

Supplementary materials

S1. Standard for Reporting Qualitative Research - Research design and methods (O'Brien et al., 2014)

Qualitative approach and research paradigm

No defined approach was used in the current study. The methodology may align with phenomenology (i.e. gathering descriptions of the lived experiences of hearing loss and hearing protection use by early-career musicians), although thematic analysis has been described as falling within the remit of ethnography, grounded theory, discourse analysis and phenomenology approaches (Kiger and Varpio, 2020). Indeed, the boundaries between different interpretive approaches has been described as “porous” (Starks and Trinidad, 2007) and it has been argued that thematic analysis could be considered a qualitative method on its own (Braun and Clarke, 2006).

The systematic process of the Behaviour Change Wheel (BCW) was used as a framework to understand the target behaviour (i.e. non-use of HPDs), identify intervention options (i.e. COM-B/TDF), and identify content and implementation options (i.e. intervention functions and behaviour change techniques) (Michie et al. 2014; see supplementary materials S2).

At the time of writing, the first author (SC) holds a critical realist view. Specifically, the author aligns to the view that the aim of scientific research is to investigate relationships between what we experience (i.e. the empirical/observable domain) and the underlying mechanisms and structures (i.e. the ‘real’/unobservable domain). Thus, critical realism allows for the idea of multiple perspectives (i.e. positivist and constructionist) and is compatible with a mixed methods approach to research (Maxwell and Mittapalli, 2010).

Researcher characteristics and reflexivity

The research team comprises a wide variety of research backgrounds including cognitive neuroscience, audiology, behavioural science, psychophysics, epidemiology and music psychology. Several authors identify as musicians, and several also experience a range of hearing difficulties including tinnitus, speech-in-noise difficulties, and permanent hearing loss. All authors hold the view that high levels of noise exposure, including from music-related activities, has the potential to cause damage to hearing, which is based on empirical findings from the research team (Couth et al., 2020, 2019) and the literature (for a review see Zhao et al. 2010). Accordingly, the authors consider the use of hearing protection devices to be a favourable health behaviour.

None of the authors had pre-existing relationships with the participants prior to their participation in this study, and none of the authors had any assumptions or presuppositions about the data other than knowledge gathered from the literature.

All interviews were conducted by the first author (SC), who has a background in cognitive neuroscience and psychology. He has been using quantitative and qualitative research methods for over 10 years to collect data from a wide variety of participant groups, including from clinical and non-clinical populations, in a variety of different contexts, and is experienced at building a rapport on a one-to-one basis with participants.

Context

Participation in this qualitative study was part of a larger longitudinal project investigating hearing health in early-career musicians (Couth et al., 2020). Participants were invited back once a year, for up to 2 years (3 visits total) to examine changes to their hearing during this period. The qualitative part of this study to investigate barriers and facilitators of hearing protection use was conducted once only during the initial baseline visit. Interviews were conducted prior to conducting any objective hearing tests that could influence musicians' views on noise exposure, hearing loss, and hearing protection use. All baseline visits were completed between March 2017 and June 2018.

Interviews were conducted approximately 30 minutes into the testing session after participants had received a detailed overview of the aims of the wider project from the researcher, provided written consent, had been offered refreshments, and had completed several other background questionnaires relating to demographics, health and lifestyle. As such, the researcher had opportunity to develop a rapport with participants before the interview. Developing a good rapport with participants was a vital aspect of this project to ensure ongoing participation in the longitudinal study. Indeed, all participants indicated that they were happy to be contacted about the follow-up tests and 69 musicians returned the following year to repeat their hearing assessments.

All interviews were conducted in audiology research labs at the Manchester Centre for Audiology and Deafness; The University of Manchester. These facilities provide a quiet and distraction-free space for conducting one-to-one interviews.

Sampling strategy

Eighty musicians (age range = 18-26 years; women n = 39) were recruited from the Royal Northern College of Music and the University of Manchester using a volunteer sampling method. Interviews were conducted with all participants as part of their involvement in the larger research project. This

sample size is relatively large for qualitative studies using the BCW framework. For example, the study by Barker et al. (2016) included 10 participants, Rolfe and Gardner (2016) included 22 participants, and Nickbakht et al. (2020) included 28 participants. It is possible that saturation could have been achieved with fewer participants, but the musicians recruited to the study were heterogenous in terms of the instruments that they play and their previous musical experience. Therefore, it was important to include a representative sample across all classifications of instruments and experiences to capture a wide range of thoughts and opinions on NIHL and HPD use. Instrument classifications included strings (n = 23), wind (n = 6), brass (n = 13), keyboards (n = 15), percussion (n = 1), voice (n = 18), and contemporary (e.g. amplified electric guitar/bass guitar/keyboards; n = 4). Participants had an average of 13.3 years of musical experience (range = 8-20 years), started playing music at an average age of 7 years (range = 2-14 years), and were engaging in personal practice for an average of 15 hours per week (range = 1-36 hours) and group rehearsals/performances for an average of 6 hours per week (range = 0-40 hours).

All participants were undertaking – or were within one year of having completed – a degree (bachelors or masters) in performance-based musical studies, and thus were all deemed to be “early-career”. We were interested in early-career musicians in particular as they progress through a period of intensive musical training (both within and outside of their host institute), and so interventions to protect hearing longevity and establish life-long hearing protection habits may be vital at this stage.

As part of the Royal Northern College of Music’s strategy to promote healthy hearing behaviour, all students are required to attend a health and safety lecture on noise-induced hearing loss and its prevention, and are provided with high-fidelity non-custom musicians’ earplugs. This hearing conservation strategy is conducted independently of the current study.

Ethical issues pertaining to human subjects

The study was approved by the University of Manchester Research Ethics Committee (REF: ethics/16388) in accordance with the Declaration of Helsinki 2013. All participants provided informed consent and all data (both recorded and transcribed) was pseudonymised so that it was only identifiable to the interviewer (author SC). All audio recordings were deleted after transcription was completed.

Data collection methods

All participants took part in a semi-structured interview based around the following questions:

- “What are your thoughts about hearing loss as a musician?”

- “Is hearing loss something that you or your colleagues are worried about?”
- “What are your thoughts about hearing protection as a musician?”
- “Why do you use or not use hearing protection?”

Participants were encouraged to provide as much detail as possible and were given the opportunity to add any additional thoughts, opinions or comments relating to the topic. Interviews were recorded for later transcription using the voice recorder on the interviewer’s encrypted and password protected smartphone.

Although it is possible to develop interview questions which specifically address each of the components of the COM-B model/TDF (Michie et al., 2014), we chose to ask a small number of general questions which allowed each participant to voice the issues that were most salient to them as an individual, rather than providing a response which was prescribed/forced by the interview question. In addition, this allowed the authors to use these responses to generate broad themes using an inductive approach, which we were then able to assign to the most appropriate TDF components retrospectively (see *Data analysis*). McGowan, Powell and French (2020) suggest that rigid adherence to the TDFs in data collection and analysis (i.e. a deductive approach) may result in important behavioural determinants being overlooked. Instead, the authors propose that the TDF should be used flexibly to optimise its use in exploratory qualitative research.

Due to the large number of measures conducted as part of the wider investigation (lasting approximately 3 hours per testing session), the number of questions included in the interviews was kept to a minimum to also avoid participant fatigue and boredom. Interviews ranged from 2-9 minutes in duration, which is shorter than is typically recommended for a semi-structured interview (i.e. 30 minutes or more; DiCicco-Bloom and Crabtree, 2006) and so the reliability and/or validity of responses may have been limited. Nevertheless, by including a relatively large participant sample, we were able to capture a wide variety of highly relevant views and opinions within a short time frame.

Units of study

See Sampling strategy and Data collection methods

Data processing

Each interview was transcribed verbatim using a professional transcription service (1st Class Secretarial, UK; <https://www.1stclass.uk.com/>). Transcriptions of each interview were provided as individual Microsoft Word files. Each Word file was imported into NVivo (version 11; QSR International) to assist with conducting the thematic analysis.

Data analysis

Authors SC and ML coded the interview transcripts independently using an inductive approach to generate themes that were strongly linked to the original data (i.e. data-driven) and reflective of the entire data set (Braun and Clarke, 2006). These themes are the main overarching barriers and facilitators of HPD uptake and sustained use. All themes were generated irrespective of any behavioural framework (i.e. COM-B model/TDF) to avoid constraining the interpretation of the data. Only once all themes had been finalised were they then mapped directly to the relevant TDF domains based on the description of each domain (Michie et al., 2014). All themes were mapped to at least one TDF, and there were no themes that could not be mapped to the framework. The final intervention strategies were developed collaboratively by authors SC, ML and CA by following the systematic process of the BCW (e.g. identifying intervention functions and BCTs by applying the APEASE criteria; see supplementary materials S2).

Techniques to enhance trustworthiness

Trustworthiness of the qualitative research is based on the criteria set out by Lincoln and Guba (1985), which includes credibility, transferability, dependability and confirmability.

Credibility

To ensure data credibility, we used data triangulation by interviewing participants from a range of musical backgrounds (e.g. genres, instrument classification, years of experience, etc.), a variety of subjective hearing difficulties (e.g. experience of tinnitus and hyperacusis; Couth et al. 2020) and varying levels of HPD use.

Investigator triangulation was applied by having two researchers (authors SC and ML) independently code the data and map themes to the TDF. The two coding authors compared codes/themes and their mapping to the TDF and discussed discrepancies with a third researcher (author CA) to reach a consensus. The development of intervention strategies involved regular discussions amongst authors SC, ML and CA until there was 100% agreement on the application of the APEASE criteria for selecting intervention functions and BCTs. All remaining authors also reviewed the generated themes and the systematic work-through of the BCW, and approved the final intervention strategies.

We also used methodological triangulation by collecting and comparing the quantitative data on HPD use patterns with the qualitative interview data. For example, reasons for non-use of HPDs were checked against usage patterns in various contexts (e.g. recreational vs. performance based) to ensure consistency amongst these sources of data.

Data credibility was also ensured through persistent observation of the data. That is, the coding authors read and reread the interview data to ensure correct interpretation, generation of themes, and mapping to the TDF. This process was further enhanced by reviewer comments on the original manuscript submission where it was recommended that we consolidate our initial set of 17 barriers and 10 facilitators into more general barriers/facilitators. This consolidation process was conducted by authors SC, ML and CA, and all authors agreed on the final consolidated set of barriers/facilitators (Table 1).

Transferability

With respect to transferability of the current findings, the proposed intervention strategies are based on barriers/facilitators for early-career musicians only (see Context and Sampling strategy). Despite these barriers to HPD use being similar to those identified in school-aged and professional musicians (e.g. Patel, 2008), intervention functions and BCTs were evaluated using the APEASE criteria for early-career musicians' circumstances. Therefore, caution should be taken if applying these intervention strategies to other musician groups. We advise that researchers consider the context of HPD use in their target population in order to develop intervention strategies.

Dependability and confirmability

The dependability (i.e. the stability/consistency) of the data analysis methods was ensured by adhering to the intervention design process outlined by the BCW (Michie et al., 2014). The dependability of the findings will be confirmed by testing the efficacy of the proposed intervention strategies and by further assessment of their acceptability amongst early-career musicians. These data and suggested refinements to the intervention strategies will be reported in any subsequent publications.

In accordance with confirmability of data, all anonymised interview transcription, initial coded themes and mapping to the TDFs (in NVivo) are available upon request from the corresponding author.

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S2. Using the Behaviour Change Wheel for designing interventions (Michie et al., 2014)

Step 1 – Define the problem in behavioural terms

The aim of this first step is to define the problem that is being addressed in behavioural terms. This is completed by answering three questions:

What behaviour?	Improving healthy hearing practices to prevent noise induced hearing damage
Where does the behaviour occur?	In all settings where sound intensity levels exceed 85 dB A (in accordance with the Control of Noise at Work Regulations 2005)
Who is involved in performing the behaviour?	Early-career musicians

Step 2 – Select the target behaviour

In this second step, it is important to consider the behaviour(s) as part of a system that does not occur in isolation. That is, the target behaviour(s) may be influenced by competing demands or other behaviours conducted by the individual, another person, or group of people. If a target behaviour is selected which is reliant on other behaviours, then this needs to be carefully considered in the design of the intervention. Therefore, the first part of this step involves creating a list of all possible behaviours which might be relevant to the problem to be solved.

Intervention designer response
Increasing HPD use uptake and retention Avoiding/eliminating noisy settings Managing exposure e.g. taking more breaks and moderating exposure Playing more quietly/reducing the volume Improving sound isolation/proofing Use of acoustic screens

Although a number of different behaviours identified at this stage could be targeted as part of an intervention, it is recommended to focus on just one or two behaviours to begin with. By introducing behaviour change incrementally it is easier to evaluate the success of the intervention and to refine as necessary. Accordingly, the second part of this step involves deciding which target behaviour(s) seems the most promising by prioritising them based on the following criteria:

Potential target behaviours	Impact of behaviour change (unacceptable, unpromising but worth considering, promising, very promising)	Likelihood of changing behaviour (unacceptable, unpromising but worth considering, promising, very promising)	Spillover score (unacceptable, unpromising but worth considering, promising, very promising)	Measurement score (unacceptable, unpromising but worth considering, promising, very promising)
Increasing HPD use uptake and retention	Very promising	Promising	Unpromising but worth considering	Very promising
Avoid/eliminate noisy settings	Very promising	Unacceptable	Unacceptable	Very promising
Managing exposure e.g. taking more breaks and moderating exposure	Promising	Unacceptable	Unacceptable	Very promising
Playing more quietly/reducing the volume	Promising	Unacceptable	Unacceptable	Promising
Improving sound isolation/proofing	Unpromising but worth considering	Unpromising but worth considering	Promising	Promising
Use of acoustic screens	Unpromising but worth considering	Promising	Unpromising but worth considering	Unpromising but worth considering
Record selected target behaviour here:	Increasing HPD use uptake and retention			

Step 3 – Specify the target behaviour

Once the target behaviour has been selected, the next step is to provide specific details about the behaviour. This involves answering the following questions:

Target behaviour	Increasing HPD use uptake and retention
Who needs to perform the behaviour?	Early-career musicians
What do they need to do differently to achieve the desired change?	Use HPDs in all noisy (>85 dB A) settings
When do they need to do it?	Before (i.e. plan ahead) and during exposure to loud sounds
Where do they need to do it?	Noisy settings e.g. practice rooms, rehearsal studios, concerts halls
How often do they need to do it?	Every time noise levels exceeds/are expected to exceed 85dB
With whom do they need to do it?	Alone, with peers, and with teachers/supervisors

Step 4 – Identify what needs to change

In order to effect behaviour change, it is essential to understand and target the barriers to- or facilitators of- the desired behaviour in at least one of the core elements of the COM-B model. Therefore, a crucial aspect of the design of this intervention to increase HPD use in musicians involved collecting qualitative data from early-career musicians relating to their thoughts and opinions about hearing loss and the use of HPDs in order to identify the key barriers and facilitators.

The main barriers and facilitators to HPD use are described in supplementary materials S3 and the assignment of these barriers/facilitators according the COM-B model/TDF is shown in Table 1 of the main manuscript.

Step 5 – Identify intervention functions

Having determined the barriers/facilitators and organised them according to the COM-B/TDF model, the subsequent step is to link the COM-B/TDF components to appropriate intervention functions likely to be effective in evoking behaviour change (see Table 1 in main manuscript). The APEASE criteria is used to identify the most appropriate intervention functions.

Candidate intervention functions	Does the intervention function meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
Education – Increasing knowledge or understanding	<p>Knowledge (Lack of concern vs. Concern about hearing problems) - Not effective as student musicians are more aware of noise induced hearing problems and have healthier attitudes towards hearing conservation than non-musicians (Chesky et al., 2009). Information relating to safe sound levels are almost always provided as part of an educational program on noise exposure (e.g. Wright-Reid and Holland 2008), thus providing more education is unlikely to improve awareness of sound levels, nor alter beliefs about necessity of HPD use.</p> <p>Behavioural regulation (Lack of access vs. Ease of access to HPDs) - Not practicable to teach forgetting prevention (e.g. remembering to take HPDs with them at the start of the day).</p> <p>Social/Professional responsibility (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Social pressures) – Not effective (see Knowledge).</p> <p>Beliefs about Capabilities/Consequences (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Discomfort and poor fit) – Not practicable. Difficult to educate people about their own beliefs about playing abilities whilst using HPDs (although see Persuasion and Modelling), since the impact on listening and playing abilities, and discomfort and fit, is objective (e.g. Chasin and Chong 1999). Also not effective (see Knowledge).</p> <p>Optimism; Goals; Intentions (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems) - Not practicable to educate musicians on their priorities, nor to teach them how to not be lazy. Musicians are more aware of benefits of HPD use so further education is not effective (Chesky et al., 2009).</p>

Candidate intervention functions	Does the intervention function meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
<p>Persuasion – Using communication to induce positive or negative feelings or stimulate action</p>	<p>Emotion (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems) – Not practicable to persuade individuals that HPDs will not impact on their music playing/listening/enjoyment where HPDs objectively have a negative impact (vs. Improved sound quality or enjoyment). Also not effective (see Education - Knowledge).</p> <p>Social/professional responsibility (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Social pressures) – APEASE met – Encourage users of HPDs (students and teachers) to persuade others to do so also as part of a musicians’ professional standards/identity/duty to themselves and other musicians.</p> <p>Beliefs about Capabilities/Consequences (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Discomfort and poor fit) – Persuade musicians to use high-fidelity/quality HPDs to prevent impact on music listening/playing/enjoyment, but these are not affordable for everyone, and thus not equitable, plus the majority of participants were already provided with musicians’ earplugs through the institute, and so not effective/cost effective (see Enablement).</p> <p>Optimism; Goals; Intentions (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems) – Not effective since musicians are aware/concerned about the importance of HPDs (see Education – Knowledge), therefore difficult to further persuade musicians to prioritize hearing health.</p>
<p>Incentivisation – Creating an expectation of reward</p>	<p>Reinforcement; Emotion; Intentions; Goals: (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Social pressures) All N/A – Not practicable. Difficult to offer short term rewards for wearing HPDs. The reward is to retain hearing/prevent tinnitus, which musicians are already aware of (see Education). Possible to be more lenient/forgiving of musical errors by early-career student musicians who are trying to play whilst using HPDs (see Training and Enablement).</p>

Candidate intervention functions	Does the intervention function meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
Coercion – Creating an expectation of punishment or cost	<p>Reinforcement; Emotion; Intentions; Goals: (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Social pressures) All N/A – Not practicable. As per Incentivisation, musicians are aware of the costs/risks of not using HPDs. Punishment for not using HPDs is not practicable, not acceptable, and could pose side effects such as opposition or defiance (see Restriction also).</p>
Training – Imparting skills	<p>Skills (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment) – Encourage students to practice/rehearse using HPDs so that they are used to attenuated sound levels and will have less of an impact on performances, plus will be more used to the sensation (Discomfort and poor fit). However, this might not be practicable and/or not acceptable for early-career musicians where they are in high-pressure situations and may not be willing/able to offer short-term compromises to their musical abilities. May be best suited to novice or child musicians when beginning to learn an instrument, when the impact of HPDs on music playing may be less costly and more time can be taken to master their instrument while using HPDs.</p> <p>Memory, Attention and Decision Processes (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Lack of access vs. Ease of access to HPDs), Behavioural Regulation (Lack of access vs. Ease of access to HPDs), Reinforcement (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Social pressures) – Not practicable to impart skills for these barriers (similar to Education).</p> <p>Environmental context and resources (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Lack of access vs. Ease of access to HPDs; Discomfort and poor fit; Affordability of high-fidelity HPDs) – Not practicable to train awareness of sound levels, especially given changing circumstances for student musicians and dynamic nature of music.</p>

<p>Candidate intervention functions</p>	<p>Does the intervention function meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?</p>
<p>Restriction – Using rules to reduce the opportunity to engage in the target behavior (or to increase the target behavior by reducing the opportunity to engage in competing behaviours)</p>	<p>Environmental context and resources (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Lack of access vs. Ease of access to HPDs; Discomfort and poor fit; Affordability of high-fidelity HPDs) – Enforcing HPD use or placing restrictions on practicing and performing in environments which exceed noise limits if not using HPDs. Not practicable to enforce since using HPD use is not mandatory (Control of Noise at Work Regulations, 2005), plus students also practice/perform outside of institution. Also not equitable for students who are not at risk. (See also Coercion; not acceptable to all students and could pose side effects such as opposition or defiance).</p> <p>Social influences (Social pressures) – Not practicable to use rules to prevent stigma or peer pressure from other students, since this could be an implicit/indirect influence. Not practicable and not acceptable to prevent interactions between students. Social restriction may develop over time as stigma could be reversed with increased uptake (i.e. change in social norms towards HPD use).</p>

Candidate intervention functions	Does the intervention function meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
<p>Environmental restructuring – Changing the physical or social context</p>	<p>Memory, Attention and Decision Processes (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Lack of access vs. Ease of access to HPDs) and Environmental context and resources (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Lack of access vs. Ease of access to HPDs; Discomfort and poor fit; Affordability of high-fidelity HPDs – APEASE met - Provide information (i.e. reminders as opposed to Education) about dangerous/critical sound levels and/or HPD use before and during noise exposure.</p> <p>Reinforcement (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Social pressures) – see Incentivisation and Coercion – not practicable. Possible to provide physical reminders about the risks of noise exposure, but musicians are generally aware/concerned and educated (i.e. not effective; see Education).</p> <p>Social influences (Social pressures) – Not practicable (see Restriction). Not acceptable and not practicable to isolate or to prevent interactions with students who do not use HPDs or have negative attitudes towards HPDs.</p>
<p>Modelling – Providing an example for people to aspire to or imitate</p>	<p>Behavioural Regulation (Lack of access vs. Ease of access to HPDs), Emotion (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems); Social influences (Social pressures); All Reflective Motivation TDFs (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Social pressures; Discomfort and poor fit) – Role models i.e. teachers, staff members, successful peers/alumni, famous musicians to champion the use of HPDs (see Persuasion). APEASE met for early-career musicians. However, potential confounds e.g. not practicable and/or not affordable to involve highly influential/famous musicians. Possibly not acceptable to all staff members, and so not equitable for all students, depending on the staff member/teacher.</p>

<p>Enablement – Increasing means/reducing barriers to increase capability (beyond education and training) or opportunity (beyond environmental restructuring)</p>	<p>Memory, Attention and Decision Processes; Behavioural regulation; Environmental context and resources (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Lack of access vs. Ease of access to HPDs ; Discomfort and poor fit; Affordability of high-fidelity HPDs) – Provide access to high-fidelity musicians’ earplugs in practice rooms/rehearsal studios/performance spaces etc. Not affordable to make high fidelity/high quality HPDs readily available. Cheaper reusable non-musicians’ earplugs not acceptable and side effects in terms of impact on music listening/playing/enjoyment.</p> <p>Emotion; Beliefs about capabilities; Optimism; Goals; Environmental context and resources (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Lack of concern vs. Concern about hearing problems; Lack of access vs. Ease of access to HPDs ; Discomfort and poor fit; Affordability of high-fidelity HPDs) – Providing access to free/reduced price, high quality, musicians’ earplugs that do not impact on performances. Very high-quality custom made HPDs are expensive and so not affordable for all institutes and therefore not equitable, plus they may be no more effective than the non-custom HPDs already provided (Chasin and Chong, 1999). All students are currently provided with reusable non-custom high-fidelity musicians’ earplugs (see Persuasion), so providing these does not provide additional effectiveness/cost-effectiveness. Although, provision of musicians’ earplugs should not be removed as many students do rely on these to protect their hearing.</p> <p>Emotion; Beliefs about capabilities; Goals; Social influences (Detrimental vs. No impact of HPDs on music listening/playing/enjoyment; Social pressures) - Reduce pressure on students to give perfect performances and provide more lenient recital scoring if using HPDs. Not acceptable, not practicable and potential side effects as it could take students longer to master their instrument, which is constrained by their degree length, and students may try to blame HPD use on poor performance to achieve better grades. This suggestion would also require restructuring of current marking schemes which vary for different instruments/genres etc., so is not acceptable for students and staff, and not equitable across genres/instrument classifications.</p>
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Candidate intervention functions	Does the intervention function meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
Selected intervention functions:	<p>Environmental restructuring – Memory, Attention and Decision Processes; Environmental context and resources</p> <p>Persuasion/Modelling – Social/professional responsibility; Social influences; Behavioural regulation; Emotion; Reflective Motivation (all TDFs) – Although see potential APEASE restrictions</p>

Step 6 – Identify policy categories

This stage of the BCW aims to determine policies that would support the delivery of the intervention functions. There are seven policy categories which represent possible actions taken by authorities (e.g. employers, principals, government) to implement interventions; Communication/marketing, Guidelines, Fiscal measures, Regulation, Legislation, Environmental/social planning and Service provision. Each intervention function is linked with various policy categories likely to be effective in supporting the intervention. The APEASE criteria is also used at this stage for selecting the most appropriate policy categories for the intervention functions selected in Step 5.

Intervention function	Policy categories	Does the policy category meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
Persuasion/Modelling	<p>Communication/marketing</p> <p>Guidelines</p> <p>Regulation</p>	<p>APEASE met – i.e. changing social norms/acceptability through media and print.</p> <p>Not effective as music students are already educated on NIHL/tinnitus and are aware of best practice for prevention.</p> <p>Not practicable to enforce rules on HPD use in all settings (i.e. personal practice).</p> <p>Not acceptable for all and could lead to opposition/defiance (side effects).</p>

Intervention function	Individual BCTs	Does the BCT meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
Persuasion/Modelling	<p>Most frequently used BCTs:</p> <ul style="list-style-type: none"> - Credible Source - Information about social and environmental consequences - Information about health consequences - Feedback on behavior - Feedback on outcome(s) of the behavior - Demonstration of the behavior (Modelling) <p>Less frequently used BCTs:</p> <ul style="list-style-type: none"> - Biofeedback 	<ul style="list-style-type: none"> - APEASE met – verbal or visual communication of HPD use from familiar staff, teachers, influential musicians etc. (although possibly not affordable, practicable, acceptable and equitable for all students – see Step 5 - Intervention Functions). - Not effective. Musicians are aware of consequences for career. - Not effective. Musicians are aware of health consequences. - Not effective to provide feedback on amount of HPD use, especially with no immediate benefits (see Feedback on outcome(s) of the behavior) - Not practicable to monitor prevention of hearing loss with HPD use. - APEASE met – staff, teachers, influential musicians etc. to provide an observable example of HPD use (although possibly not affordable, practicable, acceptable and equitable for all students – see Step 5 - Intervention Functions) - Not effective and possible side effects – regular audiological health check-ups may only prompt HPD

Intervention function	Individual BCTs	Does the BCT meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
	<ul style="list-style-type: none"> - Focus of past success - Verbal persuasion about capability - Framing/reframing - Identity associated with changed behavior - Identification of self as role model - Informational about emotional consequences - Salience of consequences 	<p>use if hearing problems are detected or may prevent use if hearing problems are not detected. Hearing damage can also be subtle and not easily detectable by standard clinical measures. Use of HPDs will not reverse hearing damage.</p> <ul style="list-style-type: none"> - Not equitable since not everyone will have used HPDs previously. Not practicable as benefits of previous HPD use for hearing health are not easily measurable. - APEASE met – providing reassurance about performing and enjoying music whilst using HPDs. - Not practicable to reframe hearing protection as hearing loss prevention as the terms are used indiscriminately, plus HPDs only serve a single purpose. - Not practicable. No strong identity associated with being a HPD user/non-user. - APEASE met – changing social norms/acceptability and encourage students to act as role models for peers. - Not effective. Students already aware of hearing/career longevity, and thus mental wellbeing. - Not effective. Students already aware/educated.

Intervention function	Individual BCTs	Does the BCT meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
	<ul style="list-style-type: none"> - Information about others' approval - Social comparison 	<ul style="list-style-type: none"> - APEASE met - inform students that peers, staff, teachers, employers, etc., approve of HPD use/are not disapproving of HPD use. - APEASE met – compare behaviour to peers, staff, teachers, influential musicians etc., who use HPDs.
<p>Environmental restructuring</p>	<p>Most frequently used BCTs:</p> <ul style="list-style-type: none"> - Adding objects to the environment - Prompts/cues - Restructuring the physical environment 	<ul style="list-style-type: none"> - Not effective/cost-effective. Students already provided with high fidelity musicians' HPDs. Not affordable to provide free and unlimited access to high fidelity HPDs, nor to provide custom moulded HPDs to all musicians. Low quality HPDs are not effective in the musical setting. - APEASE met – i.e. signage to inform students that they are entering a loud environment and/or sound level meters with visual display to provide read out of sound levels/noise limits. Calendar/push notifications to inform or remind students about upcoming loud rehearsals/performances (also linked to BCT Action planning – encourage students to plan to carry HPDs when going to noisy rehearsals). - APEASE met - Advise students to keep HPDs on their person at all

Intervention function	Individual BCTs	Does the BCT meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
	<p>Less frequently used BCTs:</p> <ul style="list-style-type: none"> - Cue signalling reward - Remove access to the reward - Remove aversive stimulus - Satiation - Exposure - Associative learning - Reduce prompt/cue - Restructuring the social environment 	<p>times (i.e. in their instrument case) to ensure easy access. Can be reminded within Prompts/cues.</p> <ul style="list-style-type: none"> - N/A. No short-term reward associated with HPD use. - N/A. No short-term reward associated with HPD use. - N/A. No aversive stimuli associated with preventing HPD use. - Not practicable - APEASE met - Advise students to use HPDs in different contexts (i.e. quiet and loud) so that they get used to impact of HPDs on music listening/performing in a variety of settings (link to BCTs Behavioural practice/rehearsal and Habit formation). - N/A. Cannot use positive/negative reinforcement for HPD use as no short-term rewards. Students already aware of association between noise exposure and hearing problems, so not effective. - Not effective to remove the useful prompts/cues. - Not practicable and not acceptable to isolate different groups of students socially based on HPD use and attitudes to HPD use.
Intervention function		

Intervention function	Individual BCTs	Does the BCT meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
- Persuasion/Modelling	- Credible Source; Demonstration of the behavior (Modelling); Verbal persuasion about capability; Identification of self as role model; Information about others' approval; Social comparison	
- Environmental restructuring	- Prompts/cues; Restructuring the physical environment; Exposure	

Step 8 – Identify mode of delivery

This final step of the BCW aims to identify how the selected BCT(s) and intervention strategy will be delivered, such as face-to-face methods at the group or individual level, or via distance methods at the population or individual level. The possible modes of delivery are also assessed according to the APEASE criteria.

<u>Persuasion/Modelling</u> Mode of delivery			Does the mode of delivery meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?	
Face-to-face	Individual		APEASE met	
	Group		APEASE met	
Distance	Population-level	Broadcast media	TV	Not relevant for delivering BCTs relating to Persuasion/Modelling since these mostly require direct interaction with another person (e.g. staff/teacher/peers) within the musical institute.
			Radio	
		Digital media	Internet	
			Mobile phone app	
		Print media	Newspaper	
			Leaflet	
	Billboard			

		Outdoor media	Poster	
	Individual-level	Phone	Phone helpline	
			Mobile phone text	
		Individually accessed computer programme		

Environmental restructuring				Does the mode of delivery meet the APEASE criteria (affordability, practicability, effectiveness/cost-effectiveness, acceptability, side-effects/safety, equity)?
Mode of delivery				
Face-to-face	Individual			APEASE met (verbal/visual prompts/cues)
	Group			APEASE met (verbal/visual prompts/cues)
Distance	Population-level	Broadcast media	TV	Not practicable; not cost-effective; not equitable
			Radio	Not practicable; not cost-effective; not equitable
		Digital media	Internet	Not practicable; not equitable
			Mobile phone app	Not practicable; not equitable
		Print media	Newspaper	Not cost-effective and not equitable
			Leaflet	Not cost-effective
		Outdoor media	Billboard	Not cost-effective

			Poster	APEASE met
Individual-level	Phone	Phone helpline	Phone helpline	N/A
			Mobile phone text	APEASE met
		Individually accessed computer programme		APEASE met

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S3. Identifying barriers and facilitators to HPD use

Barriers to HPD use

Detrimental impact of HPDs on music listening/playing/enjoyment

Consistent with previous research (e.g. Laitinen 2005), early-career musicians indicated that wearing HPDs impacts on musical listening and playing abilities, such as the ability to hear their own instruments or others around them, or reduce the enjoyment of the music:

“The only downside is that if you do wear earplugs, sometimes it’s difficult to hear. If you’re playing an ensemble it’s difficult to hear other people. Sometimes it’s difficult to hear if you’re playing in tune or not.” – Participant 5 – Saxophonist

These opinions were based on either personal experience of using HPDs or beliefs/expectations about using HPDs. Irrespective, it has been shown that even high-fidelity musicians’ earplugs can lead to an occlusion effect (Bernier and Voix, 2013; Killion, 2012), sound localisation difficulties (Chasin and Chong, 1999), and altered spectral characteristics (Chesky and Amlani, 2015). They have also been shown to alter the sound level and spectrum of played sounds (Kozłowski et al., 2011) and less resonant choral singing (Cook-Cunningham, 2019).

Due to the impact of HPDs on music playing, participants also suggested that the context of the music playing could influence whether they use hearing protection or not. For example, musicians may be comfortable using hearing protection during personal practice and rehearsals where the cost of making mistakes is low, but not for performances where mistakes may be less acceptable. This may also explain the different HPD use patterns for different musical activities (see Fig. 1c in manuscript):

“It’s different when it’s in an orchestra, it’s not as important listening to your own sound but when you’re on your own you can’t really compromise on what you can hear, you can’t block your ears.” – Participant 7 – Violinist

“Well, it’s mainly the difficulty of the music and whether it will impact or impair my ability to play the music as well as I possibly can. Often with session music or music where there’s a band, the string parts are usually easier and they can’t hear you as well so it doesn’t fuss me that I can’t hear it.” – Participant 57 - Violinist

Participants also mentioned compromising between protecting their ears and being able to perform to a high standard, especially in certain musical settings.

"I think it's really important to protect your hearing but then, at the same time, if you've got to balance that with actually performing to your best ability as well." – Participant 48 - Trumpet player

For certain early-career musicians, they are willing to sacrifice performance and listening quality for the sake of protecting their hearing (see Facilitators – Concerns about developing hearing problems).

"I think that it should be encouraged and I think people should do it more because it's more important to have your hearing than to feel fully immersed in music, I think." – Participant 74 - Saxophonist

On the contrary, other early-career musicians are not willing to sacrifice performance quality to protect their hearing.

"...it's quite tough to wear ear protection because I just can't hear what I'm doing and I'd rather do a good job than save myself some trouble in 30 years." – Participant 18 - Cellist

Lack of concern about hearing problems

A general lack of concern about NIHL and using HPDs stems from several different factors. First, early-career musicians indicated that HPDs may not be necessary for their instrument type, genre or a particular environment:

"I think it depends which genre of music we are in. So, for example, I'm in the classical sort of genre, so it's generally not as bad compared to the pop and rock sort of genre." – Participant 14 - Pianist

While this may be true in certain circumstances, there is evidence to suggest that 74% of music students exceed the recommended daily exposure limits (see NIOSH, 1998) on three or more days of the week, compared with just 13% of non-musicians (Tufts and Skoe, 2018). Additionally, Phillips and Mace (2008) suggested that 48% of music students exceed allowable sound exposure levels from individual practice alone. Accordingly, the belief that HPDs are not warranted might be ill-conceived and could indicate a lack of awareness of potentially damaging noise levels:

"...as a pianist, you don't actually realise how loud the piano is. When you're in somebody's room and they're practising, you realise how loud it actually is, but when you're practising yourself it's not that obvious." – Participant 10 - Pianist

Second, early-career musicians indicated that HPD use was low priority, where focussing on the performance at hand or other health-related issues were a more pressing concern:

"It's something that we worry about but it would be further down the list of priorities compared to, like, tendonitis and muscular problems and everything that obviously stop you playing completely." – Participant 7 - Violinist

"I think when gigging, especially, it's obviously a high stress situation of setting everything up, and when you're ready the last thing I'd think to do would be to put my earplugs in." – Participant 64 – Pianist

Focussing attention and priorities elsewhere could also explain why early-career musicians reported that they forget to use HPDs or why HPD use is not automatic:

"I think most of the times I don't really use it because I just forget..." – Participant 54 - Tuba player

"I do have hearing protection and I need to wear it more because they are nice and it would be really good for me just to wear them without thinking about it." – Participant 51 - Viola player

Third, a lack of concern about NIHL could stem from a lack of experience of hearing problems, either personally or anecdotally, and so early-career musicians may feel less need to protect their hearing:

"I think there's always a sort of thing where you go to something and then you're fine afterwards then you kind of assume you'll be fine the next time and the next time and the next time, which may not necessarily be the healthiest of attitudes..." – Participant 50 - Pianist

"We're worried about it for future problems when we're more into our career but, for now, I think we're okay. We're not suffering from it yet, so it's not a major problem." – Participant 76 - Clarinet player

Indeed, previous research suggests that musicians are more likely to use HPDs if they have an existing hearing problem (Greasley et al., 2018; Laitinen, 2005; Laitinen and Poulsen, 2008; O'Brien et al., 2014)

Finally, a lack of concern could be due to a lack of knowledge and awareness about noise induced hearing loss:

"I guess it would concern people more if we knew more about the real consequences..." – Participant 13 – Pianist

A lack of education could also lead to the false belief that noise-induced hearing problems are an inevitable consequence of the music profession that cannot be prevented effectively. This sense of

hopelessness could mean that early-career musicians do not see the point of using HPDs to protect their hearing:

"I think some of my friends don't use hearing protection, they kind of have the mind-set of, it'll just happen anyway because I'm a musician and I play percussion, or I play a loud instrument..." – Participant 58 - Percussionist

"I think it's something that I think as a musician you kind of have in the back of your mind just in the sort of way that any negative eventuality is." – Participant 50 - Pianist

Social pressures (Barrier)

Early-career musicians provided evidence for a range of social pressures which could prevent HPD use. First, noise-induced hearing problems and HPD use might be considered a taboo topic of conversation amongst musicians:

"I think it's one of those topics people almost like to try and brush under the carpet a bit, it's not really sort of cool to talk about it..." – Participant 25 - Violinist

Second, early-career musicians were concerned about social stigma or judgment from friends, peers and/or employees if they wore hearing protection:

"I feel like I wouldn't be asked back if I was going to put earplugs in while I was rehearsing or in a concert..." – Participant 52 - Viola player

Third, there were also concerns about aesthetics and being perceived to have weak or damaged hearing:

"Sometimes I think that you see hearing protection and they can, say, look like somebody's wearing a hearing aid or something, so therefore I think there's quite a negative view of it. It's just with, I think, younger people and the way it looks mainly. That's just a stigma that needs to be overcome..." – Participant 35 - Voice

Finally, colleagues, teachers and/or institutes might not provide enough encouragement and support to use HPDs:

"I think it would be important for universities and colleges to promote it more because I've never really heard of it from the university or my teacher, anyone like that. I think it's important that you make students aware that they need to be protected in their ears because all I've ever heard it from is my parents..." – Participant 51 - Trombone player

Lack of access to HPDs

The availability of HPDs was also a problem for early-career musicians, where these were not always to hand during loud performances:

"I always keep meaning to buy some earplugs or something so that I do have them around for when I would be in a situation that it would be good to have them but I just haven't got round to doing it yet." – Participant 50 - Pianist

There are several bad habits that contributed to a lack of access to HPDs. For example, poor planning or a lack of routine meant that musicians forgot to take HPDs with them when leaving home, or did not have them about their person at crucial times:

"... it's not something that's at the forefront of my mind to just go, wait, let me just grab that."
– Participant 35 - Voice

Alternatively, early-career musicians also attributed non-use of HPDs to their own laziness and inaction to acquire HPDs:

"More just out of being lazy and not going to a shop to buy some." – Participant 64 – Pianist

Note that part of the Royal Northern College of Music's strategy to promote healthy hearing behaviours involves providing all students with high-fidelity non-custom musicians' earplugs. Accordingly, the majority of early-career musicians in this study should have access to HPDs, unless these have been lost or forgotten.

Discomfort and poor fit

Dislike of the physical sensation of HPDs in the ears or problems with fit and placement is an issue for some early-career musicians, as has been reported in previous research (e.g. Patel 2008). This included HPDs being painful whilst trying to insert or whilst in place, or not being able to get used to the feeling of HPDs despite perseverance.

"...sometimes they're uncomfortable, they're a bit of a pain to get in and out..." – Participant 56 - Tuba player

Affordability of high-fidelity HPDs

Early-career musicians indicated that they would use HPDs more if they could afford to buy high-quality/fidelity earplugs that do not have an impact on their music listening and performance:

"...if there was a better solution for protecting my hearing I'd probably go for it, but it'd have to be sensibly priced and not affect my performance..." – Participant 23 -Tuba player

"The moulded ones are something that I've Googled a few times but never actually bought, I think they're quite expensive..." – Participant 52 - Viola player

"I would use it all the time if I could but there are quite a lot of situations where you can't wear hearing protection, or at least you can't wear the hearing protection that I can afford." – Participant 55 - Clarinet player

Facilitators of HPD use

Concern about hearing problems

As opposed to a lack of concern about NIHL and tinnitus, early-career musicians suggested that they were worried about developing hearing problems due to noise exposure, and wear - or consider wearing - HPDs to preserve hearing and career longevity:

"...we only get one set of ears, I think it's important to look after them now so that I can still do music 20, 30 years down the line." – Participant 28 - Oboe player

"... you can always put your earplugs in, it's a personal choice. At the end of the day, if your hearing gets damaged, it's your fault, really, so you can't blame someone else for not wearing earplugs." – Participant 48 - Trumpet player

Having awareness of noisy musical settings that warrant HPD use (either before or during the noisy activity) increases concerns about hearing damage and encourages early-career musicians to use HPDs whenever required:

"The last time I did I was playing in an orchestra that had loads of guitars and drums and just a lot of loud noise going on all the time, and so I was using hearing protection." – Participant 18 - Cellist

"Very rarely, but I think there have been occasions where some volumes of music have stirred out a response to do with hearing loss and, yeah, those occasions are probably the only ones that I can think about that really sort of trigger a response..." – Participant 62 - Saxophonist

Concerns or awareness of noise-induced hearing problems also implies that early-career musicians have knowledge of the possible detrimental effects of noise exposure. Indeed, early-career musicians

reported being educated about the risks of noise exposure and how to prevent hearing problems, but also indicated that education could have been provided at a younger age:

“... in the first week of getting to uni, we had all these talks about protecting hearing. I realised at that point that I'd been part of rehearsals and concerts that were way too loud and it was hours and hours' worth of it.” – Participant 38 – Flautist

“I think it's something that we should be made aware of sooner. I was at the Junior Conservatoire for six years and hadn't heard anything about hearing loss or anything related to being a musician, to do with hearing, until I went to the senior department. So maybe it's something that could be introduced a bit earlier on to get into the habit of using hearing protection.” – Participant 71 - Violinist

Nevertheless, knowledge about noise-induced hearing problems does not necessarily mean that musicians are worried about it. Similarly, awareness or concern about the dangers of noise exposure does not necessarily translate into HPD use by early-career musicians:

“I think everyone kind of realises that it's a problem but people don't necessarily do anything, or it's difficult to do something about it.” – Participant 78 - Violinist

“I think every musician, all of my friends, are terrified of it as it's the thing they want to do as their career, but none of them act upon it.” – Participant 64 - Voice

Social pressures (Facilitator)

Contrary to social pressures which may prevent HPD use, it was also suggested that they could promote HPD use. For example, encouragement to use HPDs from friends, family, peers and teachers:

“I know that's something that me and my colleagues and friends have talked about and agreed with, and my parents as well are also urging me to wear it as much as possible, because my mum's a musician and she knows how important it is to protect my hearing.” – Participant 51
- Trombone player

“I think it's good that at the Royal Northern now we're being encouraged to use hearing protection and we're being taught about hearing loss.” – Participant 74 – Saxophonist

In addition, it was suggested that HPDs are becoming more normalised and socially accepted with less stigma attached:

"I think it's becoming quite common now. No one has an issue about it, people just do it." – Participant 2 - Voice

"...if I see someone else that is wearing it, then that's sort of a good feeling." – Participant 15 - Cellist

"I think it's something that's kind of growing in our kind of world, more and more people are using earplugs." – Participant 47 - Trumpet player

Ease of access to HPDs

Since all RNCM students are provided with musicians' earplugs when they enrol on the course, HPDs were readily accessible for participants in the current study.

"We had a seminar at the very start of first year about how to keep our ears safe...They gave us all proper earplugs and they taught us about tinnitus and things." – Participant 44 - Voice

These earplugs come in a portable carry container that can be attached to other items, and so may prevent forgetting and ensure ease of access. However, additional strategies were suggested to ensure that HPDs were available whenever they are needed:

"I'm right at the back of the second violins next to the brass section, I'll just, you know, have them on my stand and I'll just put them in." – Participant 60 - Violinist

No impact of HPDs on music listening/playing/enjoyment

Participants suggested that they use – or are more likely to use – high-fidelity musicians' earplugs, especially if they do not affect music listening and playing. Despite all RNCM students being provided with high-fidelity musicians' earplugs, participants suggested that they would prefer "up-market" custom-moulded musicians' earplugs:

"I have the sort of mentality where, if it's not the very best hearing protection, then I'm probably not going to take it as seriously. I've had the disposable ones and I've had higher quality ones but they're not personalised, they're not the moulded ones." – Participant 52 - Viola player

Contrary to the potential for HPDs to impact on music performance and enjoyment, early-career musicians may be capable of getting used to the attenuated sound levels after some perseverance, and music performance abilities might not be detrimentally affected:

“I think it's quite easy to get used to wearing hearing protection and still play within an ensemble or play on your own and still get used to the sound.” – Participant 58 - Percussionist

Moreover, it was suggested that HPDs may actually *improve* the ability to hear and enjoyment of music, especially in very loud environments and in some musical settings. This could also explain the varying patterns of HPD use for different circumstances (e.g. recreational use; see Fig 1c in manuscript).

“...let's say I'm at a rock concert, I would use them just because I think you can hear more things if you have earplugs inside your ears because if the concert is really loud then it's kind of hard to hear all the individual parts, so it's actually easier to hear the music with the earplugs in your ears.” – Participant 29 – Classical guitarist

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