

Adolescent cochlear implant users' auditory emotion recognition lags behind their hearing peers.

The effects of language ability and auditory status on emotion recognition in adolescents

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INTRODUCTION

- Adolescents with cochlear implants (CIs) may not have access to suprasegmental cues due to reduced temporal, intensity, and spectral resolution of the device.^{1,2}
- Reduced auditory access to speech and poorer spectral resolution can have deleterious effects on cognitive functions critical for social communication, such as perception of emotion information.^{1,2}
- General language measures do not capture nuances of supra-segmental cues such as prosody, which underlies emotional intent.³
- This study aimed to determine (a) the effect of auditory status (CI vs. typical hearing, TH) on auditory emotion recognition; and (b) the link between emotion recognition and general language ability in adolescents with CI and TH.

METHODS

PARTICIPANTS: ADOLESCENTS (12-17 years)

Table 1. Demographic Characteristics

Variable	TH (n=5)	CI (n=8)
Sex - Percent female (%)	40%	25%
Mean chronologic age, years	14.40 (1.52)	15.00 (1.77)
Mean age of first CI fit, years	-	4.50 (3.34)
Mean age of second CI fit, years	-	6.00 (4.03)
Mean duration of CI use, years	-	10.50 (3.63)

Note. Device configuration includes bilateral CIs (n=7) and unilateral CI (n=1) arrangements. All participants used oral communication (one participant used both oral communication and sign language).

PROCEDURE AND MATERIALS

- **Auditory Emotion Recognition.** Adolescents listened to sentences from the Morgan Emotional Speech Set (MESS)^{3,4} and matched each to an emotion (angry, calm, happy, sad) for a percent correct score.
- **Language.** Adolescents completed the general language ability index and pragmatic subtest of the *Comprehensive Assessment of Spoken Language 2 (CASL-2)*⁵ to yield a standard score (M=100, SD=15).
- **Statistical analyses.** Multivariate analysis of variance examined group differences (CI vs. TH) in emotion recognition and language.

RESULTS

- Compared to adolescents with TH, adolescents with CIs have significantly poorer auditory emotion recognition (84% vs. 59%), $F(1,10) = 4.67, p = .044$.
- Significant group differences emerge for performance on general emotion recognition, $F(1,10) = 14.66, p = .003$ as well as angry stimuli, $F(1,10) = 15.67, p = .003$, and calm stimuli, $F(1,10) = 20.22, p = .001$.

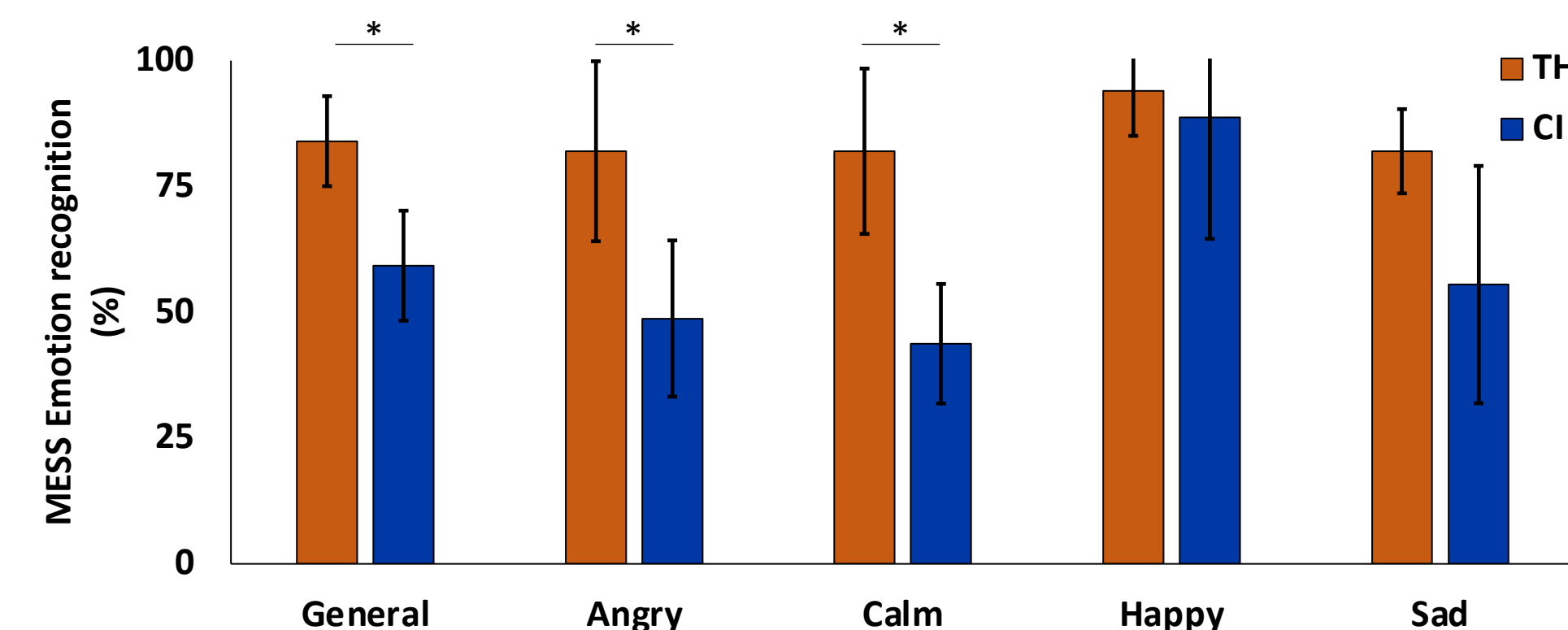


Figure 1 shows auditory emotion recognition scores for the TH and CI groups. Both identify happy most accurately. The TH group performs similarly across other emotions, but the CI group performs poorest (44%) on calm emotion trials.

- Both groups have mean language scores in normative range, but the TH group had slightly but not significantly higher scores than the CI group (109 vs. 98), $F(1,10) = 2.22, p = .17$.

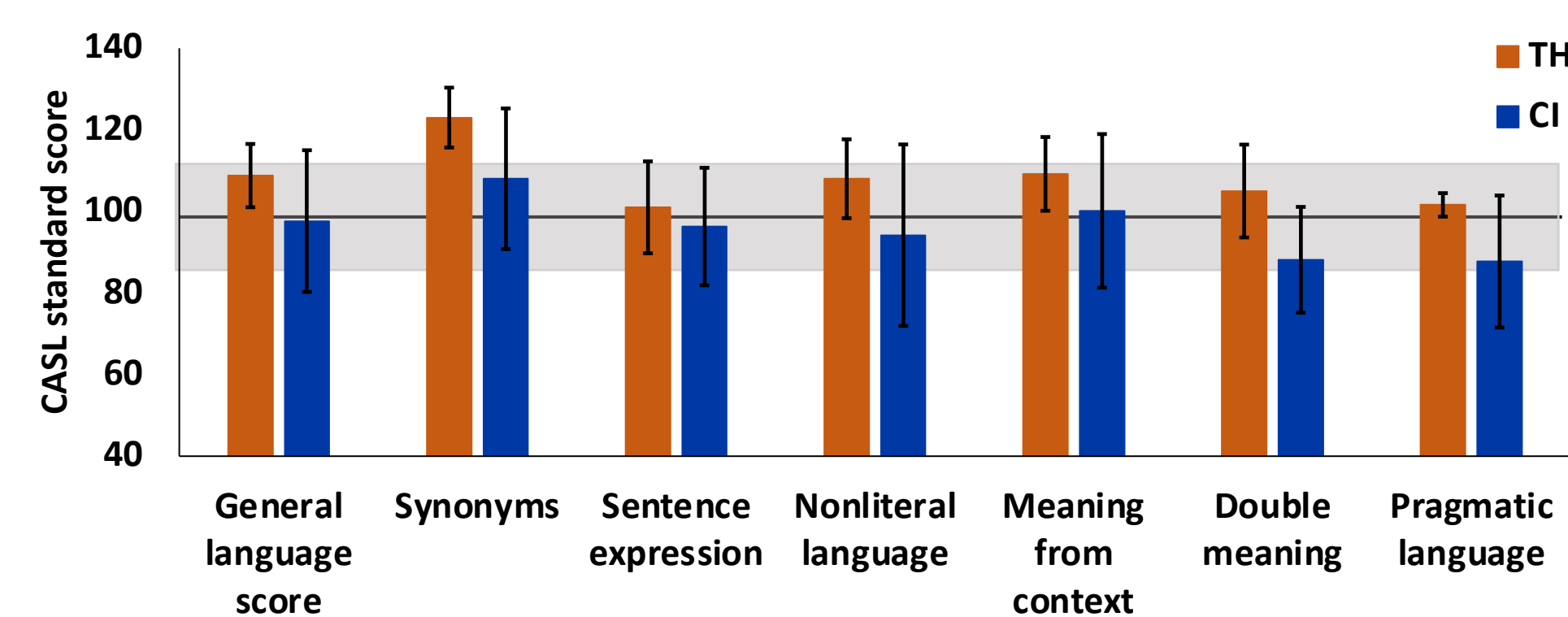


Figure 2 shows language scores for the TH and CI groups. Mean scores fall in the normative range, but the CI group shows more variability and a lower proportion of individual scores in normative range (e.g., 75% vs. 100% for general language).

- Visual inspection suggests potential relationship between auditory emotion recognition and general language ability, but the limited sample size prevents statistical analysis

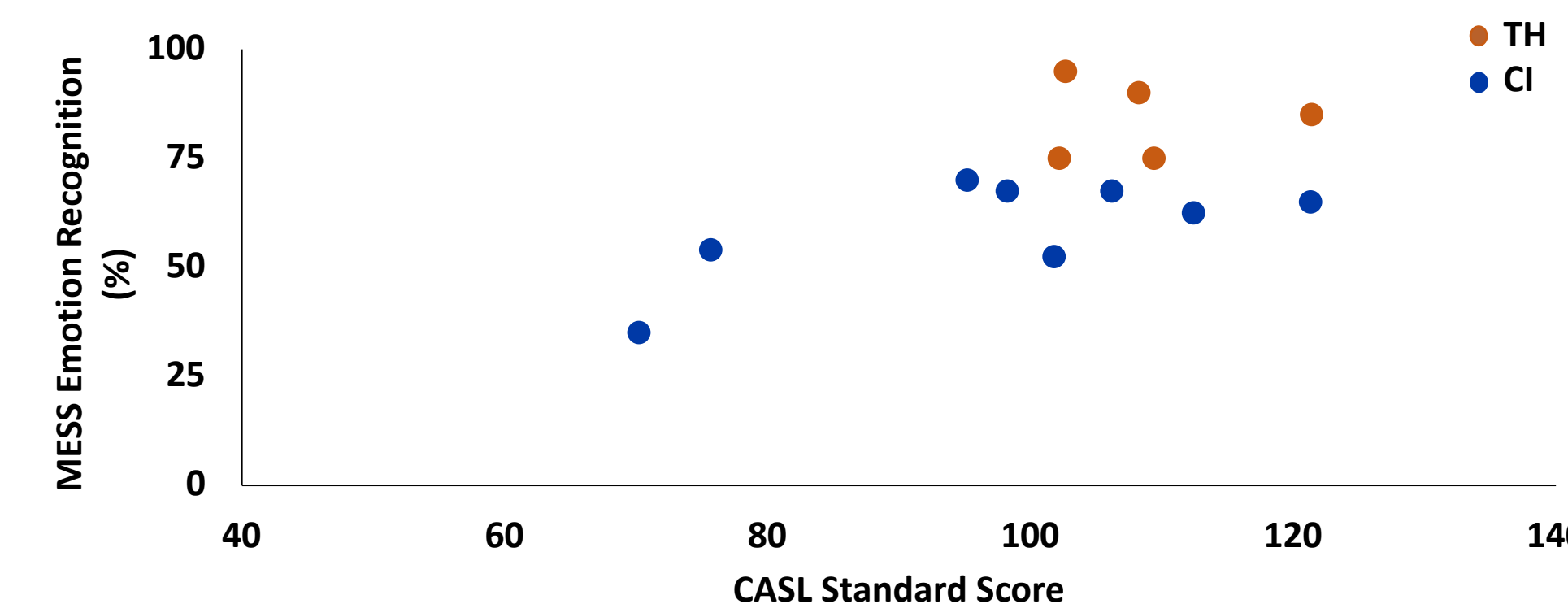


Figure 3 shows the relationship between auditory emotion recognition scores and general language scores for the TH (blue) and CI (orange) groups.

DISCUSSION

- Adolescent CI users show deficits in auditory emotion recognition compared to peers with TH.
- No significant group differences emerged in language scores, but the TH group consistently outperformed the CI group – evidence that language differences persist in adolescence, a time when many CI users are not receiving services.
- The blend of poorer emotion recognition and language performance can have negative effects on communication, especially social interactions with others.
- Professionals working with this population should consider:
 - Monitoring language level relative to intelligence and specific subtests to make appropriate referrals;
 - Assessing emotion recognition to guide programming and therapy to enhance access and utilization of suprasegmental cues to capture emotional aspects of language.
- Limitations include small sample with similar demographic characteristics.
- Future directions will expand sample size and diversity and incorporate measures of social skills and well-being.

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