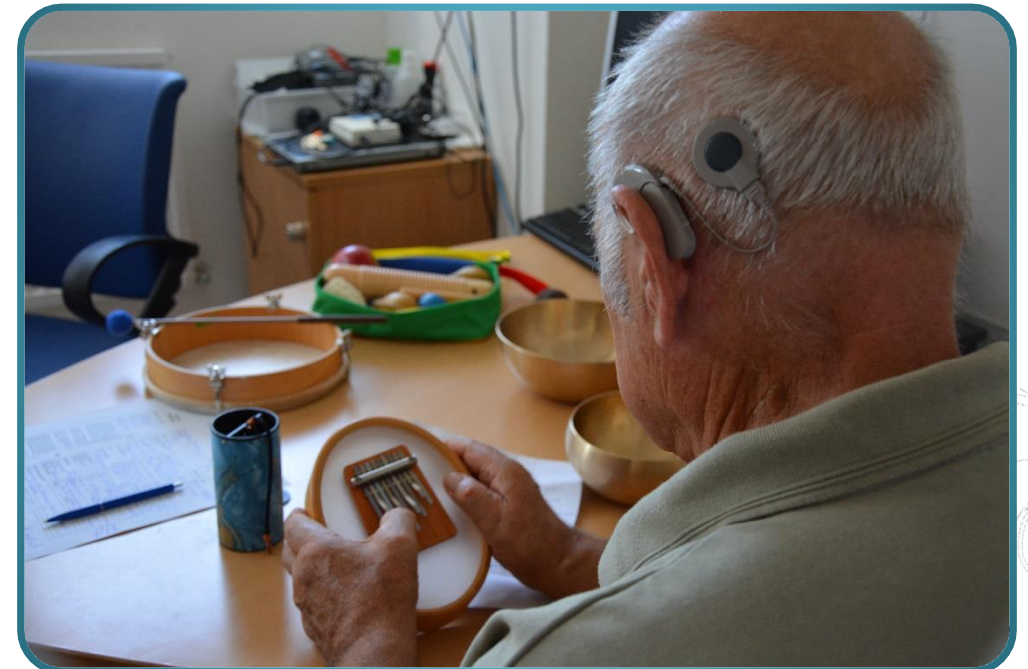


## Rehabilitation process



## Music therapy for CI recipients

- Only clinic in Austria providing rehabilitative outpatient music therapy (MT)
- individual or group settings; 1 month after the first fitting, all ages
- therapeutic support on a
  - functional level
  - psycho-emotional level
  - music as a therapeutic tool



## Instruments

- High-quality instruments
- Instruments from all over the world
- Easy to play
- Voice
- **NO MUSICAL EDUCATION REQUIRED!**

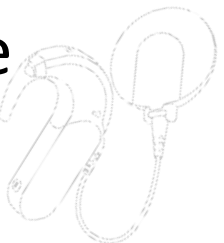




## Exercises

offers new hearing experiences in a holistic way

- melody and instrument recognition, directional hearing
- musical oriented hearing training
- exercises to reach better understanding
- possibility to talk -actual needs, feelings, problems of everyday life
- Digital Media - Apps



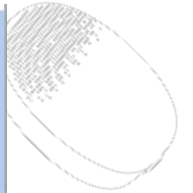
## Exercises

### Es war eine Mutter

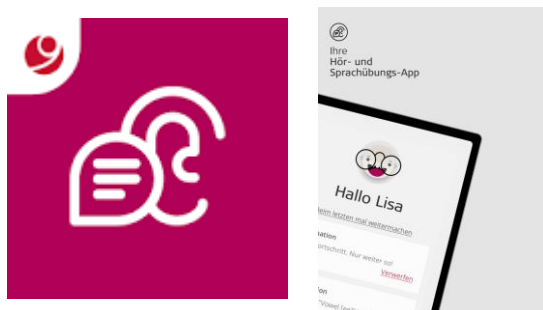
Es war eine Mutter  
die hatte \_\_\_\_\_ Kinder:  
den Frühling  
den \_\_\_\_\_  
den Herbst und den \_\_\_\_\_

Der Frühling bringt \_\_\_\_\_  
der Sommer den \_\_\_\_\_  
der Herbst bringt die \_\_\_\_\_  
der \_\_\_\_\_ den Schnee.

Und wie sie sich \_\_\_\_\_  
im Jahresreihn  
so tanzen und \_\_\_\_\_ wir fröhlich darein.



## Digital Media



### Spielerisch hören lernen

MED-ELs Hörtrainingsreihe "Listen Up!" wird fortgesetzt



Fotos: ©MED-EL



## Streaming – Tip Toi and Tonibox



Fotos: ©MED- EL

# HAVE FUN WITH SOUNDS !!!





Exercises - Task 1: How does this music sound to you? Circle all that apply!

<b>cool</b> Kühl	<b>compact</b> kompakt	<b>experimental</b> experimentell	<b>cold</b> kalt	<b>melancholic</b> melancholisch
<b>funny</b> lustig	<b>bombastic</b> bombastisch	<b>tingling</b> prickelnd	<b>sad</b> traurig	<b>dark</b> düster
<b>hard</b> hart	<b>brutal</b> brutal	<b>adventurous</b> abenteuerlich	<b>active</b> aktiv	<b>pleasant</b> angenehm
<b>sophisticated</b> anspruchsvoll	<b>merry</b> ausgelassen	<b>extraordinary</b> außergewöhnlich	<b>impressive</b> beeindruckend	<b>liberating</b> befreiend
<b>delightful</b> beglückend	<b>lively</b> belebt	<b>brilliant</b> brillant	<b>charming</b> charmant	<b>captivating</b> fesselnd
<b>fiery</b> feurig	<b>joyful</b> freudig	<b>fresh</b> frisch	<b>happy</b> fröhlich	<b>mysterious</b> geheimnisvoll



## Exercises - Task 2: Listening quiz - put a cross in the box!

- **Exercise 1: Do you hear a female or male voice?** (Hören Sie, ob ein Mann oder eine Frau spricht!)
  - ☐ Female (weiblich)
  - ☐ Male (männlich)
- **Exercise 2: How many speakers do you hear?** (Finden Sie heraus, wieviele Sprecher\*innen Sie hören!)
  - ☐ One speaker (1 Sprecher)
  - ☐ Two speakers (2 Sprecher\*innen)
- **Exercise 3: What sound can you hear?** (Welches Geräusch hören Sie?)
  - ☐ Keys (Schlüssel)
  - ☐ Water (Wasser)
  - ☐ Pen (Kugelschreiber)
  - ☐ Siren (Sirene)



## Exercises - Task 2: Listening quiz - put a cross in the box!

- **Exercise 4: Can you hear a man or a woman sing?** (Finden Sie heraus, ob ein Mann oder eine Frau singt!)

- ☐ Woman (Frau)
- ☐ Man (Mann)



- **Exercise 5: What instrument do you hear?** (Welches Instrument hören Sie?)

- ☐ Guitar (Gitarre)
- ☐ Harp (Harfe)
- ☐ Piano (Klavier)
- ☐ Flute (Flöte)






- **Exercise 6: Can you hear one tone or several tones at the same time?** (Hören Sie einen Ton oder mehrere Töne gleichzeitig?)

- ☐ One tone (ein einzelner Ton)
- ☐ Several tones at the same time (mehrere Töne gleichzeitig)



## Exercises - Task 2: Listening quiz - put a cross in the box!

- **Exercise 7: Does the melody go up or down?** (Finden Sie heraus, ob die Melodie auf- oder abwärts geht.)
  - ☐ Up (aufwärts)
  - ☐ Down (abwärts)
- **Exercise 8: Is this person singing or whistling?** (Hören Sie genau hin, ob gesungen oder gepfiffen wird.)
  - ☐ Whistling (pfeifen)
  - ☐ Singing (singen)
- **Exercise 9: Is this song in English or is it another language?** (Wird das Lied auf Englisch oder in einer anderen Sprache gesungen?)
  - ☐ English (Englisch)
  - ☐ Other language: \_\_\_\_\_ (andere Sprache)

## Exercises - Task 2: Correct answers

- **Exercise 1: Do you hear a female or male voice?**

- ☐ Female (weiblich)
- ☐ Male



- **Exercise 2: How many speakers do you hear?**

- ☐ One speaker (1 Sprecher)
- ☐ Two speakers



- **Exercise 3: What sound can you hear?**

- ☐ Keys
- ☐ Water (Wasser)
- ☐ Pen
- ☐ Siren





## Exercises - Task 2: Listening quiz - put a cross in the box!

- **Exercise 4: Can you hear a man or a woman sing?**

- ☐ Woman (Frauenstimme)
- ☐ Man



- **Exercise 5: What instrument do you hear?**

- ☐ Guitar
- ☐ Harp
- ☐ Piano (Klavier)
- ☐ Flute



- **Exercise 6: Can you hear one tone or several tones at the same time?**

- ☐ One tone (ein einzelner Ton)
- ☐ Several tones at the same time



## Exercises - Task 2: Listening quiz - put a cross in the box!

- **Exercise 7: Does the melody go up or down?**

- ☐ Up
- ☐ **Down** (abwärts)



- **Exercise 8: Is this person singing or whistling?**

- ☐ **Whistling** (pfeifen)
- ☐ Singing



- **Exercise 9: Is this song in English or is it another language?**

- ☐ English
- ☐ **Other language:** italien (italienisch)



## Recommendation

### ► Beginners: listen to ...



- songs you know well from before
  - songs you know by heart
  - songs with a clear, simple rhythm
  - music with only one instrument -> 2 instruments -> 3 instruments -> band/orchestra
  - children's songs (many repetitions, simple melodic structure, known from own childhood)
- 
- learning listening to music is like learning a foreign language

## Recommendation

### ► Advanced: listen to ...



- unfamiliar songs
- classical music - “Boléro” by M. Ravel -> same Ostinato rhythm, same melody
- Sing simple songs and get feedback on your intonation
- If you have an instrument at home, use it as a practice instrument
  - Pitch differentiation, half and whole tone, dynamics etc.
- Join a choir

## Choir workshop in St.Pölten (MED-EL)





[Journal List](#) > [J Pers Med](#) > [v.12\(3\); 2022 Mar](#) > PMC8951547



Journal of  
*Personalized  
Medicine*



[J Pers Med](#). 2022 Mar; 12(3): 443.

Published online 2022 Mar 11. doi: [10.3390/jpm12030443](#)

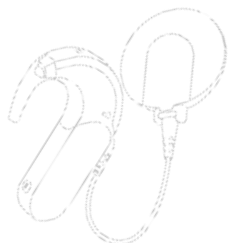
PMCID: PMC8951547

PMID: [35330442](#)

## Improved Music Perception after Music Therapy Following Cochlear Implantation in the Elderly Population

[Astrid Magele](#),<sup>1,2,\*</sup> [Bianca Wirthner](#),<sup>1</sup> [Philipp Schoerg](#),<sup>1,2</sup> [Marlene Ploder](#),<sup>1</sup> and [Georg Mathias Sprinzl](#)<sup>1,2</sup>

Dong-Kyu Kim, Academic Editor



## Music therapy study

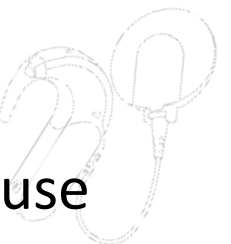
### Material & Methods

#### Inclusion criteria:

- CI recipients (post-lingual deafness)
- Older than 65 years
- Minimum of 6 months use
- Bilateral/binaural - no SSD

#### Demographics:

- Age
- Gender
- Side of CI
- Conv. Hearing aids
- Reason of deafness
- Duration of deafness
- CI – model
- Implantation date/Duration of use



## Methods

CI recipients Pre- and post tests (n=11)	Normal hearing (reference group) Single evaluation (n=10)
<b>HISQUI</b> <i>Hearing Implant Sound Quality Index</i>	<b>HISQUI</b>
<b>MUMU</b> <i>Munich Music Questionnaire</i>	<b>MUMU</b>
<b>MWT</b> <i>Music Perception Test</i>	<b>MWT</b>
<b>VAS</b> <i>Visual Analogue Scale (QoL)</i>	-
<b>Interviews</b>	-

10 individual MT sessions à 50 min.  NÖ LANDESGESUNDHEITSAGENTUR



## HISQUI

## MUMU



The questionnaire measures, how good or poor you find the sound quality from your hearing implant in your everyday, everyday listening situation. Please check the answer boxes which correspond the closest to your everyday experience. Each answer option also includes a percentage value. The percentage value will help you answering the questions "heard always", for example, means that your statement is currently correct about 60% of the time. If a specific situation/statement is not applicable, please check the box "N/A" = not applicable.

	heard always (100%)	heard frequently (60%)	heard some (40%)	heard little (20%)	heard hardly (10%)	never (0%)	N/A
1. Can you effectively distinguish between a male and a female voice?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. When talking on the phone, can you effectively understand the words of the speaker?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. When listening to music, can you effectively distinguish whether you are hearing a single instrument or multiple instruments are being played simultaneously?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. When background noise is present, can you effectively participate in a conversation with friends or family members (e.g. at a party or a restaurant)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Can you effectively hear voices such as talking, laughing or the opening of the microwave or the pouring of a cup?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Can you effectively distinguish single instruments in a familiar piece of music?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**1. Wie häufig hören Sie Musik, gehört, oder hören Sie Musik?**  
Kreuzen Sie die zutreffende Antwort an.

Wie häufig haben Sie vor der Implantation Musik gehört?  
OFT: 10 9 8 7 6 5 4 3 2 1 NEU

Wie häufig haben Sie in der Zeit Ihrer Rehabilitation vor der Cochlea-Implantation Musik gehört?  
OFT: 10 9 8 7 6 5 4 3 2 1 NEU

Wie häufig hören Sie jetzt nach der Implantation Musik?  
OFT: 10 9 8 7 6 5 4 3 2 1 NEU

**2. Welche Rolle spielt/hat Musik in Ihrem Leben?**  
Kreuzen Sie die zutreffende Antwort an.

In der Zeit vor Eintritt der Hörminderung:  
Eine sehr große: 10 9 8 7 6 5 4 3 2 1 KLEINE

In der Zeit Ihrer Rehabilitation vor der Cochlea-Implantation:  
Eine sehr große: 10 9 8 7 6 5 4 3 2 1 KLEINE

Jetzt, nach der Implantation:  
Eine sehr große: 10 9 8 7 6 5 4 3 2 1 KLEINE

**3. Wenn Sie Musik hören oder gehört haben, kreuzen Sie bitte an, wie lange Sie jeweils zuhören / zugehört haben.**

	weniger als 10 Minuten	10-20 Minuten	20-30 Minuten	30-45 Minuten	45-60 Minuten	länger als 60 Minuten	Den gesamten Tag
in der Zeit vor Eintritt der Hörminderung	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
in der Zeit Ihrer Rehabilitation vor der Implantation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jetzt, nach der Implantation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Methods

Evaluate the subjective impression of the CI users

**HISQUI:** *Hearing Implant Sound Quality Index*  
subjective sound quality in everyday life

**MUMU:** *Munich Music Questionnaire*  
music related habits and subjective music impression  
before/after MT



## Methods

### VAS

- Likert scale from 0 to 10
- subjective changes in quality of life before and after MT



### Interviews

- Were performed after the last MT session
- Questions regarding their subjective experiences and outcomes of MT

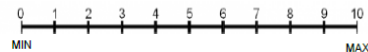


#### VAS (Visuelle Analogskala)

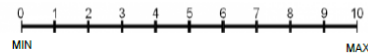
Erhebung der Musiktherapieeffekte auf psychologischer Ebene

Bitte kreuzen Sie an!

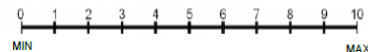
1. Frustration im Bereich der Hörwahrnehmung



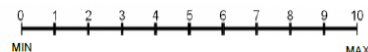
2. Motivation am Hören Lernen



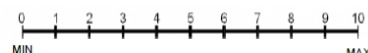
3. Selbstvertrauen/Selbstsicherheit



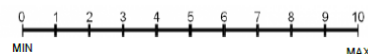
4. Teilhabe an gesellschaftlichen Ereignissen



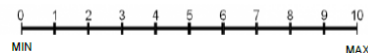
5. Aktuelles Wohlbefinden



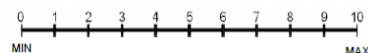
6. Lebensqualität



7. Akzeptanz der neuen Höreindrücke



8. Vertrauen in die eigene Hörwahrnehmung





## Methods


### MWT

- music perception test
- to compare the influence of MT on music perception
- Sound sequences
- Pitch discrimination
- Single or polyphony
- Differentiation of rhythms
- Recognition of instruments

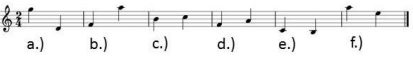


**Music Perception Test**


1) Sound sequences



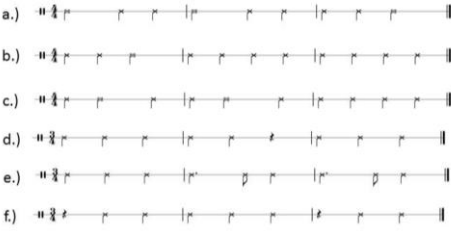
2) Pitch discrimination



3) Single or polyphonic



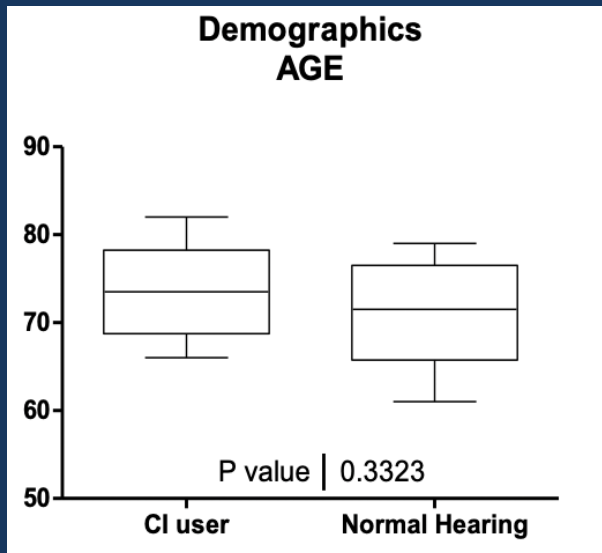
4) Differentiation of rhythms



5) Recognition of instruments

a.) piano  
b.) guitar  
c.) trumpet  
d.) harp  
e.) recorder  
f.) drums

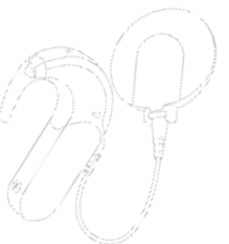
## Results Demographics



11	CI recipients
10	NH

	CI user	Normal Hearing
Mean	74	71
Std. Deviation	5.3	6.0
Std. Error	1.7	1.9
Lower 95% CI	70	67
Upper 95% CI	77	75

- Similar patients age group
- Same music habits, listening to same music



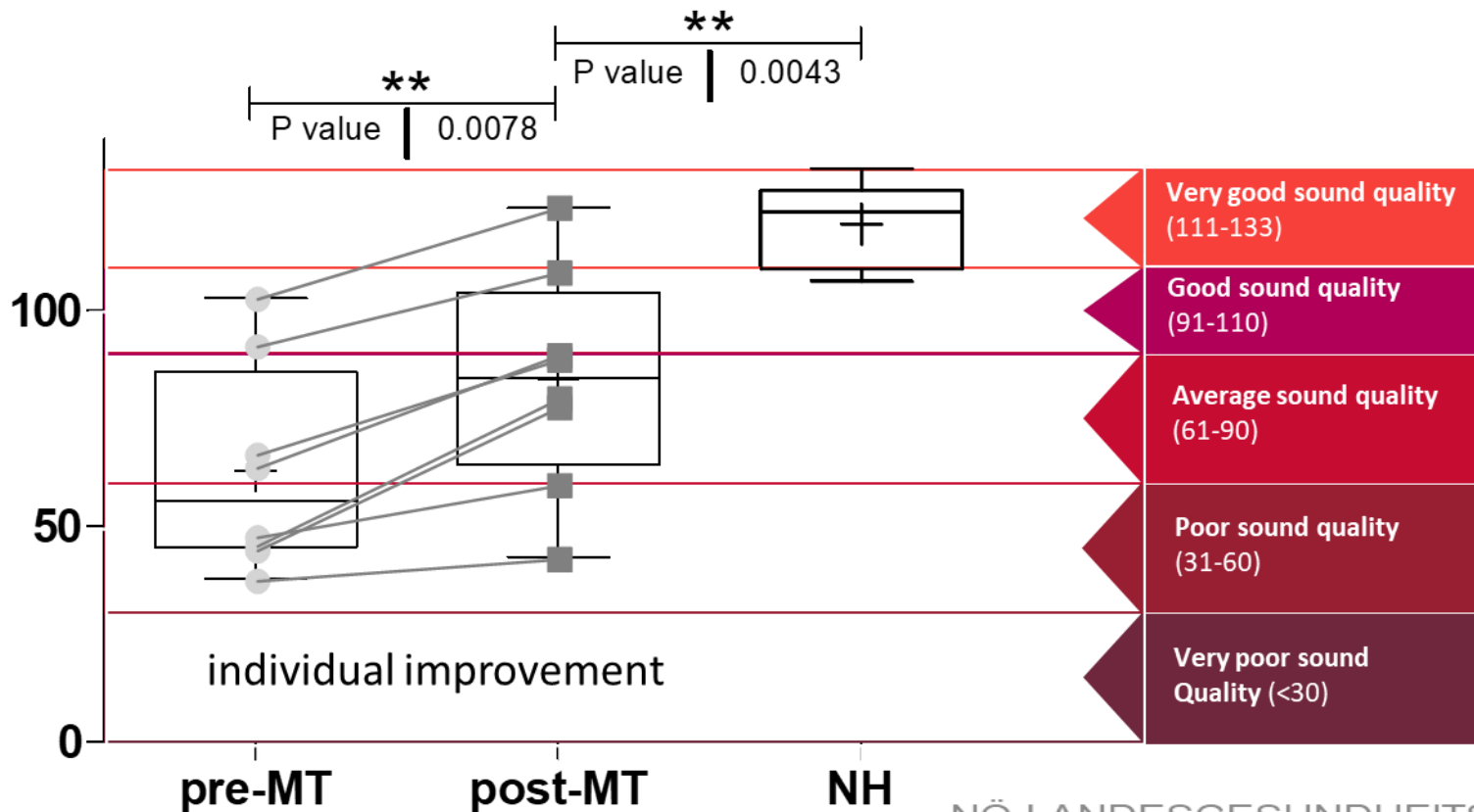
## Results Demographics

Subject ID	Age (years)	Gender	Uni/bilateral	AP type	CI experience (months)	HA contra-lateral side	time since deafness (years)
MTCI 01	82	F	uni/right	Opus 2	42	le	14
MTCI 02	69	M	uni/left	Sonnet	15	ri	1.5
MTCI 03	76	M	bilateral	Opus 2 (le) Sonnet (ri)	144(le); 21 (ri)	-	14
MTCI 04	76	M	uni/right	Sonnet	8	le	70
MTCI 05	71	F	uni/right	Sonnet	24	le	3
MTCI 06	66	M	uni/left	Sonnet	6	ri	5
MTCI 07	78	M	uni/right	Sonnet	7	le	15
MTCI 08	71	F	uni/right	Kanso	6	le	20
MTCI 09	79	F	bilateral	Opus 2 (le) Sonnet (ri)	66(le); 6(ri)	-	15 - 20
MTCI 10	68	F	bilateral	Sonnet (le). Opus 2 (ri)	12(le); 46(ri)	-	> 20
MTCI 11	65	M	bilateral	Sonnet (le). Opus 2 (ri)	7(le); 65(ri)	-	----
<b>MEAN/SD CI</b>	<b>72.8±5.7</b>	<b>5F/6M</b>	<b>4 bilateral</b>		<b>41.1±43.6/23.7±19.8</b>		<b>18.3±19.5</b>
MTNH 01	65	F	-	-	-	-	-
MTNH 02	66	M	-	-	-	-	-
MTNH 03	69	F	-	-	-	-	-
MTNH 04	78	F	-	-	-	-	-
MTNH 05	75	F	-	-	-	-	-
MTNH 06	79	M	-	-	-	-	-
MTNH 07	76	F	-	-	-	-	-
MTNH 08	72	F	-	-	-	-	-
MTNH 09	71	F	-	-	-	-	-
MTNH 10	67	F	-	-	-	-	-
<b>MEAN/SD NH</b>	<b>71.8±4.9</b>	<b>7F/2M</b>	-	-	-	-	-

AP Audio Processor; HA Hearing aid.

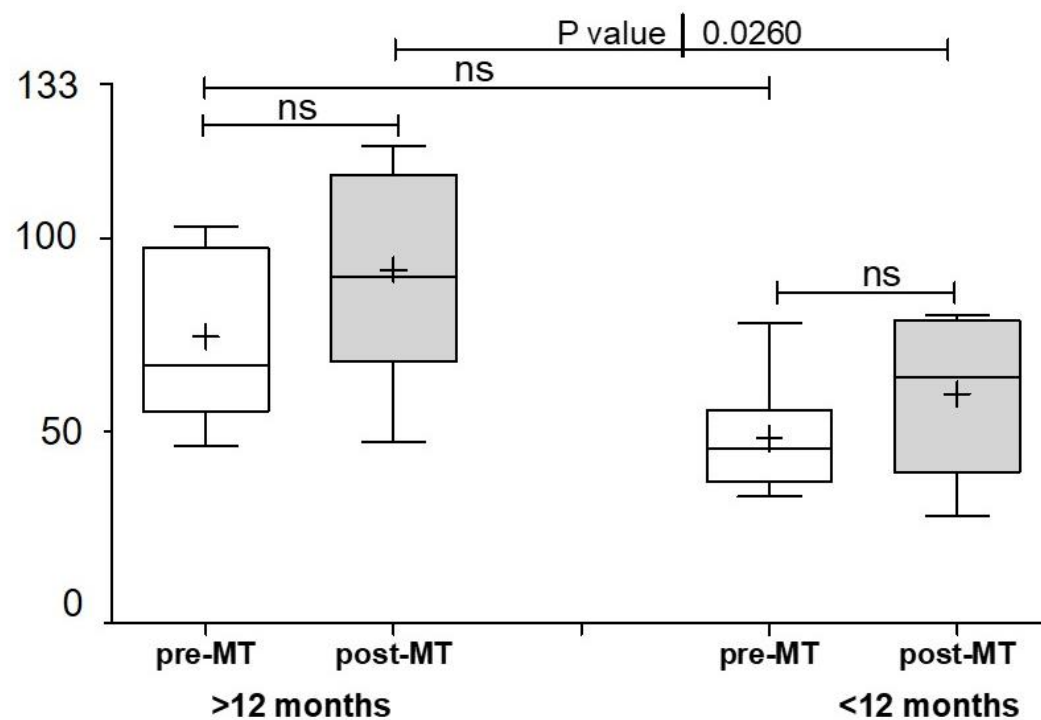


## Results HISQUI



## Results HISQUI

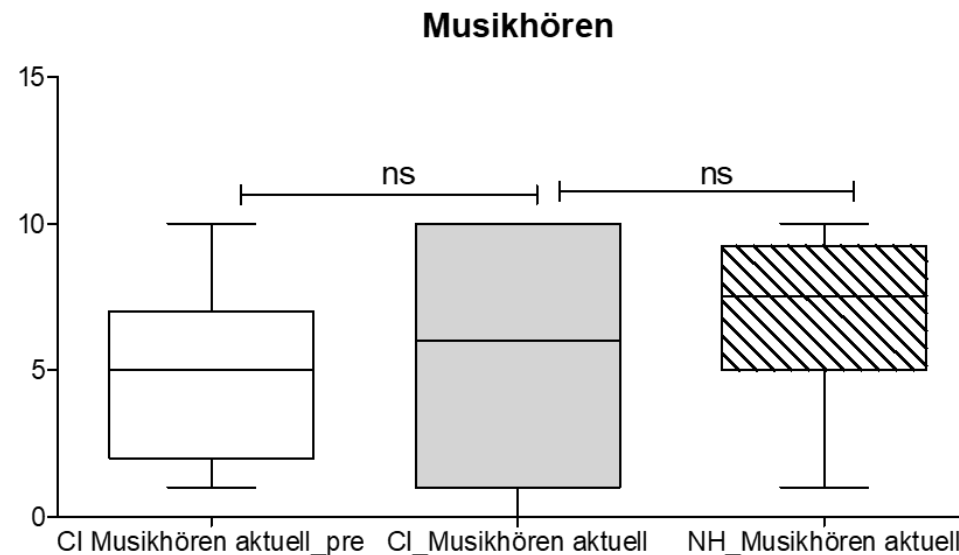
as a function of device experience



## Results MUMU

- Frequency of listening to music before and after MT not significant but the trend is upwards rising with more subjects listening to music than before – enjoyed it more

### Music consumption

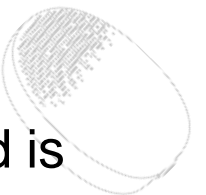
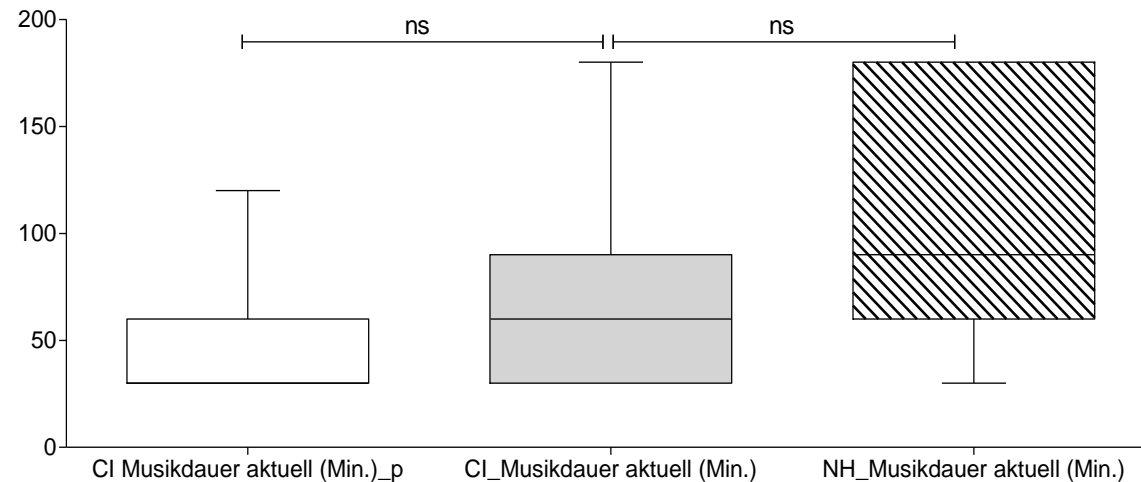




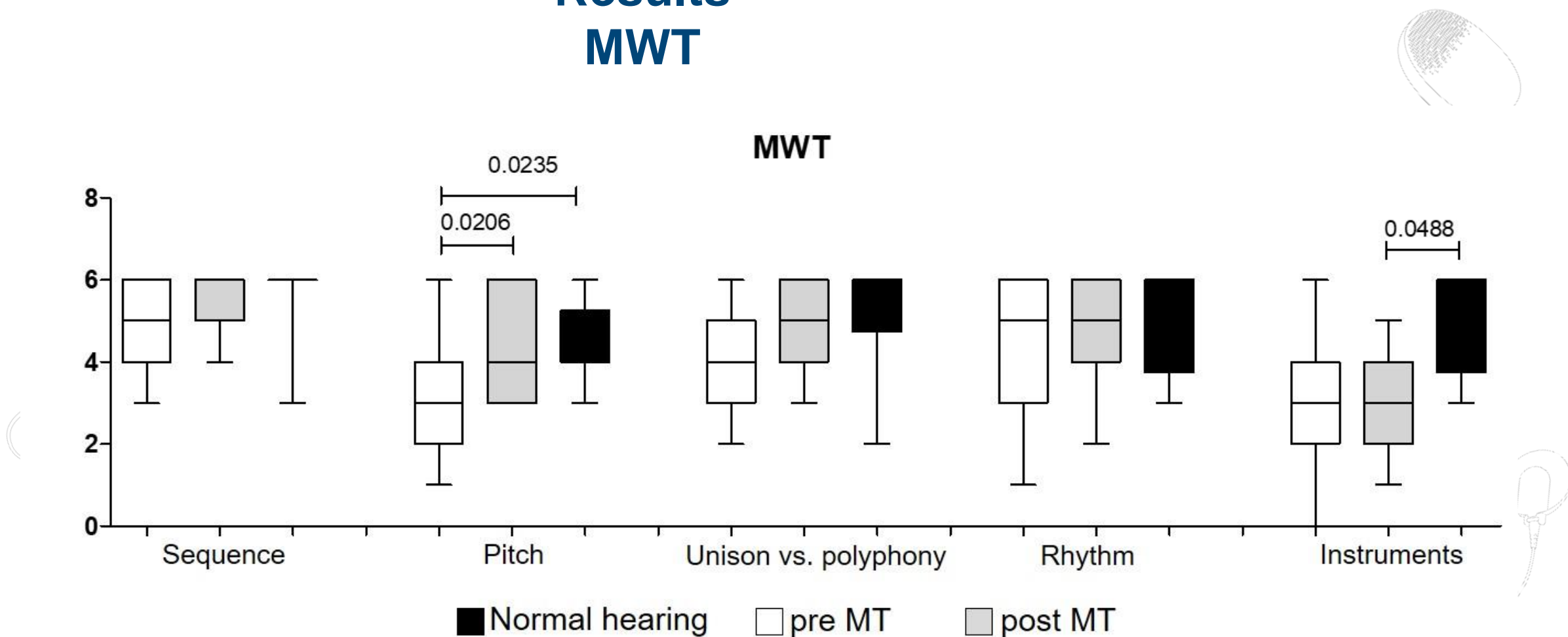
## Results MUMU

- The listening to music in minutes before the MT was quite low but it increased, the trend is here but not significant

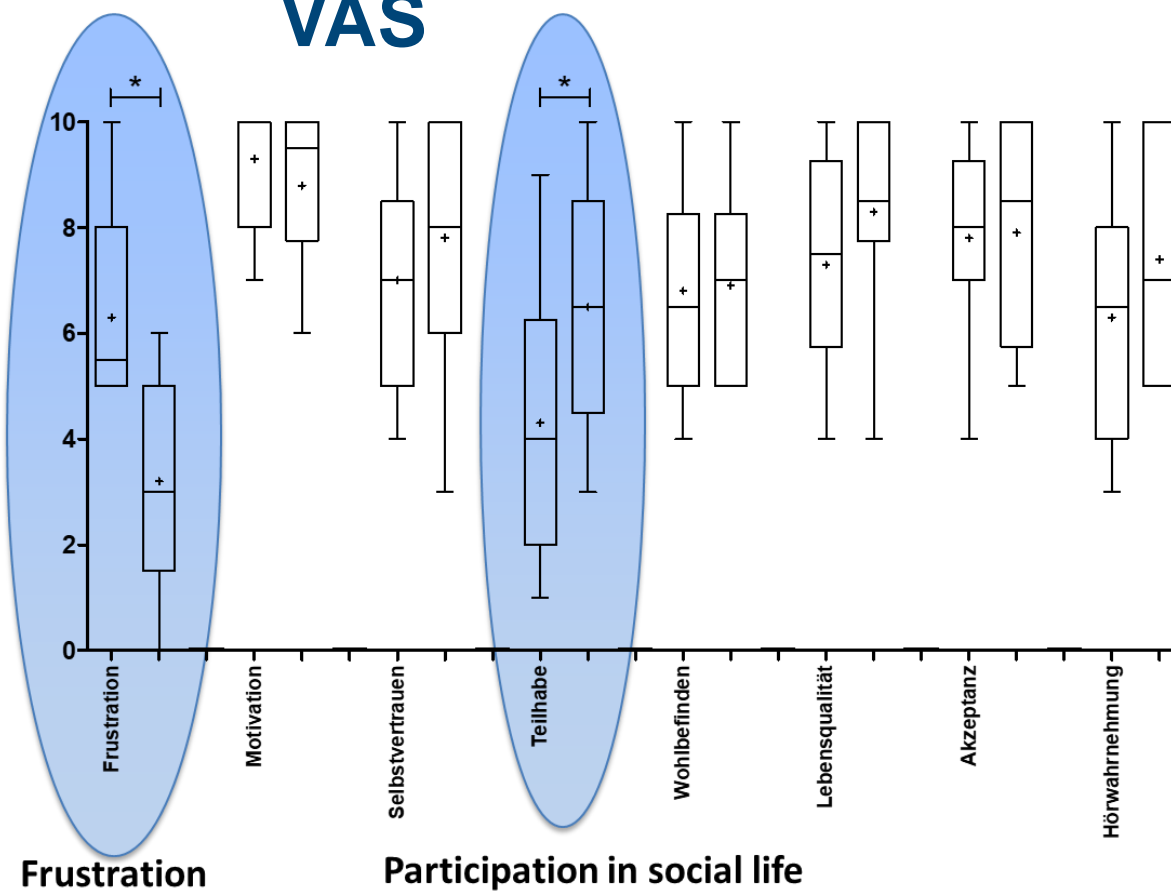
**Length of music listening per day (minutes)**



## Results MWT



## Results VAS



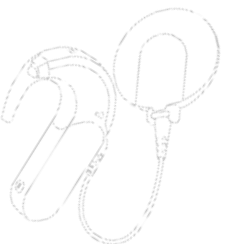
Frustration

Participation in social life

## Results Interviews

Main Categories evaluated:

- Variety of music therapy methods
- Possibility to have therapeutic talks
- Psychological/emotional support



## Discussion

### Pros:

- Well accepted by the subjects
- Significantly decreased frustration after MT (VAS) ↓
- Significantly increased participation after MT (social life) (VAS) ↑
- Significantly better sound quality after MT (HISQUI) ↑
- Trends towards better music perception and ↑
- increased enjoyment of music ↑

### Cons:

- Small sample size
- Therapy protocol not standardized
- Longer therapy needed?
- Heterogeneous age-group (pediatric vs older group)?

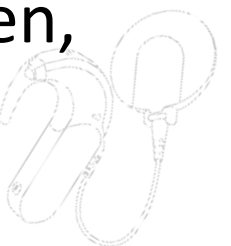


## Conclusion

We can highly recommend MT for CI users older than 65 years



- improvement in quality of life
  - support the speech understanding rehabilitation and
  - higher self-esteem and more self- confidence -> back to social life
- 
- MT should not be missing in any CI rehabilitation program: for children, adults AND the elderly population





## Publications

- ▶ ***Effects of auditory training via direct streaming to the AudioLink in SSD-CI children on speech recognition***

Stefanie Muck, Astrid Magele, Bianca Wirthner, Philipp Schoerg, Georg Mathias Sprinzi

- ▶ ***Music therapy and at-home musical training with a professional musician following cochlear implantation***

Astrid Magele, Bianca Wirthner, Philipp Schoerg, Georg Mathias Sprinzi

- ▶ ....work in progress...