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Sound Preference Predicts Real-Life Hearing Aid Preference

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ABSTRACT

Clinical audiology aims to enable seamless participation in everyday life, including effective communication, enjoyment of music, and awareness of surrounding environments. Central to these goals is the user's ability to adapt comfortably to hearing aids. However, achieving an optimal hearing experience is challenging, as no single hearing aid sound design meets the preferences of all individuals. To address this challenge, a sound preference tool was developed to capture individual sound preferences and support hearing aid recommendations. The present study investigated whether preferences identified by this tool predicted real-life hearing aid preference. Seventeen participants completed the study, which involved two clinic visits and a two-week home trial. During the first visit, participants used the sound preference tool to compare two hearing aid sound profiles across everyday listening scenarios. Based on participant responses, the tool identified a preferred profile corresponding to one of two hearing aid sound designs. Participants then alternated daily between the two hearing aid sound designs during the home trial. At the second visit, real-life hearing aid preference was assessed. Results showed a correspondence between tool-based sound preference and preferred hearing aid in real life. These findings suggest that the sound preference tool can predict real-life hearing aid preference.

Keywords: *sound preference, real-life hearing aid preference, hearing aids*

1. INTRODUCTION

In clinical audiology, the ultimate goal is to support individuals in participating fully in everyday life – understanding speech, engaging in conversations, enjoying music, and maintaining awareness of their surroundings. A key factor in achieving this is the individual's ability to adapt comfortably to hearing aids. However, clinical experience shows that no single hearing aid solution provides an optimal experience for all users. Rather, perceptions of what constitutes "good sound" varies between individuals [1], and this variability remains a core challenge in hearing aid fitting.

Recent research highlights *sound preference* as a meaningful and clinically relevant dimension of hearing aid fitting. In both a real-life and a large-scale online study, Balling and colleagues [1] found that up to 40% of listeners show clear and systematic preferences for different hearing aid sound designs, independent of demographic or lifestyle factors. These findings indicate that sound experience is inherently personal, with important implications for clinical practice. Identifying individual sound preferences early in the fitting process may therefore enable more informed device selection, enhance user satisfaction, and reduce challenges associated with acclimatization.

A sound preference framework for personalized hearing was described in two companion papers [2, 3], offering hearing care professionals a structured approach to exploring individual sound preferences and guiding hearing aid selection and fitting decisions. The authors argue that sound preference should not be viewed as a secondary consideration but rather as an informative indicator of the fit between the listener and the sound environment. Furthermore, they emphasize that preference reflects the interplay of sensory comfort, emotional reward, cognitive ease, and social meaning, positioning it as a valuable clinical signal that can support more individualized, engaging, and ultimately successful hearing aid fittings.

To support the hearing aid recommendation process, a sound preference tool (SPT) was developed (https://www.soundpreference.net/). Consistent with findings from Balling and colleagues [1], preliminary results from a clinical evaluation of the SPT show that approximately 40% of patients show a moderate or strong preference for one of the two sound designs when

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using the tool [4]. In addition, clinicians reported that the tool fosters more patient-centered discussions, aids decision-making, and promotes a broader approach to recommendations, thereby reducing single-brand bias. In this way, the SPT appears to have strong potential value in clinical practice. However, it remains unclear whether the hearing aid suggested by the SPT aligns with users' preferences in real-life conditions. The present study therefore aimed to explore whether hearing aids recommended by the SPT correspond to those ultimately preferred by users in daily life.

2. METHODS

2.1 Participants

Seventeen participants completed the study (age: 69 ± 9, gender: 9 f, 8 m). All participants came to one of the participating hearing clinics in Denmark because they were a hearing aid candidate. Twelve participants were new hearing aid users and five were experienced.

2.2 Study Flow

The study consisted of two in-person visits and a two-week field trial (See Figure 1). Prior to hearing aid fitting, participants completed the SPT to assess their sound preference. The SPT enables users to compare two HA sound profiles in five everyday listening scenarios: driving, walking in a park, cooking in a kitchen, being in a noisy restaurant, and listening to solo piano music. The two sound profiles in the SPT represent two intentionally different hearing aid sound designs. One sound design (implemented in "HA 1") has built its signal processing around a frequency-domain filter bank and focuses on enhancing the target signal. The other sound design (implemented in "HA 2") uses a time-domain filter bank to produce a natural sound that includes a balanced representation of both target and background. Because the choice of filter bank is a fundamental enabler of the distinct sound designs, they may also be referred to as the "frequency-domain sound design" and the "time-domain sound design."

In the SPT, the two sound profiles are randomly labeled as 'Sound A' and 'Sound B.' Participants were free to switch between the two sounds and to listen for as long as needed before indicating their preference or selecting 'no preference.' When a preference was expressed, participants also rated that preference as weak, moderate, or strong. After evaluating all five scenarios, participants were asked to report their overall preference and, if applicable, the corresponding strength of that preference.

After all preferences have been provided, the SPT indicates an overall preference, based on the participant's input. If the tool indicated a preference for one of the two sound profiles, the participant proceeded with the remainder of the study; otherwise, they were excluded from the study and proceeded as clients in the participating clinics.

During the second part of Visit 1, participants who met the inclusion criteria were fitted binaurally with both hearing aid sound designs (HA 1 and HA 2), irrespective of their SPT-based sound preference. The hearing care professional informed participants which devices matched their SPT-based sound preference, though they were given the opportunity to trial both sound designs.

Participants were instructed to alternate between the two sets of devices on a daily basis to evaluate them in everyday listening environments. The order in which they began using the devices was randomized. After the two-week trial period, participants reported their preferred hearing aids (i.e., the ones they wished to purchase) and their reasons for that preference. In addition, hearing aid usage data were collected from device logs to assess hours of use.

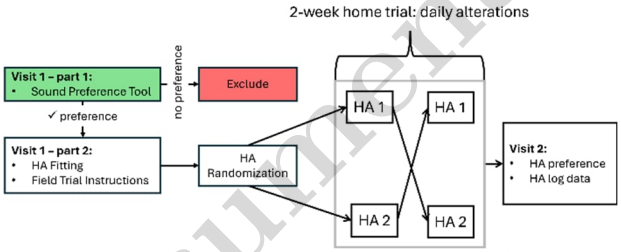

Figure 1. The study flow. Abbreviation HA: hearing aid.

2.3 Data analysis

Preference consistency was coded as a binary variable (1 = consistent preference between the SPT-based preference and real-life hearing aid preference; 0 = inconsistent preference). An exact two-sided binomial test was used to assess whether the observed proportion of participants with consistent preference differed significantly from the proportion expected by chance (0.50). To assess whether the usage of the two sets of hearing aids was comparable, the average daily wearing time was analyzed using a repeated-measures analysis of variance (RM-ANOVA), with hearing aid brand (HA 1 vs. HA 2) as the within-subject factor. All statistical analyses and visualizations were conducted using STATA version 15 (StataCorp, College Station, TX, USA).

3. RESULTS

In the SPT, seven participants showed a preference for the frequency-domain sound profile, while 10 preferred the time-domain sound profile. Participants used HA 1 for an average of 7.5 ± 3.3 hours per day and HA 2 for 6.7 ± 3.4 hours per day ($p = .26$).

Overall, 15 out of 17 participants (88.2%) demonstrated a real-life hearing aid preference that was consistent with their SPT sound profile preference, a proportion that was significantly greater than chance ($p = .002$; see Figure 2). Specifically, six of the seven participants who preferred the frequency-domain sound profile selected HA 1, and nine of the ten participants who preferred the time-domain sound profile chose HA

2. Participants reported a range of reasons for their hearing aid preferences (see Table 1).

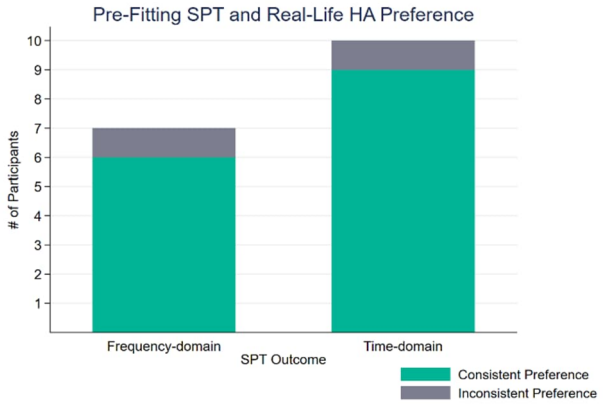

Figure 2. Agreement between pre-fitting SPT outcomes and real-life hearing aid preferences. The left bar shows participants who preferred the frequency-domain sound profile in the SPT, whereas the right bar shows those who preferred the time-domain sound profile. Green segments represent participants whose real-life HA preference aligned with their SPT-based sound preference, while gray segments represent participants whose real-life HA preference did not align with their SPT-based preference. Abbreviations: SPT–sound preference tool; HA – hearing aid.

Table 1. Reasons for hearing aid preference. The original descriptions were translated from Danish.

HA 1	HA 2
• Wind noise was quieter • Better noise cancellation • Less noise from knives in the kitchen • Loud sounds were more pleasant • Softer in sound • Noise from the grandchildren was not as noticeable • Less noise for both large and small gatherings • Less wind noise when touching the hearing aid with [*unclear abbreviation*] • Better reverberation • Less metallic sound	• Own voice was better and spoke lower because of this • Heard noisy surroundings better • Speech understanding was better from further away • The sound seemed to help more • More depth, e.g. birds, soft sounds, the beach with the wind • It's a pleasant sound • More direct sound • It's a feeling that it's better • More natural
• Appropriate sound in noisy environments • Clearer • Feels less "stuffy"	• A slightly quieter sound

4. DISCUSSION

The present study investigated whether preferences identified using the SPT prior to fitting are predictive of real-life hearing aid preference. The results demonstrate a high level of agreement, with 15 out of 17 participants selecting a hearing aid that corresponded to their SPT-derived sound preference. These findings provide preliminary evidence that sound preference assessed prior to fitting may be a meaningful predictor of real-life device choice and satisfaction.

The high correspondence between SPT outcomes and real-life hearing aid preference supports the notion that incorporating sound preference into the fitting process may enhance personalization. Traditional hearing aid fittings often prioritize audibility and speech intelligibility, sometimes at the expense of subjective listening experiences. However, previous studies have shown that user satisfaction and long-term device use are influenced by perceived sound quality and listening comfort (e.g., [5]). The SPT may therefore provide a structured and efficient way to integrate these perceptual dimensions into clinical decision-making, complementing existing fitting protocols.

One of the two participants who showed a discrepancy between SPT outcome and real-life preference was an experienced user of the same hearing aid brand as HA 1 and their real-life preference was consistent with their prior device. This observation suggests that previous experience may influence hearing aid choice, potentially overriding sound preference identified with the SPT in some cases. This highlights the importance of considering user history when interpreting SPT results and making clinical recommendations. However, since this observation is based on a single case, further research is needed to better understand the impact of prior experience on both SPT choices and real-life preferences.

Importantly, the two sets of hearing aids were worn for comparable durations, with no statistically significant difference in daily usage time. This suggests that the observed preference alignment cannot be explained simply by differential exposure to sounds. Instead, it reinforces the interpretation that subjective sound preference played a central role in determining final device choice. Participants' qualitative reports further support this interpretation. The reasons given for device preference varied widely and included both technical aspects (e.g., noise reduction, wind noise, sound

clarity) and experiential qualities (e.g., naturalness, listening comfort, perceived listening effort). This diversity is consistent with frameworks emphasizing that sound preference reflects a complex interplay of sensory, cognitive, and emotional factors [2]. Together, these findings highlight the multidimensional nature of hearing aid evaluation and the need for tools that capture this complexity.
It should be noted that, by design, participants were informed of the SPT-based recommendation prior to the trial, as this reflects how the tool is intended to be used in clinical practice. Although participants were encouraged to evaluate both devices independently, this approach may have introduced expectation or confirmation biases. It is therefore possible that the observed outcomes reflect not only the influence of the SPT itself, but also the way in which its results and associated hearing aid recommendation were communicated by the hearing care professional, contributing jointly to the eventual hearing aid preference. This is not necessarily a limitation but rather emphasizes the importance of how the SPT is applied and how sound preference is communicated.
In this context, and despite the promising findings in the current study, some broader study considerations should also be noted. First, the sample size was small (n = 17), limiting the generalizability of the results. Second, the field trial duration of two weeks, while sufficient for initial comparisons, may not capture longer-term adaptation effects that could influence preference over time. Future studies should include larger and more diverse samples and longer follow-up periods to validate and extend these findings.

5. CONCLUSION

The present study provides initial evidence that a pre-fitting SPT can predict real-life hearing aid preference with a high degree of accuracy. These findings support the integration of sound preference assessment into clinical workflows as a means of enhancing patient-centered care, improving decision-making, and potentially increasing user satisfaction. Further research is warranted to confirm these results in a larger sample and to explore how sound preference-based fitting strategies can be optimally implemented in routine clinical practice.

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