

# Noise with attitude: Influences on young people's decisions to protect their hearing

Megan Gilliver, PhD<sup>1,2</sup>; Elizabeth Beach<sup>1</sup>, PhD; Warwick Williams, PhD<sup>1,2</sup>

<sup>1</sup>National Acoustic Laboratories, Australian Hearing, Chatswood, New South Wales,  
Australia

<sup>2</sup>The Hearing Cooperative Research Centre, Victoria, Australia

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Name and address for correspondence:

Dr Megan Gilliver  
National Acoustic Laboratories  
126 Greville Street  
Chatswood NSW 2067  
Australia

Ph: +61 2 9412 6944

Fax: +61 2 9411 8273

Email: [megan.gilliver@nal.gov.au](mailto:megan.gilliver@nal.gov.au)

*Abstract*

**Objective:** To investigate young people's experiences and attitudes towards hearing health and their participation in noise reduction behaviours, to better understand how education and prevention messages may be better targeted.

**Design:** An online survey was used to investigate participants' own hearing health, their engagement with noise reduction behaviour, and their beliefs about hearing health and the risk posed by leisure activities.

**Study Sample:** Results are presented for 1000 Australian young adults (18-35 years).

**Results:** Most participants reported current good hearing health, although over a fifth showed possible early warning signs of damage. Approximately half of participants took steps to reduce their noise exposure. However, preventative action was not related to hearing loss symptomology, or perceived personal risk of noise-related damage. Participants' engagement with hearing health was related to beliefs about the risk posed by leisure noise, hearing health awareness, and the importance of hearing.

**Conclusions:** There is a need to further educate young people about the risks posed to hearing by leisure activity participation and factors that may assist improve hearing health. It is important that hearing health messages move past the traditional emphasis on knowledge, and move towards the use of more personalised motivators of noise reduction behaviour.

### *Introduction*

Young peoples' exposure to high levels of noise, and the potential resultant hearing impact, continues to be a concern for many hearing professionals (Smith et al, 2000; Neitzel et al, 2004; Beach, Williams & Gilliver, under review). Reducing the risk of noise-induced-hearing-loss generally requires limiting the time spent in noise and/or (as is more often the case) attempting to limit the volume of the noise to which ears are exposed.

Historically, the focus of noise reduction activities has been in relation to workplace safety where the ideal is to reduce noise at the source. In practice however, workplace noise reduction often still relies on individuals to be responsible for lowering their exposure, for example through the use of personal protective equipment like earplugs or muffs. This reliance in turn depends on individuals showing interest or engagement with hearing health matters. Encouraging people to reduce their noise exposure has never been easy. However, in relation to leisure noise exposure, hearing health programmes face two unique difficulties.

For most of these activities, noise isn't just an inevitable by-product to which participants are exposed. Rather, participants are attracted to these leisure activities for the high levels of noise that they involve (e.g., concerts, nightclubs). Prevention strategies for these activities aren't simply about motivating people to overlook any external inconveniences that may be perceived as resulting from noise reduction (e.g. access/cost/comfort of hearing protection). Instead, strategies must work to provide sufficient motivation to encourage individuals to prioritise noise reduction behaviour over their existing preferred sound-seeking behaviour.

The second difficulty faces is the varying nature of exposure. Unlike workplaces where the time spent in noise is usually standardised and often consistent or predictable across time (and sometimes across co-workers), leisure noise exposure is the result of voluntary participation which may vary from a few minutes to many hours. This can lead to great variations in exposure both between different participants in similar activities and within the same participant across different times or venues. As a result, one high noise activity may be relatively safe for an individual with short or infrequent attendance but of concern for other more regular attendees. For this reason, regulating the noise at the source (e.g. to 85 dB limit) may be likened to “over attenuation” for some participants, and carry with it related negative reactions.

Thus, noise reduction in leisure environments is likely to remain particularly reliant on personal regulation (i.e., individuals’ choices about the amount of noise they expose themselves to). But as has already been found, such dependence on personal regulation carries with it inherent difficulties, in large part because it depends on individuals’ motivations (or lack thereof) to monitor and adjust their own behaviour and exposure.

As for any other health promotion or behaviour change, individuals vary in their interest, motivation, and engagement with hearing health. A number of factors may influence individual engagement with any behaviour. In relation to health/prevention behaviours, people are particularly influenced by their perception of the threat (in relation to both susceptibility and severity) and the perceived costs and benefits of participating in noise reduction behaviour.

Research into the threat posed to hearing from leisure noise is increasing. Common leisure activities such as attendance at loud music venues (e.g., clubs, pubs, and concerts), use of personal stereo systems, and even participation in sporting activities have all been identified as potentially damaging to hearing (Vogel et al, 2007; Clark, 1991; Jokitulppo, 2006; Williams, 2005, 2009; Hodgetts & Liu, 2006.; Vogel et al, 2010). As such, they have become the focus of prevention messages with research investigating how to best assist participants to protect their hearing (Williams et al, 2010; Folmer et al, 2002; Weichbold & Zorowka, 2003,2007; Serra et al, 2007; Vogel et al, 2009). As the majority of participants in many of these activities are young adults (often with little to no experience of hearing loss or hearing health education), prevention messages need to be appropriately researched and targeted to fit with the group's current attitudes, knowledge, and behaviour.

Many youth-based hearing-health interventions show a focus on knowledge dissemination, around the mechanics of noise damage and practicabilities of hearing loss prevention, with varying reports of long term success (Weichbold & Zorowka, 2003, 2007; Griest et al, 2007). Although such education messages are potentially useful and important, hearing loss prevention also needs to contain personalised messages about risk and the reality of hearing loss, and address personal beliefs about hearing health (Folmer et al, 2002; Daniel, 2007; Sobel & Meikle, 2008).

A number of studies have looked at relationships between young people's use of hearing protection, hearing health, and their attitudes to noise sources in their day-to-day lives (Holmes et al, 2007; Widen et al, 2006; Widen et al, 2009; Widen & Erlandsson, 2004). Recent research has also shown that young people may not view hearing risks as important or as serious as other risks traditionally examined in relation to adolescence and young adulthood (Bohlin et al, 2011).

Less attention has been paid to young people's attitudes or beliefs about the interaction between noise and hearing health, and perceptions about personal risks and consequences resulting from exposure. Such beliefs are important, as they form the basis of the constructs of perceived susceptibility and severity suggested to underpin motivation to engage in health activities (Rosenstock et al, 1988). Further, many studies focus on the use of hearing protection devices, with little to no attention on other noise reduction behaviours. Therefore, further work is required to investigate how young people view noise and hearing health issues, and how such beliefs may be related to their motivation to reduce noise exposure.

The current study aimed to look at the relationship between hearing health attitudes and behaviour to better understand what factors may characterise increased engagement in noise reduction behaviour. The data presented in the current paper was collected as part of a more general survey which examined young adults' noise exposure behaviours (see also Beach, Gilliver, & Williams, this issue).

This paper investigates attitudes to noise, hearing, and hearing loss prevention. Specifically, the aim of this study was to examine young adults' noise reduction behaviours and their related attitudes and knowledge of hearing health issues. Of interest was whether increased knowledge of hearing health issues would be related to engagement in hearing loss prevention behaviours. Further, the study investigated whether hearing health engagement would also be influenced by those beliefs about hearing loss and noise reduction which personally relate to the individual.

### *Method*

The survey was developed by an external market research organisation under the direction of the authors. The former was also responsible for the online publication of the survey and recruitment processes. The study was approved by the Australian Hearing Human Research Ethics Committee.

### *Participants*

Results reported here are based on data from a total of 1 000 young adults (57% females, 43% males) aged 18-35 years, who agreed to participate in a larger online research survey regarding young peoples' noise exposure and behaviour (For further information about the participant sample see Beach et al, in press). Recruitment was conducted through an online panel created by an independent research company. Participants included a reasonable range of ages (18-24 years 34%; 25-29 years 34%; 30-35 years 32%), and geographical location (a proportional mix of regional, and metropolitan areas across states were represented).

### *Procedure*

Participants were presented with an online survey comprised of 25 demographic and research questions. Questions were designed to investigate participants' frequency and duration of involvement in risky (i.e., noisy) leisure activities; their beliefs about hearing and noise-induced hearing loss; as well as their own behaviour and hearing health. This paper specifically focuses on nine questions (shown in tables 1,2,& 3) relating to noise reduction behaviour and attitudes to hearing health, therefore survey items discussed in this paper are re-numbered for ease of reading.

### *Materials – Survey Items*

*Hearing health indicators.* Five items were used to investigate participants' current hearing health (Shown in table 1). The survey firstly asked participants to rate their own hearing [Q1], and two items were used to investigate participants' current hearing abilities [Q2 & 3]. An additional two items were used examine any experiences of symptoms [Q4&5] that may indicate early hearing difficulties.

<Insert Table 1 about here>

*Attitudes and knowledge.* Finally, participants' knowledge and attitudes towards hearing loss and its prevention were examined (Q6-7). A series of 11 questions using Likert-scale response options (table 2 below) was used to examine participants' beliefs regarding the risk posed to hearing by various leisure activities, the permanency of hearing loss, and the importance of hearing health issues to themselves.

<Insert Table 2 about here>

*Noise reduction behaviour.* Participants were asked if they took steps to protect their hearing [Q8]; and were also asked about their current engagement with hearing health behaviours [Q9] (Shown in table 3).

<Insert Table 3 about here>

## *Results*

Participants' responses were coded (as described in the above section) and analysed using the statistical software package Statistica, version 7.1. Responses of



“unsure” [Q4] and “don’t know” [Q5] were removed prior to subsequent analysis (8% and 3.9% of all responses respectively).

*Hearing health indicators.* When asked directly about their own hearing [Q1] most participants rated their hearing as good or better (84%), with only 7% rating their hearing in any way poor. However, many reported that they had difficulty hearing in background noise [Q2, 39%], that family or friends believed they had a hearing loss [Q3; 25%], or that they had experienced tinnitus at least sometimes [Q4; 24%]. These ‘symptoms’ are not, of course, conclusive evidence of actual permanent hearing damage. However, a participant’s experience of multiple symptoms may be an indication that they are experiencing (and are aware of experiencing) some degree of communicative difficulty (Williams & Purdy, 2008). Taken together, 22% of all participants had experienced two or more of these possible early warning symptoms of hearing loss.

A similar percentage of participants (29%) also rated themselves as having a medium, large, or very large risk of hearing impairment from their current leisure activities [Q5]. Further, a Spearman’s Rank Order Correlation showed risk ratings had a weak, but significant correlation with hearing loss symptoms,  $r_s(890) = 0.299$ ,  $p < 0.001$ , with participants who experienced two or more warning signs of hearing loss reporting higher risk ratings.

*Attitudes and knowledge.* Generally, hearing was considered important (extremely important, 51.4%; very important 40.4%) [Q6] for the vast majority of participants, with only a small number responding it was fairly important, not very important, or not at all important (7.7%, 0.2% and 0.3% respectively). Participants’

attitudes towards hearing loss and the risk posed by noise [Q7] showed a reasonable understanding of the effects of noise and the hearing loss (see table 4).

<Insert Table 4 about here>

The encouraging news from these results (table 4) is that many participants' responses show a positive knowledge of, and attitude to, hearing health. Nearly three-quarters of participants disagreed that hearing loss was irrelevant to young people such as themselves [Q7h], and 63% agreed that once damaged, hearing could not be repaired [Q7b]. The majority of participants also agreed that noise exposure from common leisure activities may damage hearing, with a large proportion of participants (85%) agreeing that concerts and nightclubs [Q7a] posed a risk to hearing.

For most items, participants' responses showed an appropriate understanding of the hearing health issue being examined. However, within the sample, the pattern of responses to many items indicated a wide variation in the attitudes and beliefs held by young people. Furthermore, participant responses to many of the items varied systematically in relation to their noise reduction behaviour as reported in items [Q8 & Q9], detailed below.

*Noise reduction behaviour.* Information about participants' noise reduction behaviour was gathered through two items, [Q8 & Q9]. Nearly half (46%) of all participants reported that they took steps to reduce their noise exposure [Q8].

Participants who took steps to protect their hearing reported experiencing slightly more early warning signs ( $M=.94$ ,  $SD=.94$ ) than those who did not take such steps

( $M=.89$ ,  $SD=.92$ ) with both groups showing high variability. A One Way ANOVA showed no overall significant difference between groups,  $F(1,918) = 0.770$ ,  $p=0.38$ .

Further, participants taking steps to protect their hearing reported slightly lower perceived risk ( $M=2.82$ ,  $SD=1.09$ ) than those not taking steps ( $M=2.92$ ,  $SD=1.08$ ), but this difference was not significant, [Q5]  $F(1,959) = 1.925$   $p=0.166$ .

When participants were asked to choose one of four statements that best described their own engagement with noise exposure reduction [Q9], responses were split as follows: (1) 13.5% of participants indicated that they were often exposed to loud noise, believed it was just a part of life, and liked their music loud; (2) 22.3% of participants indicated that they were aware loud noise may damage hearing, but they did not take action; (3) 24.6% of participants had experienced tinnitus after loud noise exposure, and were concerned while it lasted; and (4) 39.6% of participants indicated that they were actively reducing their noise exposure.

Although the response options provided in Q9 do not represent equal “steps” along a continuum from non-engagement to full engagement they do represent a distinct progression. As a result, they may provide an opportunity to look at the changes in attitude and or knowledge that may characterise increasing interest and involvement with noise reduction.

In order to better understand how those with different attitudes to noise reduction may view hearing health issues, participants were grouped based on their response to Q9. Thus, four groups were formed, namely, (1) Dismissive [*regarding the risk posed by loud noise*]; (2) Unconcerned [*about the risk posed to their own hearing*]; (3) Concerned [*about experiencing tinnitus*]; (4) Active [*in reducing noise exposure*].

These group memberships were used to further examine participants' attitudes towards hearing loss and noise reduction.

### *Attitudes and Knowledge by Noise Reduction Group*

Participant responses to attitude and knowledge questions were analysed by group membership ([Q9] Dismissive, Unconcerned, Concerned, and Active) and a summary of each group's results for these items are shown in table 5 below.

<Insert Table 5 about here>

For all questions, group responses showed a steady progression of awareness/interest in line with the progression from Dismissive to Unconcerned, to Concerned, to Active. These increases across items were analysed to determine if (and where) significant group differences existed. Unless otherwise reported, all group comparisons were conducted using one-way ANOVAs with group membership [Q9] as a factor.

Five items examined participants' general understanding of and attitude to hearing health [7 f,h,b,i, &7d ].

For items 7f and 7h, significant group differences were found for participants' beliefs that hearing loss was an inevitable result of ageing, unable to be prevented ( $F(3,996)=13.32, p<0.001$ ) and that hearing loss was irrelevant to young people like themselves ( $F(3,996)=14.77, p<0.001$ ). For both items, the level of disagreement was lowest for the Dismissive group, increasing for the Unconcerned & Concerned groups and strongest for the Active groups.

As previously reported, the majority of participants agreed that hearing loss was permanent [7b], and no significant group effect was found for responses to this item

( $F(3,996)= 1.93, p=1.23$ ). However, a significant group effect was found for [7i] regarding the ability for medical professionals to restore hearing loss. For this item, the Active group showed less agreement than the Dismissive and Unconcerned groups that such restoration was possible. ( $F(3,996)= 7.198, p<0.001$ ).

There was also a significant group effect regarding participants' consideration of hearing as an important issue [7d]  $F(3,996)=11.69, p<0.001$ . Both the Concerned and Active groups disagreed that hearing was an issue of low importance. In contrast, the Dismissive and Unconcerned groups provided equivocal responses to this item suggesting some ambivalence regarding the perceived seriousness of hearing health issues.

Three items asked participants about their beliefs regarding the risk posed to hearing by specific leisure activities [7a,e,g]. Although all groups agreed that noise exposure at nightclubs and concerts had the potential to damage hearing [7a], there was an effect for group membership,  $F(3,996) = 11.76, p <0.001$ , with the Dismissive group reporting less agreement to the statement than the other three groups. A group effect was also found for [7e] ( $F(3,996) =10.83, p < 0.001$ ) with the Active group showing stronger agreement than the other groups that personal music players were a major cause of hearing loss in young people. Finally, a group effect was also found for [7g],  $F(3,996) = 12.634, p <0.001$  with all but the Dismissive showing agreement that the noise at sporting events or gyms may pose a risk to hearing.

The remaining items [Q7c, j & Q6] focussed on how participants thought about hearing in relation to their own lives and behaviour. Items [7c] and [7j] were analysed to determine if group membership affected whether participants thought about the damaging effect of noise generally, and music players specifically, on their hearing.

There were significant effects of group membership for both [7c] ( $F(3,996)=40.65$ ,  $p<0.001$ ) and [7j] ( $F(3,996)= 18.05$ ,  $p<0.001$ ). For both items, the Dismissive and Unconcerned groups' mean responses were close to 'neutral', while the Concerned and Active groups responded that they had thought about the effect of noise on their own ears, and the hearing loss potentially caused by listening to a personal music player. Thus, although the Dismissive and Unconcerned groups did acknowledge that PSPs may result in damage [7e], they did not concurrently apply this knowledge in relation to their own music listening behaviour.

Finally, although all participant groups regarded hearing as important [Q6], there was an effect for group membership  $F(3,996) = 10.48$ ,  $p<0.001$ , with the Active group placing slightly, but significantly, higher importance on good hearing than the other groups.

### *Discussion*

The results of this study provide some interesting insights into young adults' noise reduction behaviours and their knowledge and attitudes relating to hearing health.

*Hearing health indicators.* Although only a small proportion of participants rated their hearing as poor, approximately a quarter of participants perceived their lifestyle as potentially risky for hearing, and also reported experiencing more than one hearing loss symptom.

The proportion of participants experiencing hearing loss warning signs is similar to the proportion of participants reporting symptoms following noise exposure in Holmes et al (2007), and for the proportion reported to fail a Pure-Tone Audiometry test in Widen et al (2009). However, there remains reasonably large variance

between these and similar studies making it difficult to determine reasonable estimates of difficulties experienced. The number of participants who perceive their activities as potentially damaging is within the range of actual at-risk prevalence rates reported elsewhere in the literature (Williams, 2009; Smith et al, 2000; Neitzel et al, 2004), suggesting that participants are a reasonably representative sample. Furthermore, those who perceived their activities as potentially dangerous were also those more likely to report possible early symptoms of hearing loss. Thus it appears that those who are more likely to be at risk are also aware of their possible risk. This is a positive sign for hearing health promotion as it suggests that those who experience higher levels of leisure noise may already be aware of some early impacts on their hearing health.

*Noise reduction behaviour.* An encouraging finding is that nearly half of the participants report taking steps to protect their hearing. The accuracy of these self reports and the real-life appropriateness/effectiveness of the steps being taken are difficult to determine as they were not the focus of this investigation. Rather, this study is interested in examining participant's motivation and engagement, and results point to a reasonable proportion of young adults wishing to maintain their hearing health.

Less encouraging is the finding that preventative action was not related to individuals' self-reported hearing loss symptoms or their perceptions of risk status. This result is at odds with previous research, which has found that participation in noise reduction was related to individuals' experience of hearing loss symptoms and concern about hearing loss risk (Bogoch et al, 2005; Widen & Erlandsson, 2004). There are a few reasons that may explain this different result. The use of a dichotomous variable [Q8] about "protecting hearing" as opposed to the multiple

items variables about hearing protector use used in other studies, led to comparisons between reasonably large groups with very broad engagement with noise reduction. Such data is likely to be insufficient to appropriately investigate any relationship. It is possible that differing interpretations of these questions by some participants may have impacted on the current results. That is, that some participants may interpret the question in relation to the general risk posed by the activities they attend (regardless of any noise reduction behaviours they might use) while others may interpret the question in relation to their personal risk during those activities (taking into account any noise reduction behaviours employed). These differing interpretations may be serving to further decrease any potential relationship between action and risk perception that may exist.

Regardless, the lack of a relationship remains potentially concerning for hearing health professionals as its absence indicates that many of those who are already experiencing difficulties, and/or who perceive themselves to be exposed to high-noise (risky) environments are not currently engaging in noise reduction behaviours. There is a need then, to look for other factors which may influence decisions to improve hearing health.

#### *Noise Reduction Group Membership and Hearing Health Attitudes*

The group differences found here may provide some guidance to assist with the development of targeted hearing health education activities for young adults. Active participants generally showed higher awareness of hearing loss issues as well as the risk posed by noisy leisure activities, and were more likely to report thinking about their personal exposure from leisure noise sources. Developing education messages



with these factors in mind may assist to motivate other young people to move towards these higher levels of engagement with hearing loss prevention activities.

The current study shows how progression from low to high engagement (Dismissive to Active) is reflected in increasingly positive attitudes towards hearing health issues [Q7f,h]. The importance placed on hearing [Q6], was shown to increase in relation to group membership (from Dismissive to Active), and only the Concerned and Active groups rated hearing as important in relation to other issues. [Q7d]. Active engagement with noise reduction behaviour was therefore characterised by higher levels of concern about personal susceptibility to hearing loss (regardless of age) and the perception of hearing loss as a severe and important issue.

In relation to specific activities, the Dismissive group's responses generally showed them to be less convinced (or in the case of sporting activities, unconvinced) than the other groups, that leisure activities carried any potential risks to hearing [Q7a,e,g]. Further, although the Unconcerned group showed a greater understanding of these potential risks, both they and the Dismissive group reported little interest in thinking about hearing health, or the damaging effect of noise on hearing [Q7c,d,j].

The results are perhaps not unsurprising as hearing loss tends to be viewed as a "bloodless" injury, and its insidious nature often makes it an invisible threat until significant injury has already occurred. The difficulty of raising awareness of hearing in high-noise workplaces (which are often already contending with other physical injury/death risks) has previously been noted (Westbrook et al, 1992; Waugh 1983). For those actively seeking out loud leisure noise (a factor that helps define the

Dismissive group) it is likely that hearing will rate even lower on any hierarchy of risk-monitoring to be considered.

### *Limitations*

The results described here are based on a number of subjective questions designed to elicit attitudes and perceptions of hearing health via self-report. The survey's online design meant that it was not possible to validate items against independent objective measures of behaviour or hearing health. As a result, the accuracy of the study findings will be necessarily limited by the accuracy of participants' responses, and their interpretation of the items (e.g., some participants may have over-represented the extent of their involvement with noise reduction behaviour).

However, the parallels between these and similar previous research findings provide some reassurance that participants were responding genuinely, with accurate self-reports. What is more difficult to determine is the extent to which question wording may influence responses. In the majority of cases items were developed to avoid unnecessary complexity, and maintain a reasonable level of face validity.

### *Conclusions*

The study provided an opportunity to examine beliefs about a range of hearing health issues via participants' attitudes towards related noise reduction statements. For the majority of statements, hearing health awareness gradually increased across the four groups, with attitudes towards noise reduction growing more positive from Dismissive, through to the Unconcerned, the Concerned, and finally the Active group.

However, in two areas, participants' responses showed important differences in hearing health awareness which increased markedly across group membership boundaries. The first of these was characterised by the Dismissive groups' (unrealistic) beliefs regarding the potential for specific leisure activities to pose a risk to hearing. Raising the awareness of the real risk to hearing from high-noise leisure activities is an important challenge for hearing loss prevention programs. In comparison to the other three groups, the Dismissive group was significantly less likely to agree (or, in fact, disagreed) that leisure noise could pose a risk to hearing.

However, it is also important to note that participants in the Unconcerned group (defined by low engagement in noise reduction behaviour) did show reasonable knowledge regarding leisure noise exposure risks. Thus, raising knowledge of risks is only a first step for prevention programs, and of itself is not necessarily sufficient to change behaviours.

The second increase was seen in the difference between Dismissive-Unconcerned and Concerned-Active participants' consideration of their own noise exposure, with the latter groups recognising a level of personal susceptibility to hearing loss.

Furthermore, the Active group reported significantly stronger agreement that they thought about the potential effect of noise on their ears than the Concerned group.

Taken together, these results indicate the importance of personalising the hearing health message.

Many hearing education programs currently follow a similar structure, with a concentration on educating individuals about how hearing works, the process by which loud noise may damage hearing, along with examples of loud noises, which may or may not be encountered by the target audience on a regular basis. While

such information can prove effective, the current results suggest that hearing loss prevention programs may achieve more if they move beyond this focus on scientific knowledge. Such factual education may be beneficial in moving young people's level of engagement past Dismissive, but is not sufficient to bring about action. Programs that include an increased focus on personal susceptibility, stimulate concern about the consequences of hearing loss, and refer to personalised examples of high-noise leisure activities may be more effective in motivating Unconcerned and Concerned young people alike to actively engage in noise reduction behaviour.

Placing a stronger emphasis on educating young adults about the risk for hearing loss from their leisure activities, and personalising this risk to make it relevant to their own participation is likely to be an important motivator to increase engagement with hearing health behaviour once knowledge has been established.

*Acknowledgments & Declaration of Interest*

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Table 1

*Questions about participants' hearing health*

<b>No.</b>	<b>Question</b>	<b>Response options</b>
<b>1</b>	How would you rate your hearing?	1-Almost perfect/perfect; 2-very good; 3-good; 4- neither good nor poor; 5-some times poor; 6-most times poor; 7-very poor ( I can hardly hear)
<b>2</b>	Do you have trouble hearing when there is background noise?	1-Yes; 2-No
<b>3</b>	Do any members of your family or close friends ever say they think you have a hearing loss?	1-Yes; No-2
<b>4</b>	Do you ever experience ringing or buzzing in your ears (ie tinnitus)?	1-Always; 2-Often; 3- sometimes; 4- occasionally; 5-never; 6-unsure
<b>5</b>	Thinking of your current lifestyle and leisure activities, how would you describe the risk of it leading to some degree of permanent hearing loss?	1-No risk of hearing loss 2-A very small risk of hearing loss 3-A small risk of hearing loss 4-A medium risk of hearing loss 5-A large risk of hearing loss 6-A very large risk of hearing loss 7-Don't know

Table 2.

*Items examining participants' beliefs and attitudes towards hearing*

<b>Item No.</b>	<b>Question</b>	<b>Response Options</b>
<b>Q6</b>	How important is it to you to have good hearing?	1 Extremely important 2 Very important 3 Fairly important 4 Not very important 5 Not at all important
<b>Q7</b>	<p>a) You can damage your hearing when exposed to loud noise at events like concerts and night clubs</p> <p>b) Once your hearing is damaged it cannot ever be restored to its original state</p> <p>c) I don't think about the damaging effect of noise on my ears</p> <p>d) There are so many more important issues to think about than your hearing</p> <p>e) Personal Music Players* are a major cause of permanent hearing loss in young people</p> <p>f) Hearing loss is just a natural part of growing old. There's nothing you can do to prevent it</p> <p>g) Being exposed to noise at sporting events and gym classes can damage people's hearing</p> <p>h) Hearing loss is for old people. It does not concern young people like me</p> <p>i) These days, if you damage your hearing, the medical profession can bring it back to its original state</p> <p>j) I never think about hearing loss caused by listening to music on a Personal Music Player</p>	<p>1 Strongly disagree;</p> <p>2 Disagree;</p> <p>3 Neutral;</p> <p>4 Agree;</p> <p>5 Strongly agree</p>

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\* The original survey referred to branded Personal Music Players in the question items provided. However, the generic term is used throughout this paper.

Table 3

*Response items for Hearing Health Participation*

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**Q8 Do you take steps to protect your hearing?**

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1 Yes

2 No

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**Q9 Which of these best describes you?**

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- 1 From time to time I have loud noise around me. It does not bother me. I like my music loud. It is part of life. It is not something to think about – going deaf is something old people have to deal with
  - 2 I think loud noise and music can cause permanent damage to hearing but I don't take any action to avoid being exposed to it.
  - 3 Sometimes after being exposed to loud noise or music I do get a ringing sensation in my ears that can last a few hours. It worries me a bit but when it goes away, I don't think any more about it
  - 4 I make a point of avoiding and/or limiting my exposure to loud noise and music. I worry about the short and long term effects it will have on my hearing
-



Table 4

*Response Breakdown [Q7] with Positive hearing health responses shown in bold*

Item	Q7	Response type (%)				
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
<b>a</b>	You can damage your hearing when exposed to loud noise at events like concerts and night clubs	1	2	12	<b>48</b>	<b>37</b>
<b>b</b>	Once your hearing is damaged it cannot ever be restored to its original state	3	9	26	<b>42</b>	<b>21</b>
<b>c</b>	I don't think about the damaging effect of noise on my ears	<b>14</b>	<b>38</b>	25	21	2
<b>d</b>	There are so many more important issues to think about than your hearing	<b>11</b>	<b>36</b>	34	16	3
<b>e</b>	Personal music players are a major cause of permanent hearing loss in young people	2	9	34	<b>40</b>	<b>15</b>
<b>f</b>	Hearing loss is just a natural part of growing old. There's nothing you can do to prevent it	<b>15</b>	<b>41</b>	28	14	2
<b>g</b>	Being exposed to noise at sporting events and gym classes can damage people's hearing	4	17	39	<b>35</b>	<b>5</b>
<b>h</b>	Hearing loss is for old people. It does not concern young people like me	<b>31</b>	<b>43</b>	17	6	2
<b>i</b>	These days, if you damage your hearing, the medical profession can bring it back to its original state	<b>17</b>	<b>41</b>	33	8	1
<b>j</b>	I never think about hearing loss caused by listening to music on a personal music player	<b>12</b>	<b>35</b>	26	22	5

Table 5

*Breakdown of responses to attitude questions by group membership type*

Item	Groups			
	Dismissive	Unconcerned	Concerned	Active
	M (SD)	M (SD)	M (SD)	M (SD)
<b>7a</b>	3.80 (0.88) <sup>U,C,A</sup>	4.15 (0.81) <sup>D</sup>	4.21 (0.71) <sup>D</sup>	4.27 (0.83) <sup>D</sup>
<b>7b</b>	3.60 (0.97)	3.63 (0.95)	3.71 (0.96)	3.79 (1.00)
<b>7c</b>	3.05 (1.01) <sup>C,A</sup>	2.99 (0.98) <sup>C,A</sup>	2.53 (0.96) <sup>D,U,A</sup>	2.24 (0.96) <sup>D,U,C</sup>
<b>7d</b>	2.90 (0.96) <sup>C,A</sup>	2.89 (0.96) <sup>C,A</sup>	2.61 (0.92) <sup>D,U</sup>	2.48 (1.00) <sup>D,U</sup>
<b>7e</b>	3.35 (0.88) <sup>A</sup>	3.44 (0.95) <sup>A</sup>	3.52 (0.84) <sup>A</sup>	3.77 (0.92) <sup>D,U,C</sup>
<b>7f</b>	2.83 (0.95) <sup>A,C</sup>	2.58 (0.98) <sup>A</sup>	2.50 (1.00) <sup>D,A</sup>	2.27 (0.94) <sup>D,U,C</sup>
<b>7g</b>	2.83 (1.00) <sup>U,C,A</sup>	3.21 (0.86) <sup>D</sup>	3.15 (0.88) <sup>D,A</sup>	3.37 (0.89) <sup>D,C</sup>
<b>7h</b>	2.43 (0.95) <sup>U,C,A</sup>	2.16 (0.95) <sup>D,A</sup>	2.02 (0.92) <sup>D</sup>	1.85 (0.91) <sup>D,U</sup>
<b>7i</b>	2.55 (0.86) <sup>A</sup>	2.48 (0.88) <sup>A</sup>	2.31 (0.87)	2.21 (0.89) <sup>D,U</sup>
<b>7j</b>	3.11 (1.07) <sup>C,A</sup>	3.02 (1.08) <sup>C,A</sup>	2.67 (0.98) <sup>D,U</sup>	2.50 (1.10) <sup>D,U</sup>
<b>6</b>	1.74 (0.75) <sup>A</sup>	1.69 (0.68) <sup>A</sup>	1.60 (0.67) <sup>A</sup>	1.44 (0.60) <sup>D,U,C</sup>

*Superscript initials are used to denote where the mean shown differed significantly ( $p < 0.05$ ) from the corresponding group mean, where D=Dismissive, U=unconcerned, C=concerned, and A= Active*

*NB: For Q7, Responses were coded on a continuum from Strongly Disagree (1) to Strongly Agree (5).*

*For Q6 responses were coded from Extremely important (1) through to Not at all important (5)*

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