

Auditory Steady State Response as an objective hearing measurement in nonagenarians aged 90 and 95

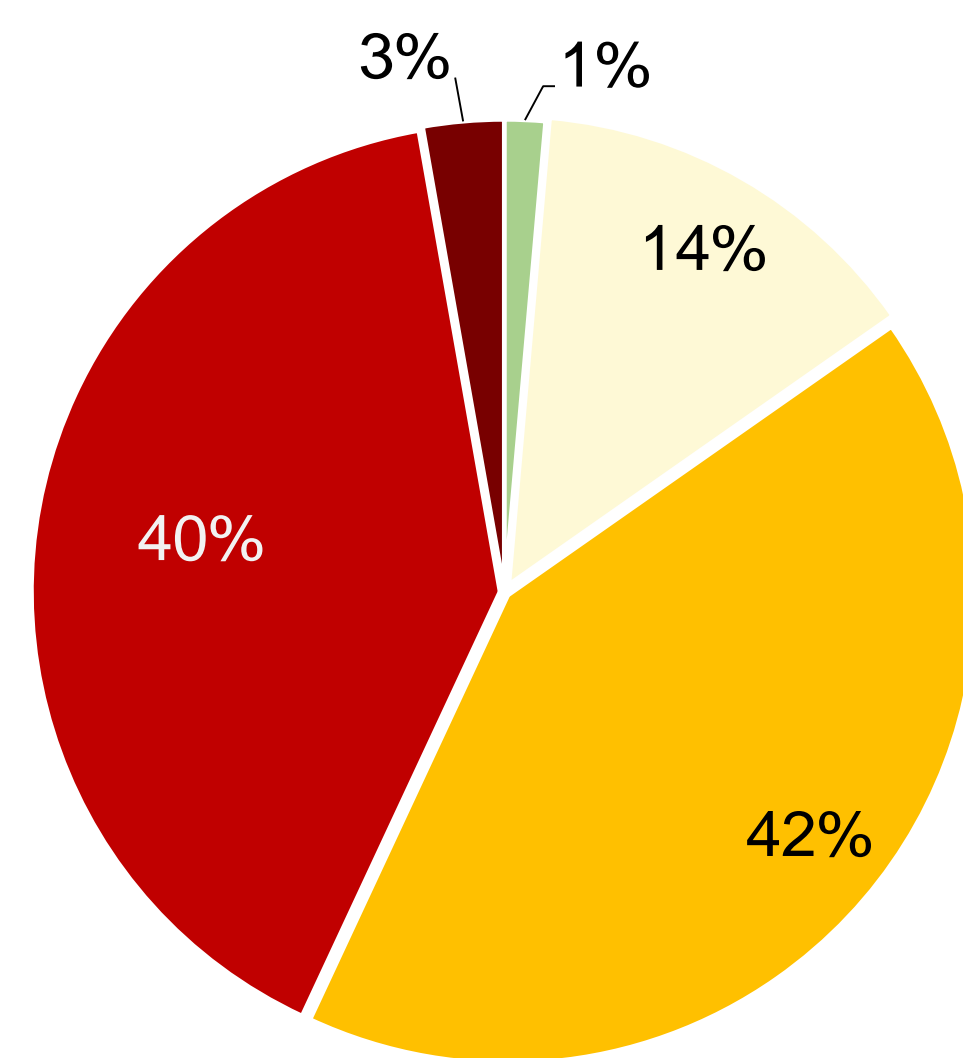
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Introduction

With an increasing number of individuals reaching the 10th decade of life, it is essential to adapt hearing healthcare to the diverse mental and physical health profiles of this age group. Considering the high prevalence of concurrent hearing loss and dementia, objective test methods that are feasible outside the clinical environment need to be added to the audiological test battery.

Auditory Steady State Response (ASSR) is commonly used to estimate hearing thresholds, especially in paediatric audiology and for other hard-to-test individuals. In this study we aimed to validate the feasibility of performing ASSR in a home setting for individuals aged 90 and above.



Degree	Hearing loss (dB HL)
Normal	0 to < 20
Mild	20 to < 35
Moderate	35 to < 50
Moderately Severe	50 to < 65
Severe or greater	≥ 65

Fig 1: Degree of hearing loss (dB HL) in the *better* ear based on participants' ($n = 72$) pure tone threshold average for 0.5, 1, 2 and 4 kHz. (WHO, 2021)

Materials and methods

Seventy-two nonagenarians living in the city of Gothenburg, Sweden, were included. Standardised pure-tone audiometry (PTA) (Fig.1) and ASSR were performed during the same session in the participants' home setting, including nursing homes. ASSR measurements were carried out using a narrow band CE-Chirp presented in four frequency bands at carrier frequencies 0.5, 1, 2, and 4 kHz binaurally, following a strict measurement protocol.

Participants $n = 72$ (67 % female)

Median age (min-max)	92.5 years (88.5 – 96.2)
Living in own house/apt	60 (83 %)
Living in nursing facility	12 (17 %)

Preliminary results

Comparing the results from our two measurements indicates that a majority of the estimated ASSR thresholds were considered to be within an acceptable range (± 15 dB) for hearing aid fitting or to assess the need for other assistive listening devices. However, on the left ear at 1 kHz, a more substantial difference was observed. This deviation could not be attributed to any equipment error and could not be replicated when a sample of younger individuals was tested. (Fig. 2).

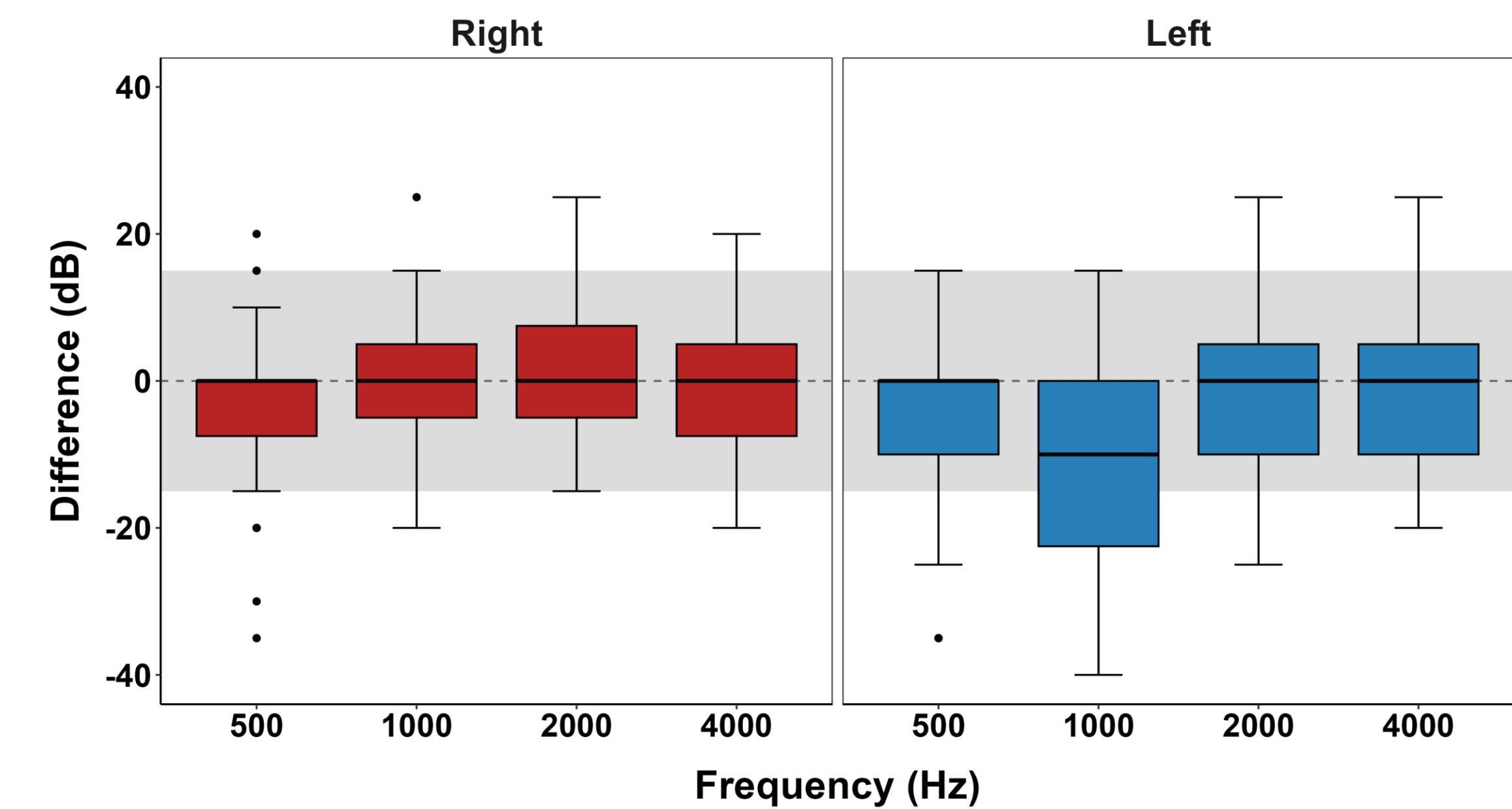


Fig 2: Box plots showing differences between participants' pure-tone audiometric thresholds and estimated ASSR thresholds between 30 and 90 dB HL, at 0.5, 1, 2 and 4 kHz on the right and left ear. The grey area indicates a clinically acceptable difference of ± 15 dB.

Conclusions

- ASSR is an objective test method that can be performed outside a clinical environment for threshold estimation in the nonagenarian age group.
- Preliminary results show a clinically acceptable difference between hearing thresholds measured with standardised pure tone audiometry and estimated ASSR thresholds.

