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Perception of Music and Speech in Adolescents with Cochlear Implants - a Study on Effects of Intensive Musical Ear Training

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BACKGROUND & AIMS

Little is known about music perception in the new generation of prelingually deaf adolescents who grew up with CIs. Recent studies, however, indicate that to keep pace with their normal hearing (NH) peers, supplementary measures of rehabilitation are important throughout adolescence. Music training may provide a beneficial method of strengthening not only music perception, but also linguistic skills, particularly prosody.

This study aimed to investigate

1. **the potential effects of an intensive musical ear training program on adolescent CI users' discrimination of music and speech**
2. **music listening habits and music enjoyment among adolescent CI users**

Group	Girls /Boys	Mean age at project start	Age range	Mean implant experience (y)	Uni-/bilateral implant
CI grp.	6/5	17.0 (SD 0.9)	15.6-18.8	9.47 (SD 4.2)	(2/9)
NH grp.	2/8	16.2 (SD 0.5)	15.3-17.0	-	-

Table 1. Demographic data for the 2 experimental groups.

METHODS & PARTICIPANTS

Eleven adolescent CI users participated in a short intensive music training program involving rhythm-training, singing and ear training. The active music making was supplemented with daily computer-based listening exercises. Ten NH peers formed a reference group, which followed standard school schedule and received no music training (Table 1).

Before (T1) and after (T2) the intervention period, both groups performed behavioral tests for perception of music and emotional prosody. Furthermore, the participants filled out an online questionnaire on music enjoyment and listening habits.

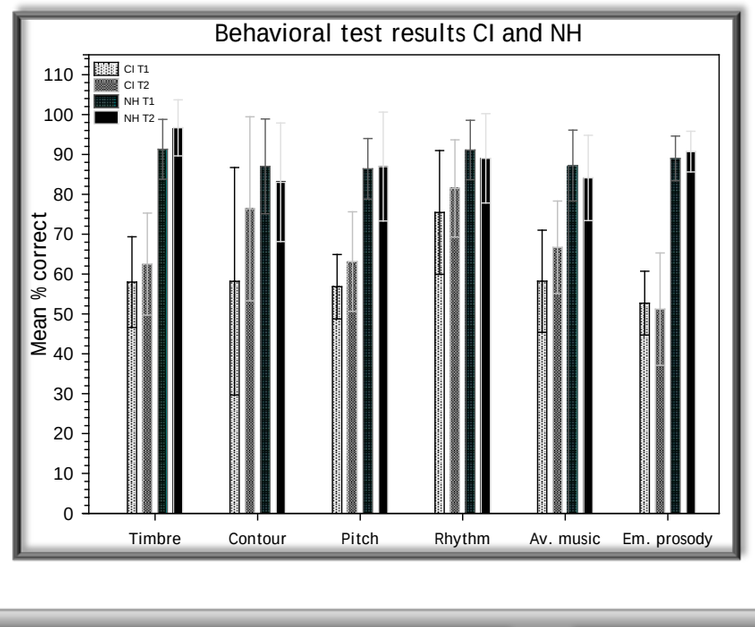

Figure 1. Behavioral scores for the two experimental groups at T1 and T2. Timbre: discrimination of 8 different musical instruments: Contour: identification of the direction of 5-note melodic patterns; Pitch: ranking of 2 pitches; Rhythm: discrimination of rhythm patterns; Av. music: overall music discrimination performance averaged across tests; Em. prosody: recognition of 3 different spoken emotions.

RESULTS

Music discrimination skills

1. **CI users: significant *overall* progress.**
2. **Significant progress in discrimination of *melodic contour* and *rhythm***
3. **NH group produced significantly higher average scores than the CI group at both sessions.**
4. **No effect of the music training on discrimination of emotional prosody (Figure 1).**

Music listening

1. **The majority of the adolescent CI users listen to music often (27 %) or every day (55 %)**
2. **The majority of the CI users appreciate listening to music (mean Likert-scale score: 3.7).**
3. **The adolescent CI users rate the quality of music through their implant positively (Figure 2).**

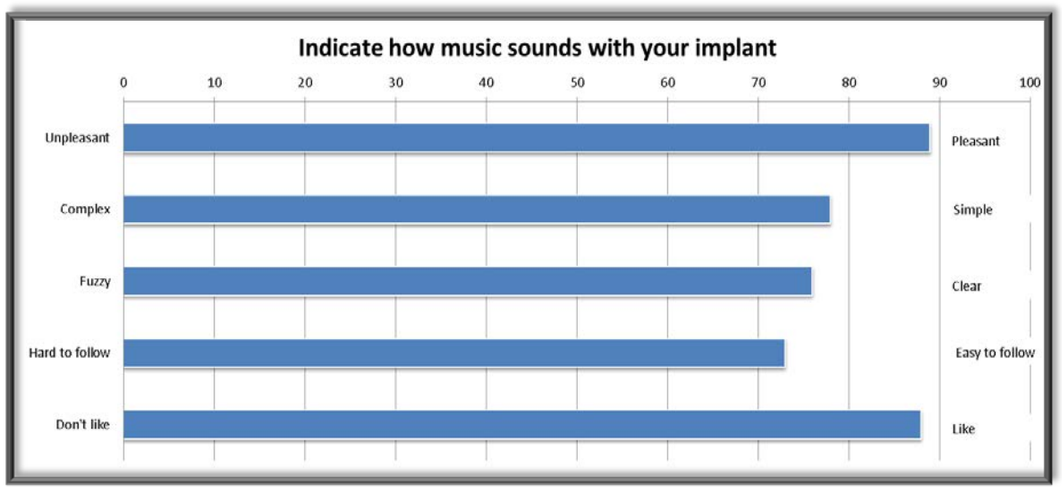

Figure 2: Mean values for adjective descriptors of music heard through the implant. Average value across the five pairs: 80.9 points.

CONCLUSION

- **Prelingually deaf adolescent CI users, who have only experienced the degraded sound from the implant, may improve music discrimination skills, even from short term training.**
- **Rhythm and direction of melody are well preserved by the CI and thus efficiently influenced by training. By contrast, recognition of emotional prosody is poor and unaffected by music training.**
- **Despite poor perception of pitch and timbre, adolescent CI users appreciate listening to music and many do so every day.**
- **In general, adolescent CI users find the sound of music easy to follow, pleasant and clear.**
- **All participants completed the program and the majority found the active elements of the training program relevant.**
- **Computer applications were only used sparsely and most participants did not find them relevant.**

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