

Clinical strategies for improving music listening

BY ALINKA GREASLEY AND HARRIET CROOK

For audiologists and patients alike, the technical challenges of fitting hearing aids for music are well known. **Drs Greasley and Crook** introduce their research and top tips for improving satisfaction in this important topic.

Hearing aids are often problematic for music perception, with listeners frequently reporting issues such as a lack of clarity, poor sound quality and distortion [1,2]. Music plays a key role in people's health and wellbeing through functions such as emotional regulation, reduction of negative states (e.g., anxiety, loneliness) and social connectedness, and music is increasingly used in clinical and care settings with older adults to manage conditions such as dementia, Alzheimer's and Parkinson's Disease. It is important therefore to address problems that hearing aid users experience with music in order to enable continued musical participation.

Audiologists are rarely taught about programming hearing aids for music during their training and, whilst a small number of audiology clinics and audiologists specialise in music, there is little empirical evidence about the strategies being used [1]. Nearly a decade ago, Chasin and Hockley put forward suggestions based on their clinical practice for managing issues with music listening [3]. This included setting similar WDRC parameters for speech and music, adjusting bandwidth depending on degree of hearing loss, and disabling automatic functions for speech. However, it is not clear whether audiologists have been using such strategies, or whether they lead to improved outcomes.

As part of the Hearing Aids for Music (HAFM) project (www.musicandhearingaids.org), a collaboration between the University of Leeds and Sheffield Teaching Hospitals NHS Trust investigating how hearing impairment and hearing aids affect music listening, we devised a study to explore the ways in which audiologists address musical needs in clinic [1]. We asked audiologists to reflect on any training, the extent and outcomes of discussions about music, and their experiences and confidence in programming hearing aids for music.

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Ninety-nine audiologists completed the survey. They represented a spread of ages (22-71 years), clinical experience (years practising: 49% <10 years, 51% >10 years) and sectors (62% public, 23% private, 10% public and private, 1% charity, 4% unknown), and the majority of their day-to-day practice was reported to be fitting binaural BTE hearing aids. Very few had received formal training on music, though a third (37%) reported some training through conferences, continuing professional development or manufacturer-led workshops.

A majority (85%) had discussed music with patients, though the frequency of discussions about music varied with some (13%) asking four out of five patients, but half asking one in five patients or fewer. Around 60% reported some confidence in providing advice about music and in fitting hearing aids for music, though 25% were 'not sure' and 17% were 'quite reluctant' to do so, highlighting a need for greater knowledge and training in this area. Positively, having had some training was associated with confidence in providing advice, confidence in programming hearing aids for music, and in programming hearing aids for a greater number of patients.

Specific fitting strategies

Audiologists in our study were asked to reflect on any fitting strategies they used to improve music listening, and responses

were analysed thematically. Below we consider a few of the most frequently reported (see Greasley et al 2020 [1], p8 for a full list).

Disable automatic functions for speech.

This included turning off feedback cancellation, noise reduction and microphone directionality. If a patient reports a problem with feedback, which is more likely in live music contexts, disabling the feedback manager prevents pure tone musical stimuli (e.g., organ, flute) being mistakenly analysed as feedback and suppressed. Similarly, with noise and wind noise management, disabling this functionality avoids musical stimuli being interpreted as unwanted sounds. There may be benefits to fixed microphone directionality for live settings, as audience and competing noise can be distracting. This can also allow focus on the music for performers, reducing loud input from behind so long as ambient noise (e.g., other performers) is audible.

Alterations to compression were commonly cited, though answers were generalised (e.g., change compression type/settings, change compression ratios) which made it difficult to quantify specific adjustments. Studies have shown that slow-acting WDRC and linear amplification are associated with higher preference ratings for classical music than fast-acting WDRC [4] and that hearing aid users' ability to pick out individual instruments was improved in

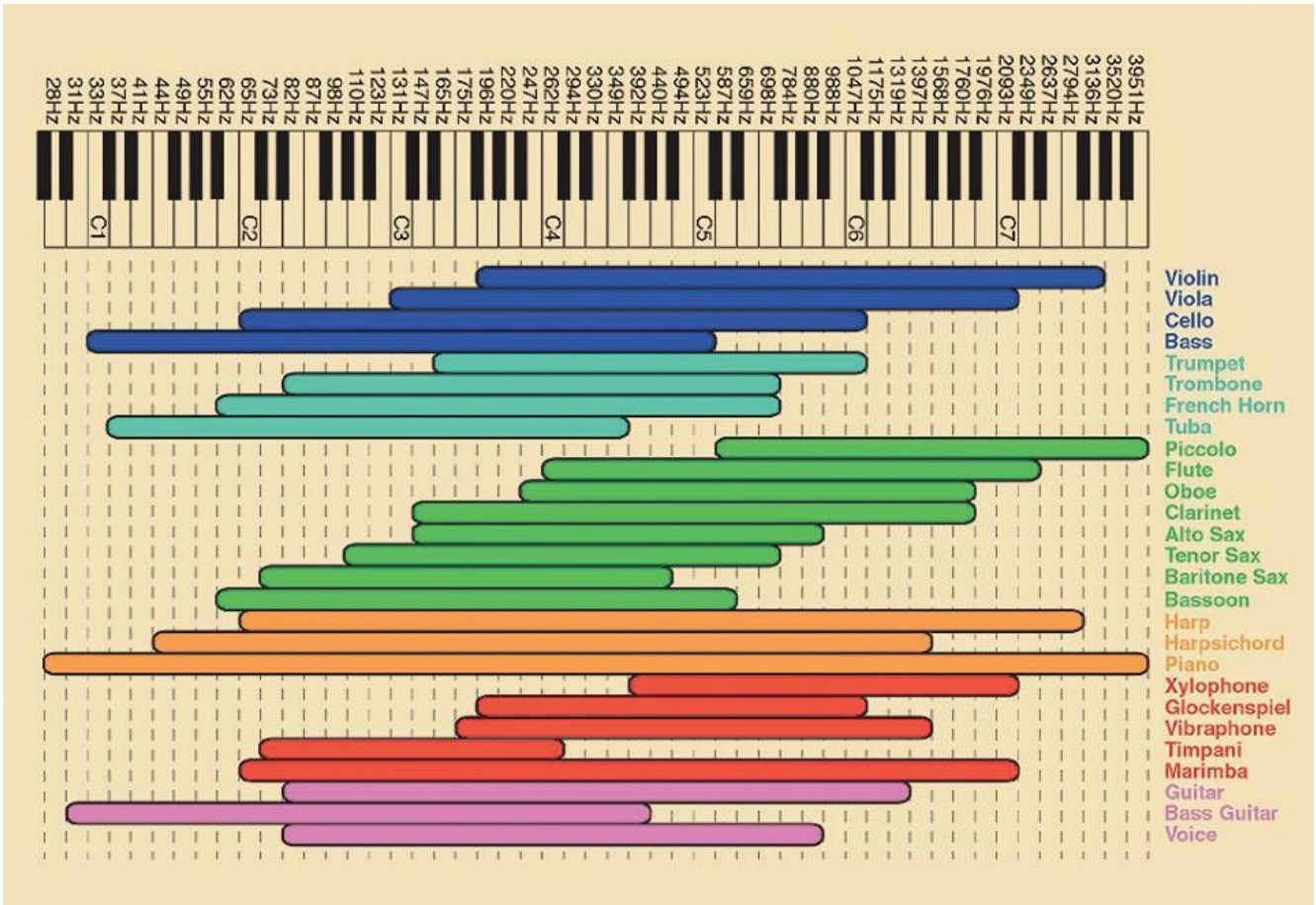


Figure 1. Chart for use in counselling, showing the frequency ranges of difference musical instruments. Image by Alexyo.Netcom, CC BY-SA 3.0.

Table 1 - Top 10 counselling tips	
1.	Establish the importance of music to the individual
2.	Take a history or what, when, where and how the hearing aid user listens and/or plays/sings
3.	Check hearing aid user understands their hearing loss and hearing aid technology
4.	Ask what difficulties they are experiencing with music, and how this differs according to musical setting
5.	Use chart to explain perceptual consequences of hearing loss (Figure 1) and how this may affect their listening and/or performance
6.	Explain why music can be challenging for hearing aid technology (Figure 2)
7.	Convey that it takes time to acclimatise to music through hearing aids, but the majority are happy with their aids for music
8.	Encourage them to use our <i>Music listening with hearing aids</i> leaflet which provides advice
9.	Be aware that musicians are more likely to report worse outcomes and will need more guidance
10.	Refer them to our resources: https://musicandhearingaids.org/resources/

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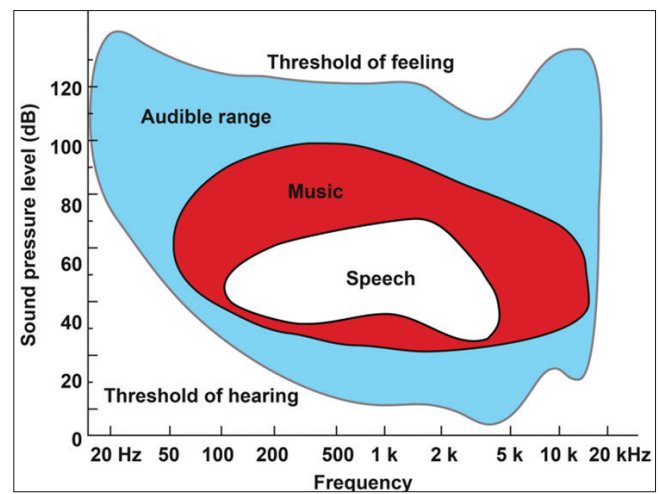


Figure 2. Music occupies extended frequency and dynamic ranges compared with spoken language. Image from Ramirez T, Herbig R. Optimising hearing aid processing for music appreciation. *ENT & Audiology News* 2016;**25**(4):101-2.

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the linear amplification condition compared to slow/fast-acting WDRC [5]. Though further research is needed, given evidence to date, we would advocate using slow-acting compression.

Changes to gain appeared frequently in responses, though some noted increased gain at high frequencies and others reported applying low- or mid- frequency gain, and there was a lack of specificity as to the degree of change or how these were applied across different frequencies or for differing input levels. Marchand explored the effects of changes in frequency-specific gain on preference for classical and jazz excerpts, finding that hearing-impaired listeners preferred gain with the maximum amount of low frequency emphasis [6]. Vaisberg et al found that hearing-impaired listeners preferred increased low-frequency gain compared to standard fitting formula for speech (DSLv5-adult), as well as decreased high-frequency gain for popular and classical music [7]. It seems there is a preference for increased low-frequency gain for music, however further research is needed.

Using the manufacturers music program. The use and efficacy of music programs is mixed. Madsen and Moore found some evidence that music programs made it easier to distinguish between individual instruments, but found no differences in aspects such as clarity and tone quality [2].

Table 2 – Top 10 technical tips

1. Fit volume control and mute
2. Use open fitting
3. Verify fitting with REM as accurately as possible
4. Use a music program
Within music program
5. Use everyday gain prescription
6. Turn off adaptive functionality (e.g., feedback reduction, noise reduction)
7. Increase Maximal Power Output
8. Look at compression ratios, and select slow-acting compression
Other
9. Check for audibility and occlusion
10. Refer to our resources (<i>Music Counselling and Fitting: A guide for audiologists</i> ; Quickstart clinic guide <i>Starting out with a music program</i>)
https://musicandhearingaids.org/resources/

Looi et al found that those with a music program reported worse sound quality for music than their everyday program [8]. Overall, we would advise using a music program as this can be programmed to encompass other strategies. A trial will allow patients to assess benefit on a case-by-case basis.

Another reported strategy was adjusting **Maximum Power Output (MPO)** due to the higher dynamic range of music, though this needs to be done with care and within safe limits. Increasing MPO minimally allows more flexibility for adapting gain across frequency where WDRC is used and may enhance music clarity, though further research is needed to establish the beneficial effects of this. Another strategy was **Use open fitting** as this provides a more natural acoustic which the brain is used to interpreting, and listeners can use the natural acoustic cues for localisation. Open fittings reduce the build-up of self-generated low-frequency sound, which is especially beneficial for singers and performers.

Taking individual differences into account.

Importantly, many audiologists emphasised that there is no ‘one-size-fits-all’ approach, and it is necessary to ask hearing aid users about the styles they listen to and about typical listening and performing contexts.

Developing evidence-based resources

Our study is one of the first to map empirically the strategies that audiologists are using to address musical needs in clinic and, using the evidence, we have developed some counselling and technical tips for audiologists (see Tables 1 and 2). We have also developed resources for audiologists and hearing aid users that are freely available on our website. Due to the nature of the short survey, responses lacked specificity and there is a need for more in-depth research to consolidate these findings. Whilst the consistency with which audiologists reported these strategies means they are likely to be dependable, there is a need for systematic research relating clinical strategies to improvements in outcomes for music. This would provide an empirical evidence base for the development of validated guidelines to support training. The project team are currently on grant capture to continue research in this direction.

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AUTHORS



Alinka Greasley,

Associate Professor of Music Psychology, School of Music, University of Leeds, UK.

Twitter: @musicdeafness
www.musicandhearingaids.org



Harriet Crook,

Trust Organisational Lead for Healthcare Science, Implant Programme Co-ordinator, Sheffield Cochlear Implant Assessment and Rehabilitation Programme, Sheffield Teaching Hospital NHS Foundation Trust, Sheffield, UK.

Twitter: @HarrietCrook1 and @musicdeafness