

Attitudes, risk behaviour and noise exposure among young adults with hearing problems: identifying a typology.

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Abstract

This study explored attitudes towards leisure noise and use of hearing protection, and perceived susceptibility to leisure noise damage in young adults with hearing problems. Twelve participants aged between 18 and 35 years took part in a semi-structured interview. Data were analysed using Framework Analysis. The results showed a positive attitude to noise and a passion for loud music, along with a lack of knowledge of the consequences of noise damage; and perceived low risk of hearing problems were associated with people not using earplugs. The aesthetics, comfort, perceived effects on music quality; and attitude of others were all barriers to earplug use. Of those who had used earplugs, previous hearing-related symptoms and concern about future hearing damage were the main motivators for use. Four types of people were identified to describe the variation in attitudes and behaviours: There were those who had no change in behaviour or concern about damage; those who were concerned and used earplugs; those who were concerned and avoided loud venues; and those who were concerned about communication difficulties only. Considering the wide variability, it may be more effective to shift attention from trying to change individual attitudes and behaviours, to considering systemic changes to protect hearing, through ensuring the music industry and relevant authorities take greater responsibility.

Keywords: leisure noise; tinnitus, hearing loss; prevention; awareness

Learning objectives: 1) The reader will understand the potential barriers, as well as benefits, for earplug use; 2) The reader will be able to identify categories of young people with hearing problems describing the variation in attitudes and behaviours towards leisure noise and hearing protection.

Introduction

Exposure to loud noise can cause damage to the inner ear and can result in hair cell death leading to hearing loss (American Hearing Research Foundation). However, even low noise levels are still able to cause irreversible damage to the cochlea¹. The damage may not be immediate but results in accelerated hearing loss over the following decades of life². Noise exposure can also cause tinnitus³; the perception of sounds in the head or ears, in the absence of any external sound. Impaired hearing and tinnitus is also known to adversely affect the quality of life and may lead to psychological conditions such as anxiety and depression^{4,5}.

It is estimated that 1.1 billion young people could be at risk of developing noise-induced hearing problems (NIHP)⁶. Frequent noise exposure louder than 90dB can pose a much higher risk of hearing problems⁷, compared to lower levels of noise. In occupational noise environments, hearing protection regulations are in place. However, limited laws exist in non-occupational settings, and a typical nightclub can achieve noise levels between 104 and 112dB⁸. Fortunately, employees working in the music and entertainment sector are protected by The Control of Noise at Work Regulations (2005) requiring employers to prevent or reduce risks to employees' hearing

in the workplace. Despite venues not always enforcing the use of hearing protection⁹, at least regulations for employees do exist. However, no such regulations exist to protect the hearing of members of the public attending loud venues.

Young adults are a particularly vulnerable group because they often participate in activities where music is played at loud volumes^{10,11}. As a result, there has been an increase among the younger generation of NIHP^{12,13}. One course of action is to try and prevent young people from developing hearing problems in the first place. Although changes at the systemic level such as reducing noise levels at venues can be implemented, changes at the individual level are also beneficial. This can be achieved by changing attitudes and ensuring protective behaviours, such as using earplugs, are adopted. Attitudes towards noise and hearing protection are likely to influence behaviour. In general, young adults who have the most positive attitudes towards risk-taking behaviour are more likely to engage in risk-taking activities and less likely to use protective strategies¹⁴. In relation to noise, those who have experienced hearing symptoms e.g. tinnitus, noise sensitivity or temporary hearing loss, are more likely to have negative attitudes towards noise and loud levels of music¹⁵ and therefore more likely to use hearing protection than those who have positive attitudes towards noise^{16,17}. However experiencing hearing problems is not always a motivator for hearing protection. Recent studies in the UK¹³ and Belgium¹⁸ found a high prevalence of temporary NIHP in students and yet the use of hearing protection was minimal and the majority said the risk of hearing damage would not affect their nightclub attendance. Similarly, a US study found that when University students were questioned about hearing problems that can occur when noise is too loud, only 15% of considered tinnitus as a symptom to be concerned about¹⁹.

The general willingness for young adults to use earplugs in music venues is low²⁰⁻²². A study in the US found that less than 10% of college students reported using hearing protection for rock concerts, discos and sporting events¹⁷. Perceived individual susceptibility to hearing damage and perception of risk is likely to be one factor influencing earplug use. An online survey of Australian young adults found that those who engaged in noisy activities showed early signs of hearing damage²³, and although some recognised the risk associated with noise exposure, few had started to reduce that risk by using earplugs. Furthermore, in a study in India, less than 3% of students reported using ear protection in loud venues, despite 83% acknowledging that loud sound can have a harmful effect on hearing²¹. When exploring adolescents' perceptions of loud music and hearing protection, Vogel et al²⁴ found that most adolescents often played their MP3 players at maximum volume and although they were aware of the risks of exposure to loud music, most considered their personal vulnerability to be low. A lack of awareness about the need to protect their ears from noise damage and their low levels of perceived susceptibility, means that many young people are not considering earplugs or lower volume levels as an option. Johnson et al¹³ found that 86% of students reported they had never received information about NIHP or had earplugs recommended.

The majority of research on knowledge, attitudes and beliefs that may underlie young adults' behaviour with respect to noise and hearing protection has been conducted in the US^{11,17,19,20,24,25} and Australia^{10,16,23}. In the UK, research is limited. Furthermore, the majority of research has been conducted on people without known hearing problems. Our aim was to explore attitudes

and behaviours among young adults that do have hearing problems. Using qualitative research methods, this study aimed to address the following questions: 1) What attitudes do young adults with hearing problems have towards leisure noise, 2) What are the motivating and inhibiting factors for engaging in protective hearing behaviours among young adults with hearing problems; 3) How do young adults with hearing problems view the seriousness of, and their susceptibility to, further hearing problems? The study also aimed to identify a typology of people with hearing problems to describe the variation in attitudes and behaviours towards leisure noise and hearing protection.

Method

Recruitment

Ethical approval was received from the University of Nottingham School of Medicine ethics committee. Young adults aged between 18 and 35 years were recruited via advertisements asking for volunteers who had tinnitus or hearing loss to take part in an interview about how their hearing problems have affected participation in 'loud' activities and their use of hearing protection. Participants responded to the advertisement by contacting the author and arranging an interview at a convenient time and location. Informed written consent was obtained from all participants. The interviews were conducted between January and March 2016 at a neutral location on the University campus. Participants received a £20 inconvenience voucher for taking part.

Participants

We conducted 12 interviews with young adults with hearing problems (tinnitus or hearing loss) aged between 18 and 35 years old (8 female; 4 male; mean age 24 years). Three were members of staff at the University and the others were undergraduates, postgraduates and PhD students. Six people had tinnitus only, three people had hearing loss only, and three people had tinnitus and hearing loss, and all participants reported that their hearing problems had been diagnosed by a health professional. When asked their level of hearing impairment, three people described it as being moderate, two people described it as mild, and one person described it as mild to moderate. The duration of hearing loss ranged from since childhood (two participants), five to ten years ago (two participants) to within the last five years (two participants). Seven people felt the cause of their hearing problems was from exposure to loud music, three people said the cause was due to a medical condition such as a cholesteatoma, and two people were unsure as to the cause. Those with tinnitus had been living with the condition for between two and five years.

Measures

The interviews were conducted by the author, who had experience in interviewing and qualitative data analysis. During the interviews the participants were asked to discuss their experience and views on the following issues:

- Their hearing problems and the impact on everyday life
- Venues they visit where there is loud music, including reasons, frequency and duration
- Their attitudes towards noise levels of music in leisure venues
- The benefits and barriers associated with hearing protection
- The perceived severity of, and susceptibility to, further hearing problems.

The interviews lasted between 25 and 45 minutes and were conducted using open-ended questions. All interviews were recorded and transcribed. The author was unknown to the study participants and had no personal or professional relationship with them before or after the study.

Data analysis

In the interest of time, the focus groups and interviews were transcribed by a professional third party (UK Transcription). All transcripts were read carefully before analysis began. Data coding and analysis were performed using NVivo qualitative data analysis software. The topics discussed have a theoretical underpinning derived from health belief models (e.g. Health Belief Model²⁶; Theory of Planned Behaviour/Reasoned Action²⁷) which have attempted to explain the factors that determine participation in health behaviours. The approach to data analysis adopted for this study was a 'Framework' analytic approach^{28,29}, a very systematic approach that is suitable for research with a clear a priori framework, i.e. questions, topics or issues that are identified in advance. These are then systematically considered in the analysis²⁸. The researcher is able to maintain an effective and transparent audit trail, which enhances the rigour of the analytical processes and the credibility of the findings³⁰. A deductive approach (where questions, topics or issues are considered in advance, as opposed to inductive where none are considered in advance) to analysis was adopted, as the original research aims and the topics in the interview schedule (hearing problems and impact on everyday life; attitudes to leisure noise; protecting hearing; perception of risk) guided the development of the framework for analysis. The framework approach resulted in themes that were driven by a combination of the study aims and other new findings that arose naturally through the interviews (e.g. coping with hearing problems; reducing hearing problems in society).

Results

Table 1 details the participant characteristics and summarises their leisure noise behaviour, use of hearing protection, ability to cope with their hearing problems; leisure noise concern and any change in their lifestyle or behaviour as a result of their hearing problems. Ability to cope, and leisure noise concern, were categorised based on analysis of the participants' interview responses. The participants' discussions relating to each of the topics are presented below. Examples of participant comments are included throughout to illustrate the findings. In each case the age, gender and hearing status of the speaker is indicated ((hearing loss (HL);tinnitus (I)).

INSERT TABLE 1

Hearing problems and the impact on their lives

Two people could pinpoint the exact time they developed tinnitus (e.g. after a particular concert or festival), and for others it was a gradual occurrence after years of listening to loud music:

"What caused it was probably my iPod on too loud. I used to listen to it all day, every day when I was at school. I didn't put the noise limiter on... Then when I went to University, I think what exacerbated it was going out all the time, being surrounded by noise. But also having headphones in all the time, so my ears didn't really have a break" (Female, 26, T).

The impact the hearing problems had on the participants' lives varied dramatically. Two themes emerged from the data summarising this topic: a) Ability to cope with their hearing problems; b) Change of lifestyle.

Ability to cope with their hearing problems

Many participants coped well with their hearing problems and still listened to loud music. For some, they had accepted their condition and were able to cope well because they had become used to their hearing problems.

“It doesn't really affect me at all. I think that's because in my mind I've got better at adjusting and coping with it...I think I've just gotten used to it” (Female, 26, T).

One person commented that he had a good attitude towards his tinnitus and was able to think “*things could be worse*” which helped him to ignore his tinnitus most of the time. Those who coped well with their hearing problems had developed successful coping strategies such as relaxation techniques, lip reading, listening to white noise, distraction, and becoming better informed about their condition by learning about noise exposure and noise damage. Support from other people, particularly friends who have hearing problems, also helped people cope better, as well as realising that “*other people are in the same situation*”.

“I have got one friend who has occasional tinnitus, and he understands it” (Male, 19, T).

“At Uni, I've met a couple of people who do have tinnitus...I didn't know as many people actually have it as they do” (Male, 20, T).

For others, their hearing problems had negatively impacted on their lives. Those who had hearing loss felt that their hearing problems impacted “*significantly more*” than they thought it would due to communication difficulties. They also avoided certain places because it was very ‘*tiring*’ having to concentrate when there is background noise. Because of the difficulty communicating, participants also felt isolated:

“I hate it, it's really isolating. It's just horrible...I often get excluded from conversations without my friends realising it” (Female, 23, T & HL).

For other participants, it was very difficult to accept their diagnosis particularly as they reflected that it was likely to have been “*self-inflicted*”. Some participants expressed guilt and regret at their previous behaviours which had contributed to their hearing problems:

“I wish I'd worn hearing protection definitely, because I enjoyed going to concerts and I probably wouldn't have stopped that but I really wish I'd worn hearing protection” (Female, 28, T & HL).

One participant struggled to accept the fact she needed to wear a hearing aid at the age of 23 years old. She felt ‘*embarrassed*’ wearing it and worried about people picking on her, having previously been bullied for wearing a hearing aid. Her hearing problems had an immense emotional impact on her, leading to feelings of depression. She was distraught when she found there was no cure for her tinnitus:

“When they [GP] said there wasn't a cure I absolutely broke down. I said, I cannot live the rest of my life like this'...it's something you wish you could live without, so to find out there wasn't a cure was one of the most upsetting things I'd ever heard” (Female, 23, T & HL).

This participant also struggled on a day-to-day basis because of the lack of support available, either professionally or from friends and family. She described her tinnitus as “*absolutely awful*”, and felt that “*nobody understands the effect it has*”. She was referred for counselling but nothing came of it and her GP said there was nothing that could be done other than try and correct the hearing loss. These feelings of helplessness had meant she was struggling to cope with her hearing problems.

Change of lifestyle

Some participants reported having changed or “*toned down their lifestyle*” because they were concerned about their hearing problems getting worse when exposed to loud music. They did not want to take the chance because they would “*rather keep their hearing*”, and they reported that going to clubs makes the tinnitus much worse.

“I choose my hearing over the things I enjoy, which is a shame, but worth it” (Male, 19, T)

Rather than completely change their lifestyle some participants opted to wear earplugs when in music venues, but others had a complete change of lifestyle and preferred to avoid loud venues:

“I went to a club a few months ago and I only went for an hour, I used to go for six hours. I just hated it so much, and the feeling when I got home afterwards. I avoid it at all costs. I also avoid going to loud concerts as well now because of it, because I’m very aware...I don’t like it anymore...It makes my tinnitus unbelievable so yes I do avoid those situations, definitely” (Female, 28, T & HL).

Attitudes towards leisure noise

Both positive and negative attitudes towards leisure noise at music venues were expressed. A third of the participants had mostly positive attitudes, a third had mostly negative attitudes and avoided loud venues altogether, and a third had both positive and negative attitudes which were interchangeable depending on their circumstances at that time. If the intention was to talk, then some venues were perceived as too loud because the volume was too high to comfortably engage in conversation.

“If there’s loud music I’ll just leave, because you can’t hear anything and because it doesn’t appeal to me to be in a place with loud music where you have to shout at each other” (Female, 28, T & HL).

Participants with positive attitudes towards loud noise regarded it as ‘*enjoyable*’, ‘*mood enhancing*’, and ‘*part of the experience*’. During the analysis it was evident that many participants considered themselves ‘*music lovers*’ as they described their “*love*” and “*passion*” for loud music. Many participants enjoyed listening to their own music, playing instruments, or going to events. Some participants expressed a love of loud music:

“I make my own music. I’ve got various instruments to play and so on. Usually I crank those quite loud and stuff” (Male, 18, T).

These participants had mostly positive attitudes towards leisure noise or a mix of positive and negative attitudes as they recognised the risks associated but wore earplugs so they could continue to enjoy the music. Some of these participants felt that the “*benefits outweigh the risks*” and that it would “*compromise the experience having to turn it down*”.

Some participants felt there is an expectation that certain venues will be loud, because it is “*part of the experience*”, “*being in the zone*”, and being able to “*immerse yourself in the music*”. Being able to “*feel*” the music as well as hear it, made the experience more enjoyable for some participants:

“Clubs now ...the louder they are, the more booming they are, the more likely people are to enjoy it because there’s more energy...Once it’s quite loud you can actually feel it in your body as well as hearing it, which I think adds to the experience” (Male, 18, T).

However, not everyone enjoyed the sensation of ‘*feeling*’ sound energy. Negative attitudes towards loud noise were held by people who experienced unpleasant physical consequences such as feeling their body shaking or vibrating, experiencing tinnitus, and pain in the ears, which became “*too much*”. People also had negative attitudes towards leisure noise due to the concern that it could cause their hearing problems to get worse, as one participant commented with regards to her tinnitus:

“I think this is the worst level...I’d feel more disturbed if it got worse” (Female, 24, T).

There was also concern about the impact that hearing problems could have on them professionally:

“At the minute, even though I struggle to hear in my left ear I’ve got my right that can compensate for it. If it happened in both, especially in my job, I work in customer service, I would really, really struggle. I would be really concerned” (Female, 23, T & HL).

Benefits and barriers associated with wearing hearing protection

Attitudes towards hearing protection and the benefits and barriers for engaging in protective behaviours were discussed. Most of the discussion revolved around the use of earplugs in music venues. However, other protective behaviours to reduce the risk of noise damage were also mentioned such as turning the volume down on their own music, taking frequent breaks, or leaving a venue early, to avoid aggravating their tinnitus.

“I try and take precautions like go outside fairly frequently. . . . Because, just remembering how it was when I did first get it. It was really annoying. I really want to avoid that happening again” (Male, 22, T).

“With my iPod, I turn it down. I’m a lot more prone to turning it down. I make sure that I can’t set it at the maximum, and I probably wouldn’t anyway” (Female, 26, T).

The main themes relating to the benefits of earplugs were ‘safety and protection’, and ‘personal noise injury as motivator for use’. Protection was the primary reason for using earplugs, in order to avoid further hearing-related damage:

“I don’t go to many particularly loud things and if I do I always take my hearing protection. It’s just because I’m aware of the risk and I’d rather not take it” (Male, 22, T).

Those who were concerned about further hearing damage from leisure noise either avoided going to loud places, or used earplugs. For these people, attending loud venues was not worth the risk without using hearing protection.

“Even if I’m not going to a concert, bars these days will play things extremely loud. Some people say, ‘Don’t you feel a bit weird or think you look a bit weird?’ But I think it’s not worth the hearing loss. . . . I will make sure that I have got ear protection” (Male, 19, T).

Although some participants decided to avoid loud music venues in order to reduce the risk of further hearing problems, others continued visiting loud music venues and did not use earplugs, despite recognising the benefits of them. Barriers to earplug use related to aesthetics, stigma, comfort, effect on music quality, availability, and attitude from others. Some participants were concerned about getting “funny looks” from other people if they turned up at a nightclub with earplugs in. They were concerned that they would look “odd” or “stupid” on a night out. Those that did wear earplugs said they no longer cared what other people thought of them because they didn’t want to take the risk of further hearing damage.

“When I first started wearing them I was a bit self-conscious. . . . now I don’t really care” (Female, 26, T).

The attitude of others was also an important factor when considering whether or not to wear earplugs. Participants reported that they looked to what their friends were doing, and did not want to be the only person in their circle of friends wearing earplugs. What their peers thought and did was an ‘important part of the decision’ as to whether they wore earplugs. When asked whether she would wear earplugs, this participant commented:

“Potentially if it is the right appearance. I know that sounds vain, but I think someone my age could get it ripped out of you for standing in a nightclub with orange foam earplugs sticking out. . . . I can imagine people going, “What the hell are those?” If it was discreet then I would consider it” (Female, 20, HL).

Although recognising that it is “*really bad*” form to not wear earplugs because of the risk of potential further hearing problems, for one participant, the desire not to be different to her friends was too strong.

“None of my friends do. I think of it as being...antisocial...it sends out weird messages to people that you’re with...If you’re the only one with earplugs in it is quite conspicuous in a way” (Female, 21, HL).

Another participant, who considered herself to have severe tinnitus and moderate hearing loss, and was distressed by her hearing problems, did not want to wear earplugs for fear of being different to her peers:

“I think mainly through embarrassment, really. I don’t want to be that awkward friend, the funny one that has to wear earplugs when they’re out”. (Female, 23, T & HL).

Comfort was another potential barrier to earplug use due to them being “*irritating on the ears*”, and the fact they would “*probably fall out*” if the participant was dancing. One person reported wearing earplugs when he was drumming, but as they were expensive he did not want to risk them falling out at a concert. Additionally, he had tried a cheaper pair of earplugs at a concert but it caused the music to sound “*muffled*”, and “*unclear*”, which reduced the enjoyment of the event, so he had not used earplugs in music venues since then.

“When I went to my first concert when I was 16 I bought earplugs because obviously a concert is even louder than in clubs...I had my earplugs for one of the bands I was listening to and all I could just hear was the guys standing outside the club venue and just the kind of rattly, earth-shaky boom, rather than the rest of the song. So I just decided it wasn’t worth it, and I’m not paying money to hear a rumble, so I took them out and have since just not used earplugs (Male, 18, T).

Participants also expressed the opinion that wearing earplugs would “*take away from the experience*” because nightclubs and concerts are expected to be loud and “*you know what you are letting yourself in for*”.

The seriousness of, and perceived susceptibility to hearing loss and tinnitus

When considering the seriousness of, and the participants’ susceptibility to further hearing damage, two themes emerged: a) risk to self; b) and poor level of knowledge.

Risk to self

Some participants who had indicated they felt their hearing problems were caused by music, expressed concern that they would be at further risk of hearing problems by exposing themselves to loud music:

“I’m particularly scared of the tinnitus because I know it can get to levels that are really extreme...I definitely have noticed a complete change in my listening habits and my music. I love music, I really do, but surely if you really love music, you don’t want to go deaf...and I don’t want it to get worse, especially not if it’s something that I was contributing [to]” (Female, 28, T & HL).

Others, despite having hearing problems as a result of music, were not concerned about further damage, either because they felt the damage had already been done and it was too late to do anything about it, or they were intending to change their behaviour in the near future:

“Well I know my lifestyle will change significantly when I graduate. I will hopefully be going in to a law firm and obviously I won’t be going out as much” (Female, 20, HL).

One person stated that when he first got tinnitus he had “*hope*” that it would go away, but now he has resigned himself that he has it forever, and no longer makes an effort to protect his ears:

“Because I know that I’ve definitely got it now...I’m not making as much of an effort” (Male, 20, T).

Some participants still engaged in risky behaviour and were perhaps in denial about their potential risk of further hearing problems because “*at this stage of their life*” they have “*different priorities*”, indicating that while at University their priority is to have fun with their friends at clubs and concerts and they did not want their hearing problems to prevent them doing what other young adults do. Although they “*know full well*” that it cannot be good for their ears, they chose not to think about the consequences and continued carrying on with the same behaviours, perhaps because they were in denial.

“I don’t think it has been said to me enough how much of an impact it could have down the line which is why I haven’t stopped I guess” (Female, 20, HL).

Poor level of knowledge

The analysis of the interviews also revealed a lack of knowledge concerning the potential damage that noise can do, and therefore a reduced perception of personal susceptibility to hearing loss and tinnitus. Participants demonstrated a lack of knowledge about safe noise levels (in decibels), and safe exposure times. This lack of knowledge was frustrating for participants because they did not feel fully informed of what the dangers could be:

“I’m certainly not aware of how frequently and how bad it would have to be to cause permanent damage. Whether a one-off can cause permanent damage or not, I would assume not, but I don’t really know. So if I don’t know, then, obviously, lots of other people probably don’t know either” (Female, 35, HL).

As a result of not knowing enough about the potential implications of noise damage, there was a lack of concern among some participants, with people commenting that they will “*just carry on doing what [they are] doing anyway*”. Without knowing or appreciating what the consequences could be, participants were unwilling to change their behaviours. It was hard for them to imagine what it would be like to have poor hearing. Some people commented that if noise levels were put into context then it might help them appreciate what is “*an acceptable level and what becomes a dangerous level*”.

Some participants never thought about the need to protect their hearing before they developed hearing problems. Many were not aware of the consequences of loud music.

“Before I got it, I’d never really given it any thought at all...I thought it was only something you get as you just get older. I thought it was the norm, I guess, to get it after going to a concert” (Male, 20, T).

As a result many participants expressed wishing they had been better informed before they developed hearing problems so they would have been in a better position to prevent them, and said they would welcome “*more education*” on the risks of noise exposure. Some participants expressed regret over their previous behaviour.

“I wish I’d not turned that stupid iPod up. It would have saved so much struggle” (Female, 26, T).

“I think if somebody actually spoke to me about it before I even went I’d have considered doing something to protect my hearing. If I’d have known that this could have happened to me and the effects that it has – not just the fact that it’s happening but the effect it actually has on normal, everyday life...I think if I’d have known about it I definitely would have done something to prevent it happening” (Female, 23, T & HL).

Typology of people with hearing problems

Following completion of the Framework analysis, a typology of people with hearing problems was developed based on the variation in attitudes and behaviours towards leisure noise and hearing protection. The criteria used to define these types were i) ability to cope with their

hearing problems, ii) concern over leisure noise damage, and iii) any change in lifestyle or behaviour as a result of hearing problems. As shown in Table 2, four types were identified.

INSERT TABLE 2

Type 1: No concern about noise damage and no change in behaviour

Four participants were classified into this category. Two people had tinnitus which they believed had been caused by loud music; and two had hearing loss due to a medical condition. They all coped well with their hearing problems and did not indicate any concern about further hearing damage from leisure noise. Consequently they did not report any change in behaviour or lifestyle as a result of their hearing problems.

I know full well that [loud music] is doing nothing good to my ears but I'm really into music" (Male, 18, T).

Type 2: Cautious and positive behaviour change

Four participants were identified as belonging to this category. They all had tinnitus, one person also had hearing loss, and they all coped well with their hearing problems. All of them felt their hearing problems were caused by loud music and they were concerned about further hearing damage when exposed to loud music. Consequently they reported using earplugs when in loud venues so they can continue enjoying music.

"Because it's irreversible, it can just ruin your life... There are cases where people have been suicidal over it, so I think it's not worth letting it get to that stage... I do go to gigs quite regularly, butI won't risk going in somewhere unless I've got them [ear plugs]" (Male, 19, T).

Type 3: Poor coping and negative behaviour change

Two participants fit into this category. Both of them had tinnitus and one person also had hearing loss. One person was unsure of the cause of her tinnitus and the other felt her hearing problems were caused by loud music. Both reported difficulty in accepting and coping with their hearing problems, with one person particularly distressed by her tinnitus. As a result they were both concerned about leisure noise exposure and the potential for further hearing damage and they avoided loud music venues so as not to put themselves at risk.

"At first it made me really depressed.... people don't understand the effect it has, absolutely awful... So I try to avoid being anywhere which is really loud... Sometimes when I get back it's unbearable to deal with so I'd rather just take myself out of the situation and avoid going" (Female, 23, T & HL).

Type 4: Concerned about communication difficulties only and not noise damage

Two participants can be described under this type. They both have hearing loss and one also had tinnitus. Neither of these participants felt their hearing problems were caused by loud music. One person said her hearing loss was due to a medical condition, and the other person was unsure. Neither of them were concerned about future leisure-noise damage in loud venues, possibly because their hearing problems were not caused by loud music. However, as a consequence of their hearing problems, they reported avoiding loud venues because of the communication difficulties they face, rather than concerns about noise damage.

"For the last few years my hearing has deteriorated quite a bit in my right ear... it does impact on things quite significantly more than I thought it would... it is quite disorientating in a loud environment... If I

go in a public, crowded environment, I struggle to hear people speaking to me, even if it's in close proximity. Things like going to bars and pubs now, I tend to avoid, just because it's so difficult. I prefer quieter environments if I know I'm going to be speaking to people” (Female, 35, T & HL).

Discussion

The aim of this study was to explore attitudes towards leisure noise, the benefits and barriers for engaging in protective hearing behaviours, and perceived susceptibility to hearing problems among young adults with hearing problems. A second aim was to identify a typology of people with hearing problems to describe the variation in attitudes and behaviours towards leisure noise and hearing protection. Both positive and negative attitudes towards leisure noise were expressed. Many participants enjoyed loud music and considered themselves music lovers. Loud music enhanced the experience and was expected in certain venues. However some participants expressed negative attitudes towards noise in certain venues that are too loud or when they experienced hearing problems. Previous studies have also found mixed attitudes towards noise levels among nightclub attendees^{13,31,32}.

When music was considered too loud, some participants engaged in protective behaviours, such as moving to the back, leaving early or taking breaks, but the reported use of earplugs was low. Barriers to earplug use related to appearance, the perceived effect on music quality, and availability^{33,34}. Peer attitudes were an important factor in the decision whether or not to wear earplugs. This is consistent with previous research showing those who are concerned about their appearance are significantly less likely to wear earplugs²². It is likely that many other young people will also be susceptible to peer pressure, and therefore if earplugs are made ‘cool’ by improving the design and having celebrity endorsement^{16,35}, earplug use might be encouraged.

Another significant barrier was the perceived effect of earplugs on music and sound quality by limiting the ability to hear the music, or reduced clarity of the music. As music lovers some participants placed more importance on their lifestyle, enjoyment and love of loud music, than on their hearing and preferred not to change their lifestyle. This result echoes a recent study which found that the majority of students would continue to visit a nightclub as often as usual despite the risk of hearing damage¹³. However, a love of music can also be a motivating factor for earplug use among people who have experienced injury from noise, in order to prevent further damage^{16,22,36}. Experiencing noise injury symptoms can act as a ‘wake-up call’¹⁶ and in this study it did prompt some participants to use earplugs. However, several participants still decided against earplugs despite recognising that their hearing problems were potentially caused by loud music. When considering the severity of and susceptibility to hearing problems, there was an apparent lack of knowledge regarding the consequences of noise damage. Low levels of awareness about the consequences of loud music have been demonstrated in previous studies³⁷, and when people have been unaware of the dangers of noise, this has contributed to a lack of perceived susceptibility, and low levels of earplug use³⁸. Interestingly, there were mixed results with regard to self-perceived risk. Some of those who experienced signs of damage from music exposure believed themselves to be at further risk from continued exposure. Others were less concerned about further damage, despite acknowledging that their hearing problems were noise-related.

Perhaps the most significant outcome of this study is in the identification of a new typology of people with hearing problems based on the variation in attitudes and behaviours towards leisure noise and hearing protection. As far as the author is aware this is the first study to achieve this. Particularly interesting was the finding that participants with tinnitus behaved differently regarding their attendance at loud venues despite recognising that loud music may have caused the hearing problems in the first place. Some people were distressed by their tinnitus, had difficulty coping and feared going to loud venues in case the tinnitus got worse, so they avoided these places completely. Tinnitus distress is thought to be linked to personality traits⁵, which could partly explain the differences in behaviour. Others accepted their condition, coped well, but their hearing problems had been a ‘wake-up call’¹⁶ and they were cautious in their behaviour. Rather than avoid the loud venues they enjoyed, they used earplugs to protect against further damage. Finally, some people carried on as normal, had no change in lifestyle or behaviour and were not concerned enough about hearing damage to prompt them to protect their ears. These participants were not fully aware of the consequences of noise damage, and some were of the view that as their tinnitus cannot be cured they may as well continue doing what they are doing. Again, this highlights a lack of awareness regarding the cumulative risk posed by repeated exposure to loud music – and it is not only young people who are unaware – this study shows that even those with hearing problems may lack awareness. The final type involved people with hearing loss who were more concerned about their communication difficulties in loud venues rather than the potential for further hearing damage, and perhaps this was because their hearing problems were caused, not by noise, but by a medical condition.

This study does have its limitations. This is a small qualitative study with participants from one university and is therefore not representative of young adults in general. Although key attitudes and behaviours towards leisure noise and hearing protection among young adults have emerged from the data, generalisations cannot be made. Large scale studies are required to test the prevalence and importance of such factors. Nevertheless, these findings have important implications for hearing education programs. Specifically, this study has highlighted issues to consider when designing such programs; most importantly is the need for programs to be tailored to the individual. Due to the wide variability of attitudes and behaviours identified in the typology of people with hearing problems it is likely that a tailored program will be more beneficial to the individual to take into account personality traits, level of knowledge, and level of hearing problems. People with and without hearing problems will likely require different approaches in order to achieve maximum potential from the hearing education programmes. Other issues to consider are challenging the stigma that is still associated with wearing earplugs and improving knowledge of earplugs, e.g. tackling the assumption that all earplugs reduce sound quality, when in fact different types of earplugs have different effects on sound quality.

In addition to tailored programs, more general educational programs within schools and society are required in order to raise awareness of the association between noise exposure and hearing damage, and to motivate young people to act accordingly¹⁰. Such programs exist in America, e.g. Adopt-a-band³⁹; Dangerous Decibels²⁵; and The Sound Sense⁴⁰, and, although there is the PlugEm Campaign⁴¹, few educational hearing programs exist in the UK. With greater awareness, people might start to see their hearing as a priority and will be able to make better educated informed decisions regarding their hearing health. However, the task of convincing individuals to

change their noise-related behaviour is perhaps even more challenging than first thought. This study highlights the variability among people with hearing problems in terms of their attitudes and behaviours towards hearing protection and perceived susceptibility to further damage from noise. People who already have hearing problems respond to noise and hearing protection in different ways and they behave and think in different ways that are not necessarily predictable from their symptoms or experience. Peer pressure is a significant influence, and even though people may know they are at risk, some of them still decide not to change their behaviour. Despite the effectiveness of earplugs in preventing temporary hearing loss after loud music exposure⁴², many young adults are still unlikely to use them⁴³. Therefore the music industry and relevant authorities should take responsibility to create safer listening environments. It may be more effective to shift attention from trying to change individual attitudes and behaviours, to considering systemic changes to protect hearing.

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Table 1: Participant characteristics

	Gender	Age	Details of hearing problems	Cause	Music venue behaviour	Participation in other loud leisure activities	Use of hearing protection	Professional help sought	Ability to cope	Leisure noise concern	Change in lifestyle or behaviour
1	Male	18	T (2 years)	Music	Attends nightclubs a couple of times a week; attends concerts regularly as often as before onset of tinnitus.	Plays musical instruments, and makes his own music which he plays loud.	Used earplugs once at a concert but it reduced the sound quality of the band so he decided it wasn't worth using them.	No	Good	No	No change
2	Female	20	HL (Moderate, since childhood)	Medical	Attends nightclubs and concerts once or twice a week.	Listens to a personal music player through headphones and has it on loud. Plays music in her room loud. Considers herself a music lover.	Never	Sees a consultant because she has had hearing problems since childhood.	Good	No	No change
3	Male	20	T (2 years)	Music	Attends nightclubs and concerts once or twice a week. Also goes to festivals in the summer.	Listens to a personal music player through headphones but has it at a safe level. Changed from using in-ear headphones to over-ear headphones	Has purchased, never worn because they were bright yellow and didn't fit properly.	Went to the GP and was referred for a hearing test. Was told the tinnitus would go away.	Good	No	No change

						because he thought they would be safer.					
4	Female	21	HL (Mild, since childhood)	Medical	Attends nightclubs and concerts once or twice a week.	Listens to a personal music player through headphones but has it at a safe level.	Never	Visits the GP when her ears are hurting as she is prone to ear infections	Good	No	No change
5	Male	19	T (2 years)	Music	Goes to gigs and bars regularly, but not as often as in the past: doesn't go to clubs very often anymore because of concern about the noise.	Plays guitar in a band and practices a few times a week.	Has his own earplugs which he takes everywhere and always uses in loud venues.	No	Good	Yes	Uses earplugs now
6	Male	22	T (2 years)	Medical and music	Regularly attends concerts, nightclubs and bars as often as before.	Listens to a personal music player through headphones but has it fairly quiet. Plays in a band.	Started using earplugs when he was in a band because someone else did. Found them uncomfortable but is used to them now.	Went to the GP about his tinnitus.	Good	Yes	Uses earplugs now
7	Female	26	T (within the last 5 years)	Music	Attends nightclubs and concerts about once a week	Listens to a personal music player through headphones but at	Most of the time uses earplugs in loud venues but	Went to the GP about the tinnitus but was told there	Good	Yes	Uses earplugs (most of the time)

					but used to go a lot more often when younger.	a safe level. Used to listen to it all day every day on full volume.	occasionally forgets them.	was nothing to be done.			
8	Female	28	HL (Mild, within the last 5 years) & T (within the last 5 years)	Music	Used to go to very loud concerts regularly when younger and nightclubs several times a week as a student. Now attends a couple of times a year.	Listened to very loud music when she was younger.	Has used them when they have been available at venues	Went to the GP and has had a hearing test and is due to have more tests.	Good	Yes	Avoidance / ear plugs
9	Female	23	HL (Mild-moderate, within the last 5 years) & T (within the last 5 years)	Music	Went to bars and nightclubs a few times before developing tinnitus but avoids loud places now.	No	Never	Went to the GP. Was given a hearing aid to help with the hearing loss and tinnitus. Was referred for counselling.	Poor	Yes	Avoidance
10	Female	24	T (2 years)	Unsure	Used to attend nightclubs once or twice a month but has stopped going because of tinnitus.	No	Never – not aware of where to buy them	Went to the GP and was told the tinnitus was related to stress and that it would go away but it did not.	Fair/poor	Yes	Avoidance

11	Female	35	HL (Moderate, 5-10 years ago) & T (within the last 5 years)	Medical	Used to go to a nightclub or concert roughly once a month in the past, but avoids them now.	No	Never	No	Good	No	Avoidance due to communic ation
12	Female	35	HL (Moderate, 5-10 years ago)	Unsure	Used to go clubbing occasionally but avoids loud venues now. Sometimes goes to a pub.	No	Never	No	Good	No	Avoidance due to communic ation

Table 2: Typology of people with hearing problems based on the variation in attitudes and behaviours towards leisure noise and hearing protection.

Type	Description	Participants
No concern about noise damage and no change in behaviour	Those with tinnitus or hearing loss who cope well with their condition, are not concerned about leisure noise damage, and do not engage in protective behaviours or change in lifestyle.	1,2,3,4
Cautious and positive behaviour change	Those with tinnitus (who may also have hearing loss), that cope well with their condition but are concerned about further leisure noise damage so they engage in protective behaviours such as using earplugs so they can still enjoy going to loud venues.	5,6,7,8
Poor coping and negative behaviour change	Those with tinnitus (who also might have hearing loss), that struggle to cope with their hearing problems. They may have depression as a result. They are concerned about further leisure noise damage and avoid loud venues for fear of making their tinnitus worse.	9,10
Concerned about communication difficulties only and not noise damage	Those with hearing loss who are able to cope with their condition, are not concerned about leisure noise damage but do engage in avoidance of loud venues due to communication difficulties.	11,12