

## BACKGROUND

- In a previous study, we used audiometric data from the National Health and Nutrition and Examination Survey (NHANES) database to develop a set of four gain-frequency responses (“presets”) that can fit 70% of older adults with mild-to-moderate sensorineural hearing loss.
- The set of four gain frequency responses are shown below as audiograms and their associated NAL-NL2 REAR targets. The grey highlighted region shows the fitting range of the four presets

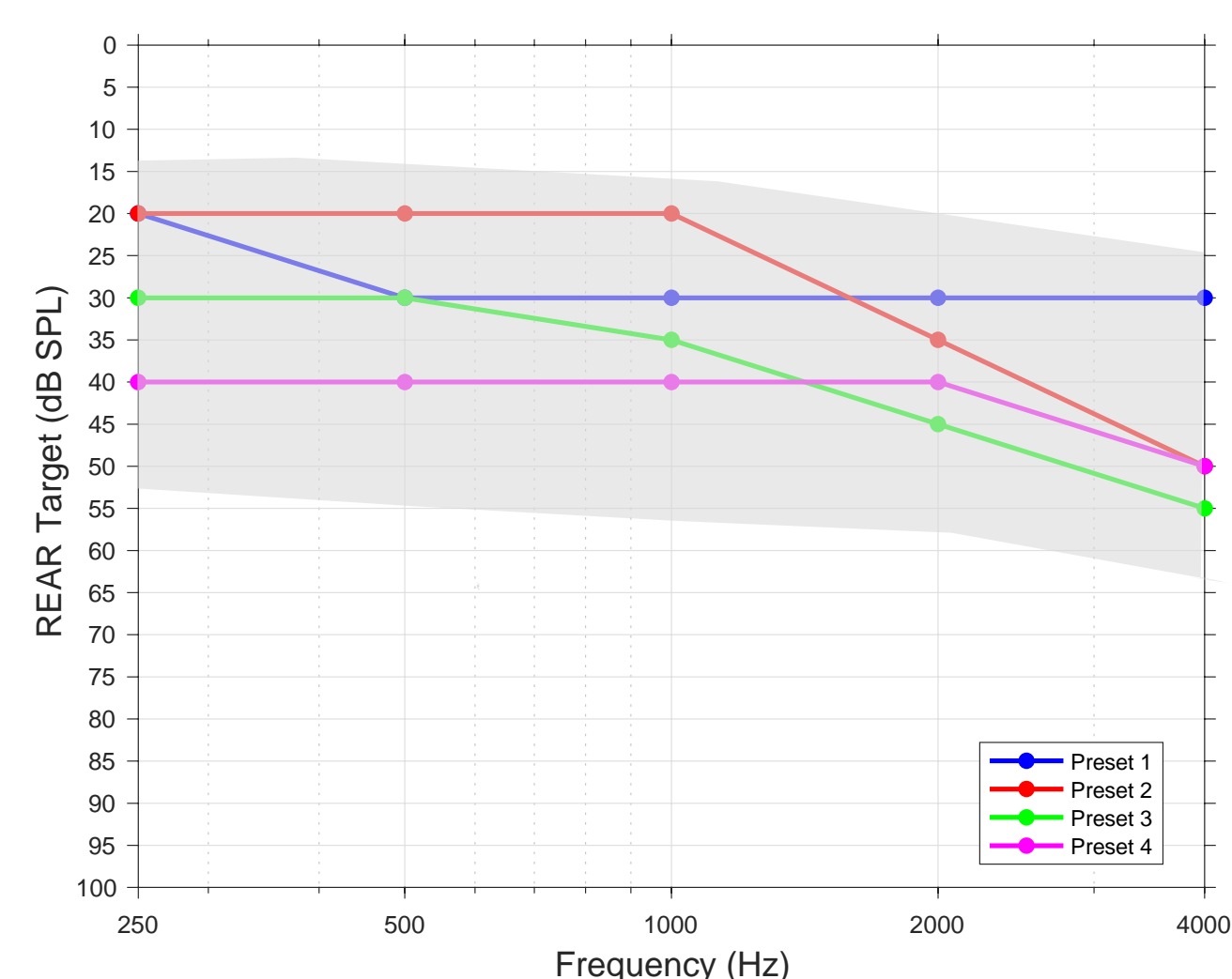


Fig 1: Audiograms associated with the four presets

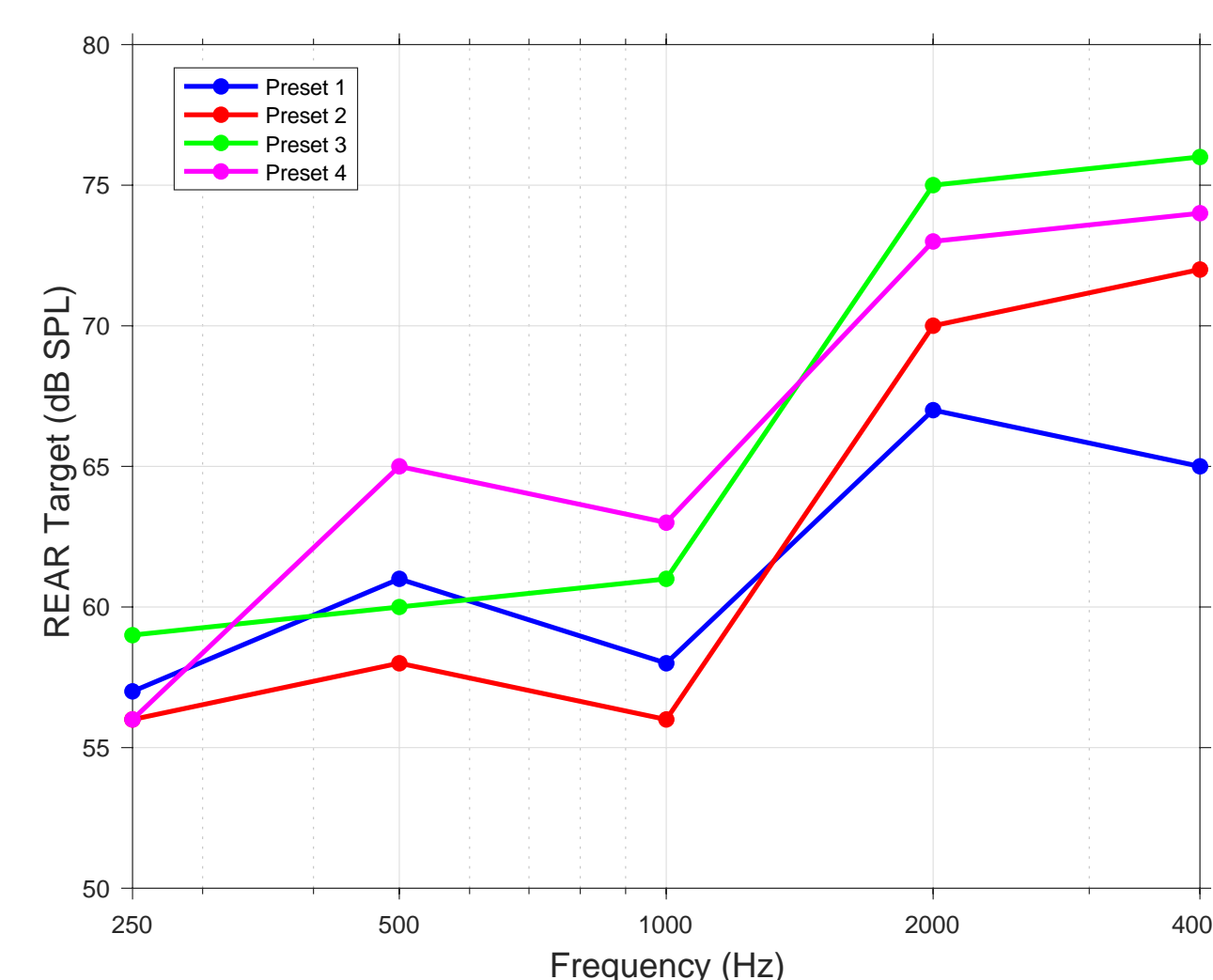


Fig 2: REAR targets of the four presets

- The goals of this study were: **1)** examine how new and experienced older adult hearing aid users choose presets by listening to them; **2)** analyze the goodness of self-selections relative to each individual’s NAL-NL2 real-ear aided response (REAR) targets; **3)** characterize the extent to which pure-tone average, self-reported hearing difficulty, and previous hearing aid experience predict the goodness of self-selection

## METHODS

- Participants: 37 older adults age 55-88 (17 females, mean age= 70.1, 24 new hearing aid users) with mild-to-moderate SNHL (PTA  $\geq 25$  &  $\leq 55$  and all frequencies 250Hz-6kHz  $\leq 65$  bilaterally)

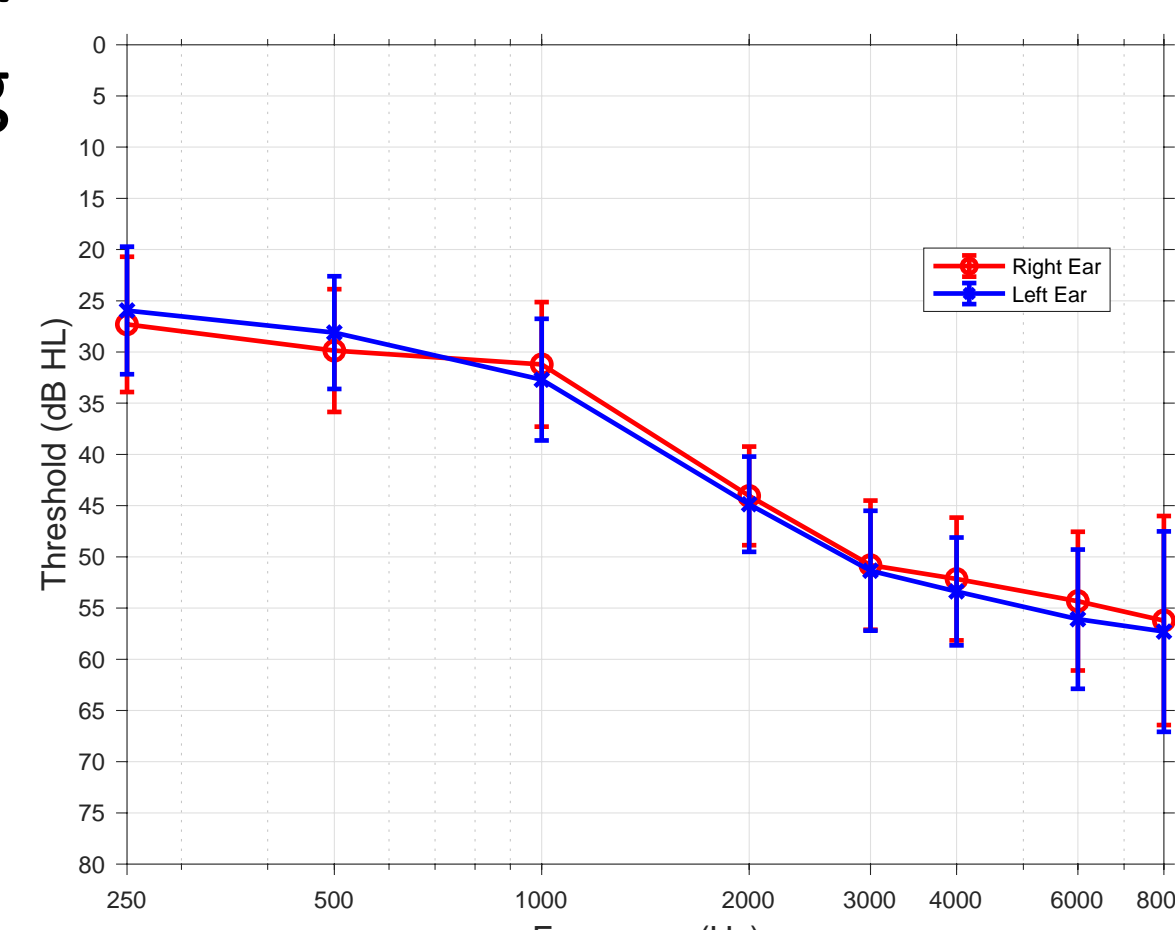


Fig 3: Mean audiometric thresholds for all participants

- Subjects were instructed to select their preferred preset for each ear while listening to sentences in quiet and noise. Presets were stored in the program memories of basic-level hearing aids and remote controls were used to change programs.
- For each ear at each frequency from 250-4000 Hz, we compared the measured REAR target of the self-selected preset to the individual’s NAL-NL2 REAR target.
- The goodness of the self-selection was calculated by obtaining the signed difference between the self-selected REAR and the NAL-NL2 REAR target at each frequency from 250-4000 Hz.
- To integrate deviations across frequencies, we took the average of the summed absolute value of the signed differences.
- Pure-tone average (PTA) was calculated as the average of thresholds at 500, 1000, and 2000 Hz
- Self-reported hearing difficulty was measured using the Hearing Handicap Inventory for the Elderly or for Adults (HHIE/A).

## RESULTS

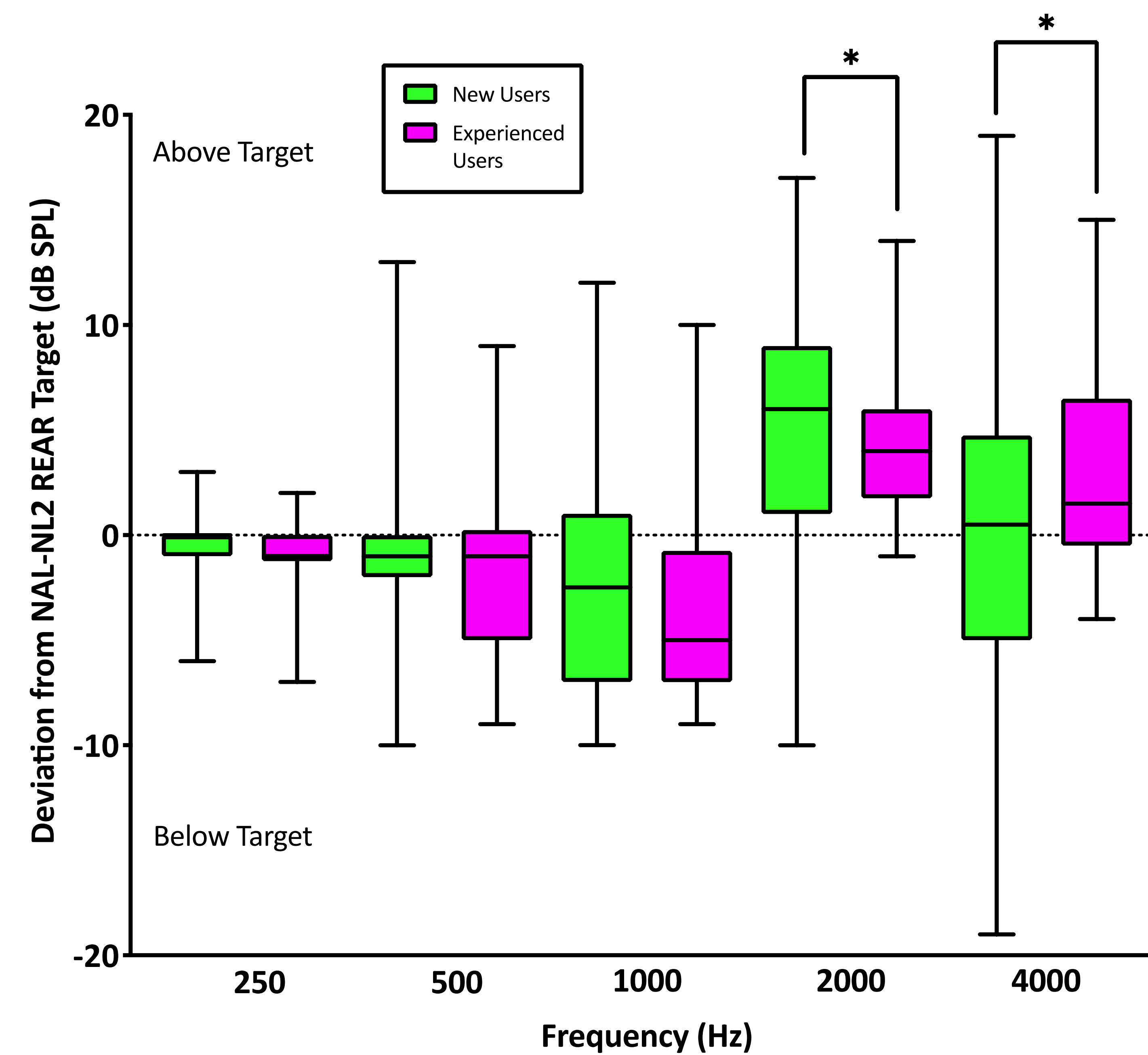


Fig 4: Deviation from NAL-NL2 REAR target by frequency for new and experienced users. Deviation values were obtained by calculating the signed difference between the NAL-NL2 REAR target and the self-selected REAR for a given frequency in each ear.

\* Denotes statistically significant difference in variance between new and experienced users, indicating that new users demonstrated a wider range of deviation values at 2000 and 4000 Hz,  $p = 0.04$  and  $0.048$ , respectively.

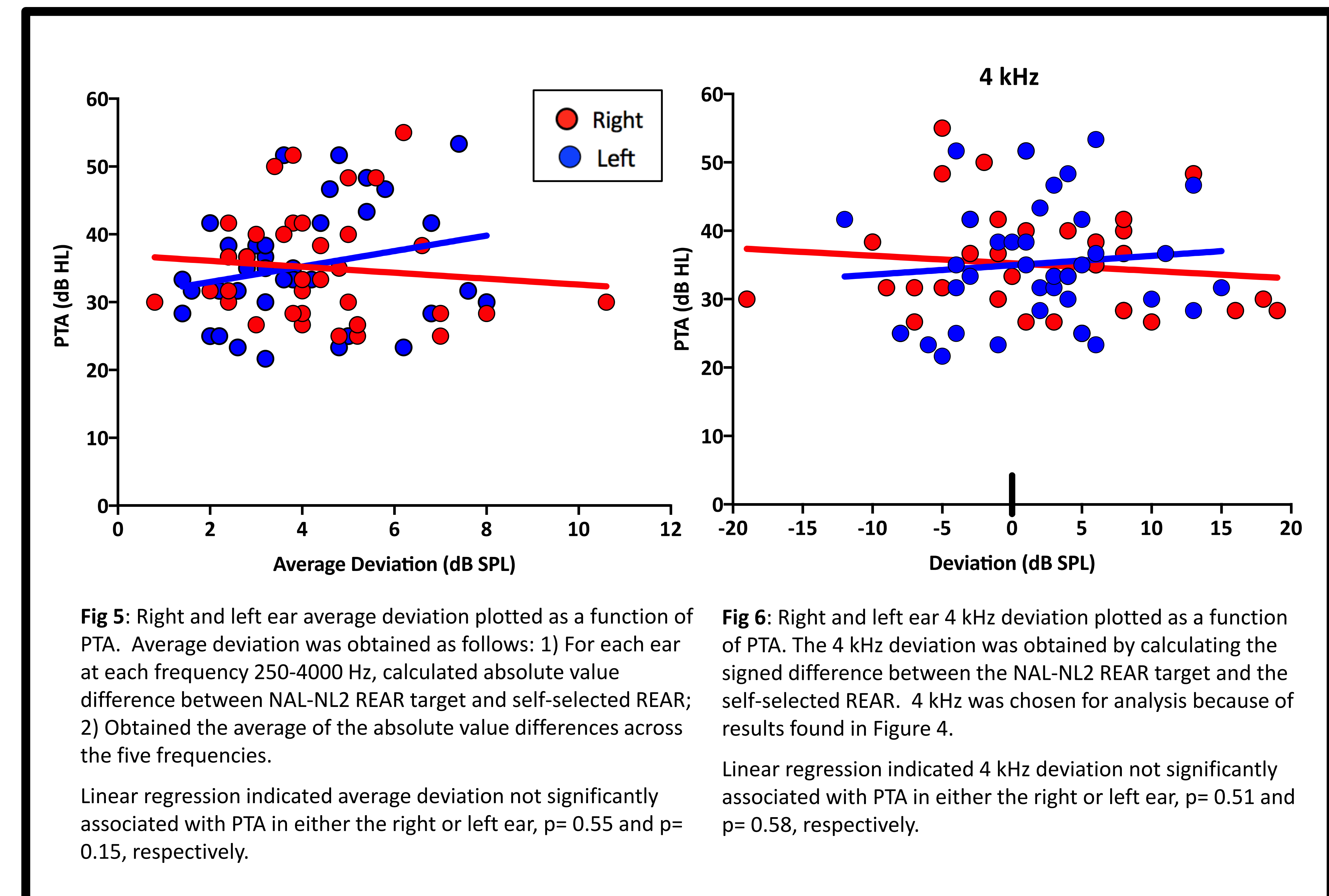


Fig 5: Right and left ear average deviation plotted as a function of PTA. Average deviation was obtained as follows: 1) For each ear at each frequency 250-4000 Hz, calculated absolute value difference between NAL-NL2 REAR target and self-selected REAR; 2) Obtained the average of the absolute value differences across the five frequencies. Linear regression indicated average deviation not significantly associated with PTA in either the right or left ear,  $p = 0.55$  and  $p = 0.15$ , respectively.

Fig 6: Right and left ear 4 kHz deviation plotted as a function of PTA. The 4 kHz deviation was obtained by calculating the signed difference between the NAL-NL2 REAR target and the self-selected REAR. 4 kHz was chosen for analysis because of results found in Figure 4. Linear regression indicated 4 kHz deviation not significantly associated with PTA in either the right or left ear,  $p = 0.51$  and  $p = 0.58$ , respectively.

## DISCUSSION

- The data indicate that relative to experienced users, new users may over- or under- amplify high frequencies when self-selecting preconfigured OTC amplification.
- If future OTC services delivery models include listening stations, kiosks, or other methods for self selection, they should provide guidance to assist new users in selecting gain-frequency responses with appropriate high-frequency gain.
- Experienced users, however, may be more likely to self-select appropriate gain without assistance— possibly due to their previous experience using amplification programmed according to best-practice verification methods.
- While previous hearing aid experience may predict patterns in self-selection, pure-tone average and self-assessments are unlikely to be of predictive value.

## ACKNOWLEDGMENTS

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## CONTACT

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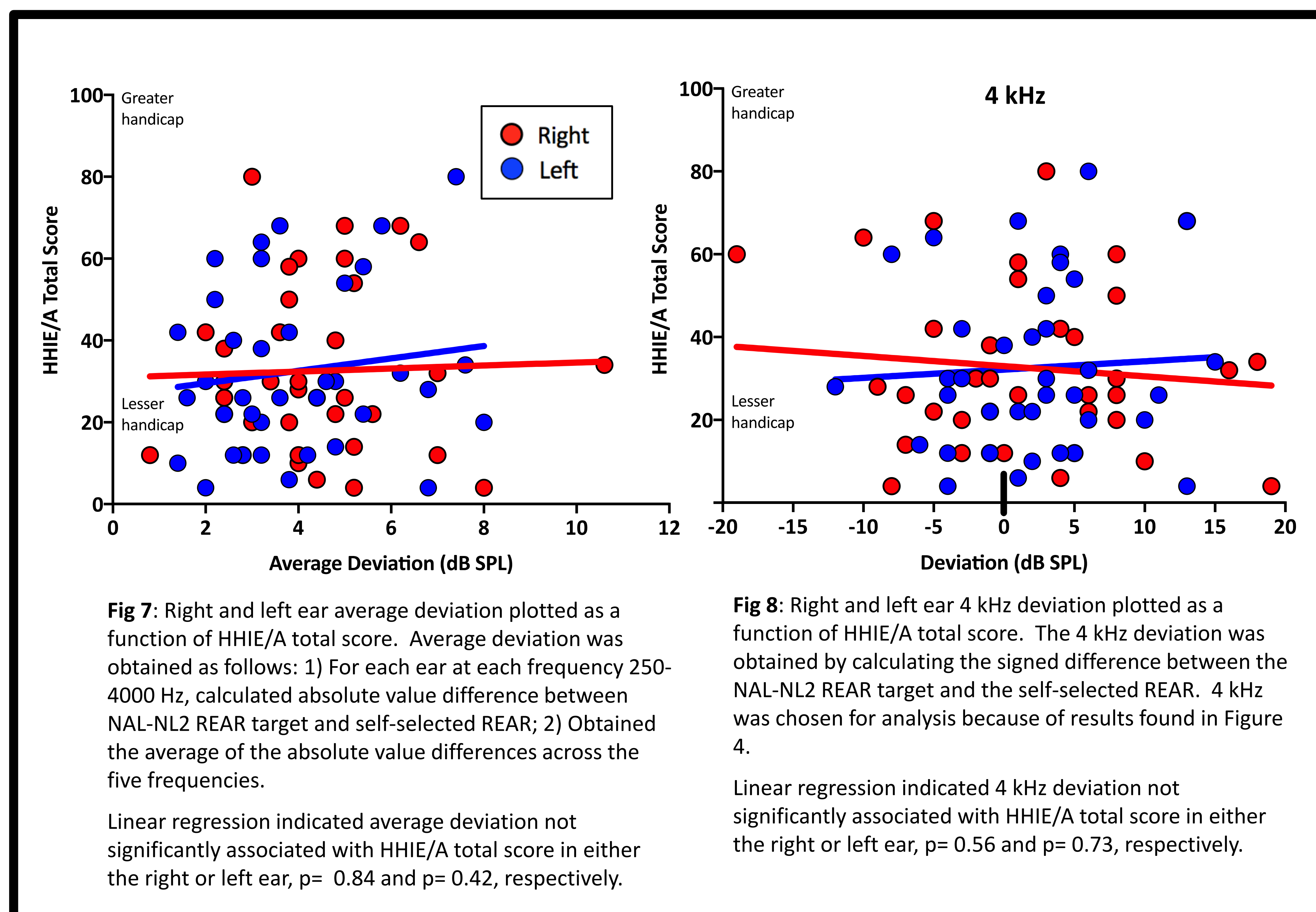


Fig 7: Right and left ear average deviation plotted as a function of HHIE/A total score. Average deviation was obtained as follows: 1) For each ear at each frequency 250-4000 Hz, calculated absolute value difference between NAL-NL2 REAR target and self-selected REAR; 2) Obtained the average of the absolute value differences across the five frequencies. Linear regression indicated average deviation not significantly associated with HHIE/A total score in either the right or left ear,  $p = 0.84$  and  $p = 0.42$ , respectively.

Fig 8: Right and left ear 4 kHz deviation plotted as a function of HHIE/A total score. The 4 kHz deviation was obtained by calculating the signed difference between the NAL-NL2 REAR target and the self-selected REAR. 4 kHz was chosen for analysis because of results found in Figure 4. Linear regression indicated 4 kHz deviation not significantly associated with HHIE/A total score in either the right or left ear,  $p = 0.56$  and  $p = 0.73$ , respectively.