



# MUSIC LISTENING PREFERENCES AMONG HEARING AID USERS

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## INTRODUCTION

Hearing aids are typically optimized for speech, often neglecting music—a vital part of everyday listening<sup>1</sup>. Despite its emotional significance, music is rarely addressed in clinical fittings: 58% of audiologists never discuss it, and 67% of users report difficulty enjoying music with hearing aids<sup>2</sup>. Prior studies have examined gain and compression preferences<sup>3,4</sup>, but few have explored responses to dedicated music programs or customizable equalizers. This study investigates individual preferences for music listening among hearing aid users with diverse hearing profiles, musical backgrounds, and acoustic couplings of the hearing aids, aiming to better understand how personalization affects music satisfaction.

## METHODS

### PARTICIPANTS:

- 20 experienced hearing aid users.
- Age: 44-78 years, mean: 68 years
- PTA: 7.5 – 80 dB HL, mean: 45 dB HL.
- 11 play instruments at least occasionally.
- 18 attend concerts at least occasionally.

### HEARING AIDS:

- Starkey Edge AI 24 mRIC devices, programmed to e-STAT 2.0 fitting formula.
- Following fine-tuning to the primary (“Personal”) program, participants wore the devices for a 1-week acclimatization period prior to testing.
- After acclimatization, a dedicated “Music” program was added at default settings (i.e., no fine tuning).
  - The “Music” program was designed with a music-oriented fitting rationale and compressor structure optimized for music listening, allowing both natural sound quality and restoration of audibility for soft music and loudness for loud music<sup>5</sup>.

### PAIRED COMPARISON:

- “Music” program vs “Personal” program.
- Two levels: low-level music (LLM) at 55-60 dB SPL and high-level music (HLM) at 70-80 dB SPL.
- Six stimuli: Various music genres (each 10 secs long), each repeated three times.

### EQUALIZER (EQ) TASK:

- Baseline: “Personal” program with noise reduction features off.
- Participants adjusted the frequency response of the “Personal” program for each music stimuli at each level (LLH and HLM) three times.
  - An adjustment range of +/- 14 dB was used for three frequency bands: Bass (150 – 1100 Hz), Middle (1.4k – 3k Hz) and Treble (3.3k – 9.3k Hz).
- At a later stage, participants were asked to rate their satisfaction of the “Personal” program and the three self-selected equalizer settings blindly.

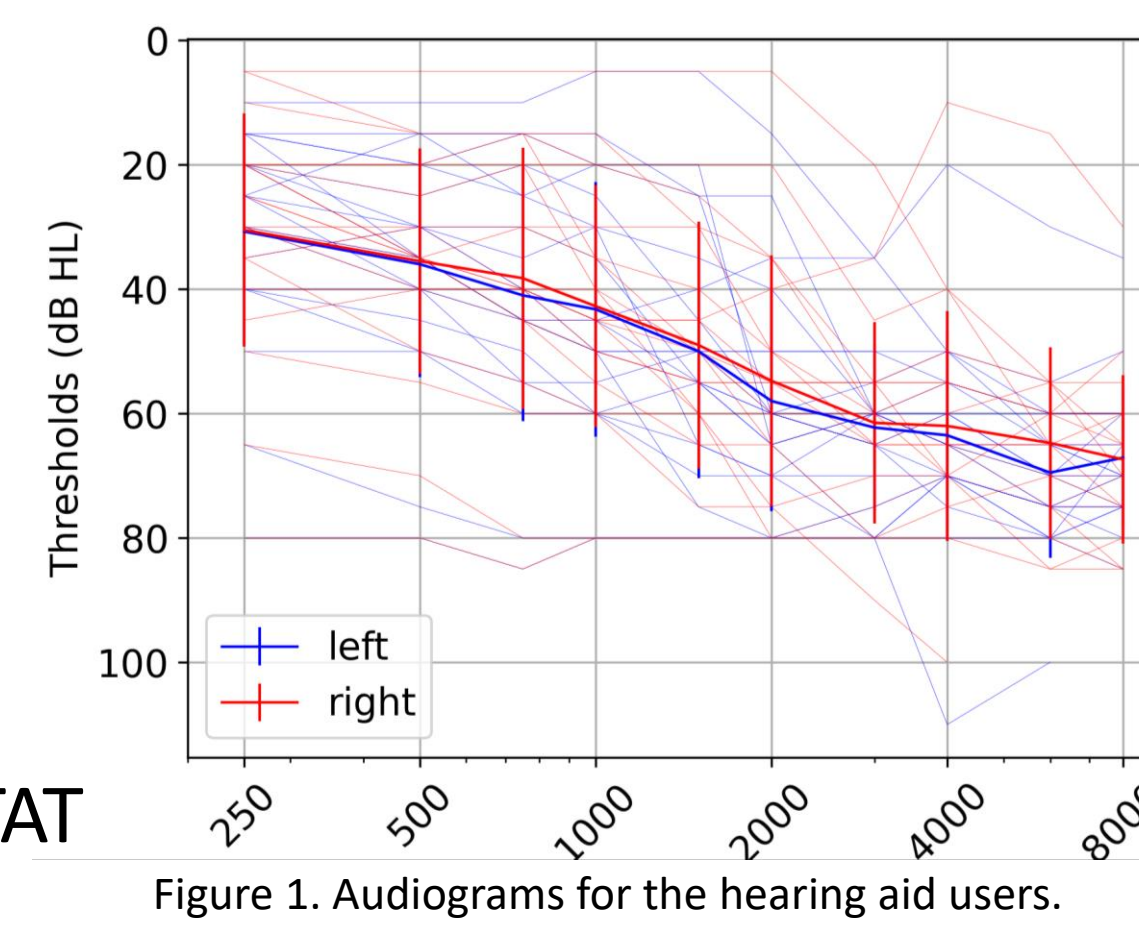


Figure 1. Audiograms for the hearing aid users.

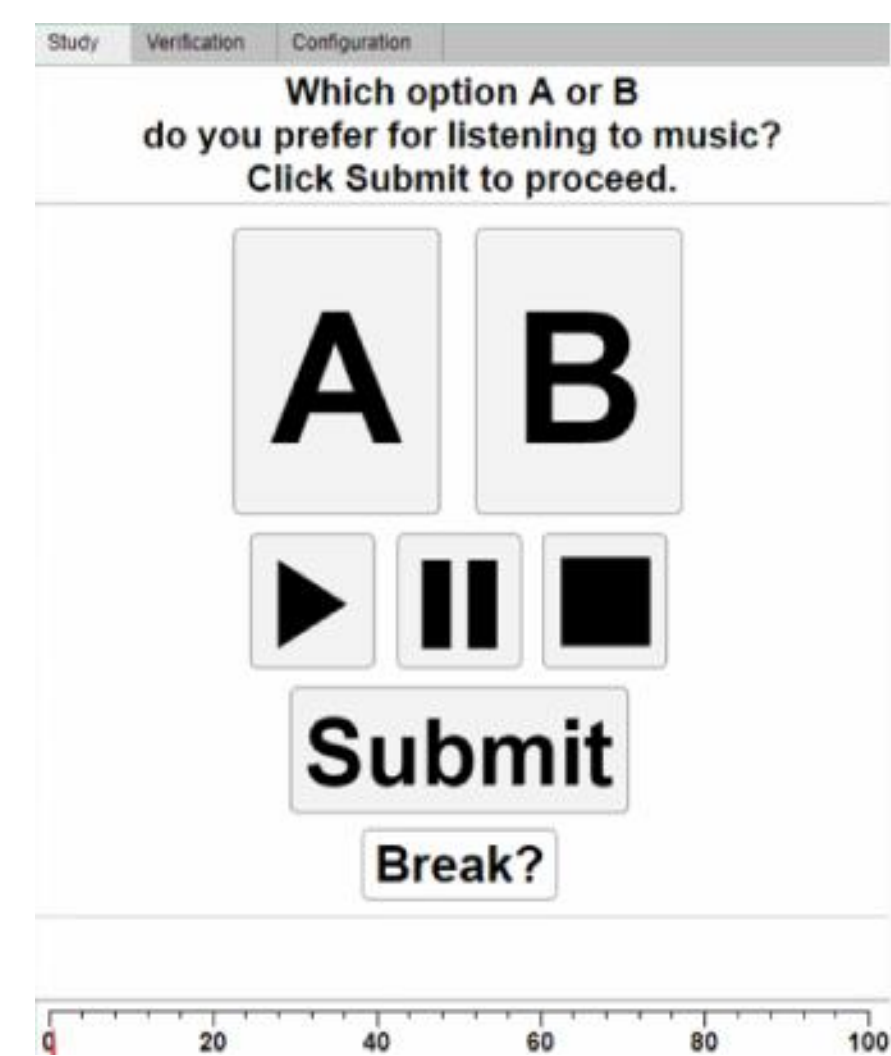


Figure 2. Software interface for the paired comparison test.

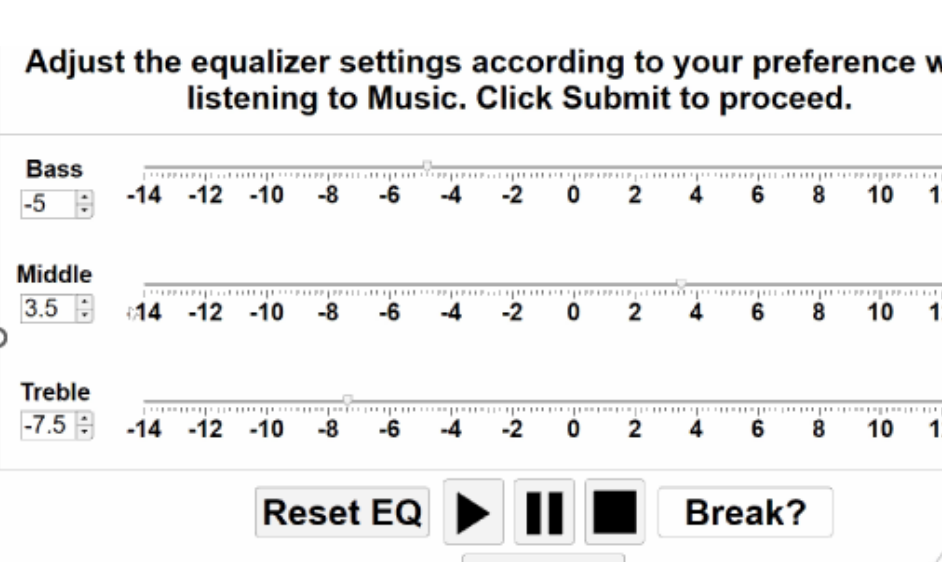


Figure 3. Software interface for the equalizer test.

## RESULTS

### FITTING OUTCOMES

- After fine-tuning, Abbreviated Profile of Hearing Aid Benefits (APHAB) score was collected. Participants showed benefits that were comparable to or better than the normative scores reported for successful hearing aid users<sup>6,7</sup>.

### PAIRED COMPARISON

- Paired comparison results were averaged across all 36 trials, ordered by the PTA (pure tone average from 0.5, 1 and 2 kHz).
  - In musicians, 6 strongly preferred the “Music” program and 4 preferred the “Personal” program.
  - In non-musicians, 3 preferred the “Music” program and 2 preferred the “Personal” program.
- A linear regression was conducted with sound level, PTA, fitting type (open vs occluded), and musician as independent factors. Only PTA was significantly associated with preference ( $p = 0.007$ ), where worse PTA was associated with lower preference for “Music” program.

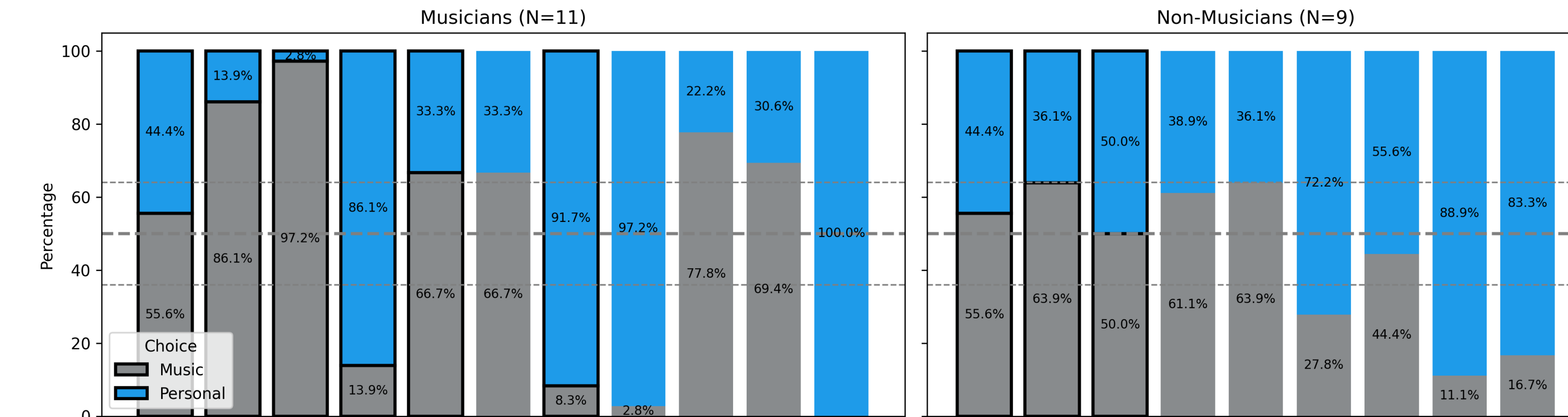


Figure 4. Percentage of choices for “Music” versus “Personal” program paired comparison. Each stacked bar represents one participant, ordered by PTA. Black-outlined bars indicate participants using open-fit hearing aids. Dashed horizontal lines mark the preference boundaries corresponding to statistical significance for 36 paired-comparison trials.

### EQUALIZER TASK

- Self-selected equalizer offsets were averaged across six music stimuli and three repeated trials for each individual. The equalizer offsets showed small effects and large individual differences across bands.
  - In the HLM condition, middle-band offsets differed significantly from 0 dB (one sample t-test,  $t = -3.52$ ,  $p = 0.002$ ), whereas bass and treble offsets were not significant ( $p > 0.05$ ).
  - In the LLM condition, bass offsets were significantly greater than 0 dB (one sample t-test,  $t = 4.46$ ,  $p < 0.001$ ), with no significant effects in the middle or treble bands ( $p > 0.05$ ).

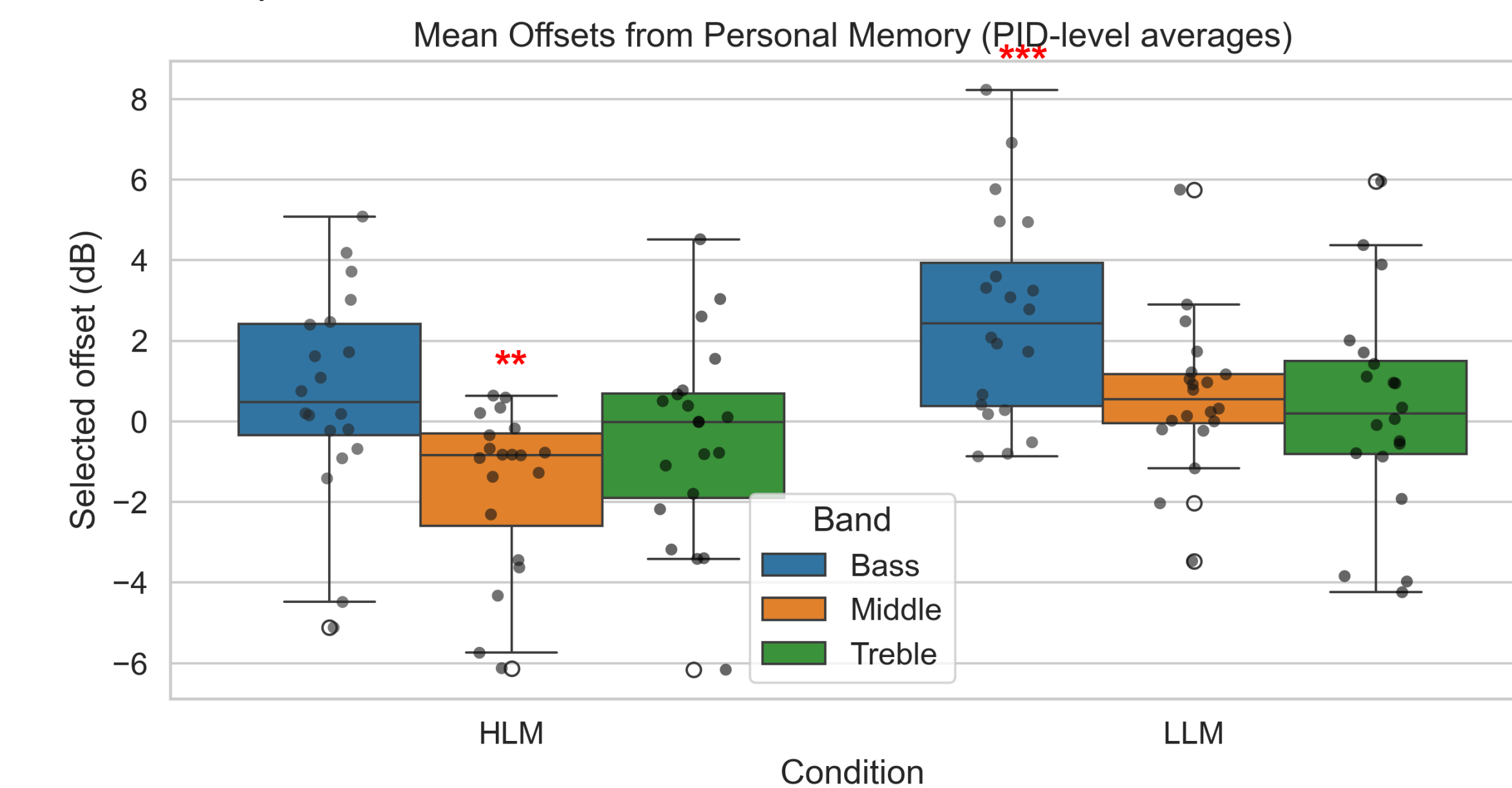


Figure 5. Mean EQ offsets relative to the listener’s “Personal” program (with noise reduction features off) across bass, middle, and treble bands in the HLM and LLM conditions. Points denote participant-level mean adjustments; red asterisks indicate offsets significantly different from 0 dB ( $p < 0.05$ ).  
\* :  $1.00 \times 10^{-2} < p \leq 5.00 \times 10^{-2}$ ;  
\*\* :  $1.00 \times 10^{-3} < p \leq 1.00 \times 10^{-2}$ ;  
\*\*\* :  $1.00 \times 10^{-4} < p \leq 1.00 \times 10^{-3}$ ;  
\*\*\*\* :  $p \leq 1.00 \times 10^{-4}$

## RESULTS (CONT.)

### EQUALIZER TASK – SATISFACTION RATINGS

- Satisfaction ratings (1=completely unsatisfied; 7=completely satisfied) were averaged across the three self-selected EQ ratings within each individual.
- In HLM, “Personal” and EQ programs did not differ (paired t-test,  $t = -0.87$ ,  $p > 0.05$ ); 80% of participants showed <1-point differences, with equal proportions preferring EQ and “Personal” settings (10% each).
- In LLM, satisfaction was higher for EQ (paired t-test,  $t = -3.21$ ,  $p = 0.005$ ), with 30% (6/20) of participants showing  $\geq 1$ -point preference for EQ and none preferring the “Personal” program. Five out of the six of the participants are musicians (i.e., individuals who play music instruments at least occasionally.)

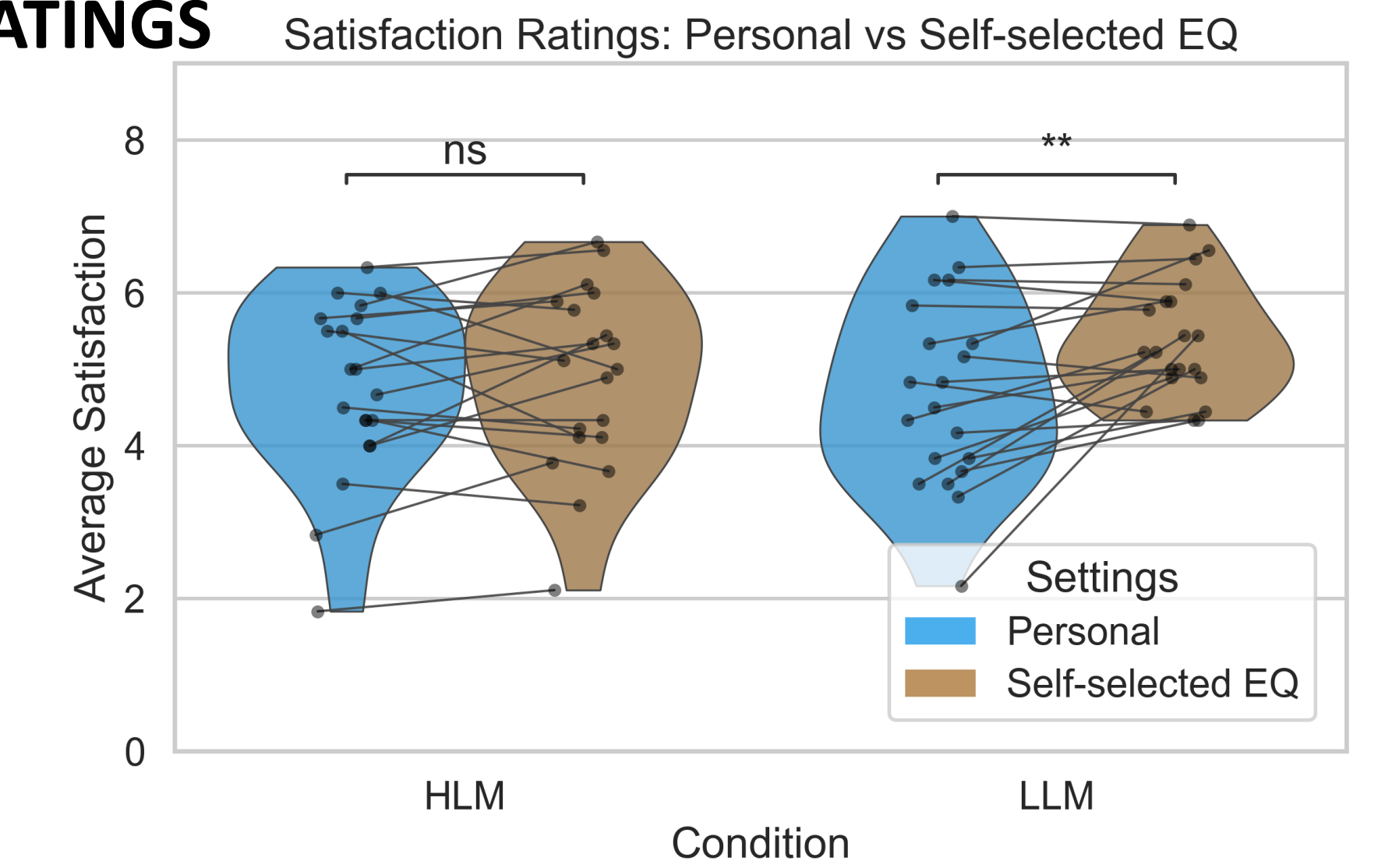


Figure 6. Satisfaction ratings for the “Personal” program versus the listener’s self-selected EQ settings. Ratings range from 1 to 7, with higher values indicating greater satisfaction. HLM: high level music; LLM: low level music; ns: not significant; \*\* :  $1.00 \times 10^{-3} < p \leq 1.00 \times 10^{-2}$ .

## CONCLUSIONS

- Music listening preferences among HA users show substantial individual variability, even among experienced users with generally successful fittings.
- Similar to previous findings, self-selected EQ adjustments were generally small in magnitude<sup>4</sup>, yet a small group-level preference emerged, towards more bass band and less middle band for music listening.
- Group-level preference for a dedicated “Music” program over the “Personal” program was not uniform across listeners. However, poorer PTA was associated with reduced preference for the “Music” program, suggesting that audibility may outweigh music balance in individuals with more severe loss.
- Satisfaction ratings revealed that self-selected EQ provided greater benefit during low-level music listening in a subgroup of participants, where 30% of listeners showed clear preference for EQ settings over the “Personal” program.
- These findings suggest that dedicated music programs and customizable equalizer settings should be discussed as music listening options during hearing aid fitting, especially with musicians, to optimize personal preferences.

## REFERENCES

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