

A qualitative study of earplug use as a health behaviour: The role of noise injury symptoms, self-efficacy, and an affinity for music

The use of earplugs in loud music venues is confined to a small minority who wish to avoid hearing damage from excessive noise exposure. Using the framework of the health belief model (HBM), structured interviews were held with 20 earplug-wearing clubbers.

Qualitative analysis revealed the HBM constructs relevant to understanding this group's motivation to protect their hearing. Personal experience of noise injury symptoms was the most common cue triggering earplug use. Awareness of the benefits of earplugs and appreciation of the long-term implications of hearing damage, affinity for music, and high self-efficacy were also key variables underlying this health behaviour.

The main avoidable cause of preventable hearing loss is exposure to excessive noise (Dobie, 2008; NOHSC, 2004b; WHO, 1997). The source of this noise can be the workplace, non-work (or leisure) activities, or a combination of these. In developed countries, excessive noise is at least a partial contributor to hearing loss in more than one-third of all cases, and excessive noise is one of the biggest compensatable occupational hazards worldwide (WHO, 1997). In Australia and many other countries, workplace noise exposure is controlled by legislation which stipulates that the level of noise exposure (L_{Aeq}) should not exceed 85 dB for an 8-hour period (NOHSC, 2004a). At this level, there is a small, but acceptable, level of risk of hearing loss (WHO, 1980). For every 3-decibel increase in L_{Aeq} in the workplace, the acceptable exposure time is halved. For example, if the L_{Aeq} is 88 dB, the maximum exposure time is reduced to four hours, at 91 dB, two hours and so on (Standards Australia, 2005). Outside of work, a person's noise exposure is unregulated. This is problematic because for some people, their non-work noise exposure will exceed acceptable work-related noise exposure levels (either on its own or in conjunction with work-related exposure) and thus impact significantly on their lifetime exposure to noise, and thus increase the risk of hearing loss (W. Williams, Beach, & Gilliver, 2010).

One of the noisiest leisure activities commonly undertaken by young adults is attending a nightclub or dance music venue. Typically, patrons spend between 4.3 and 5 hours in a nightclub (Goggin et al., 2008; Smith, Davis, Ferguson, & Lutman, 2000; W. Williams et al., 2010) where average noise levels are between 97 and 103 dB (Goggin et al., 2008; Serra, Biassoni, Oritz Skarp, Serra, & Joekes, 2007) and can be as high as 112 dB (Serra et al., 2005). If one applies the workplace regulations outlined above, then patrons who spend 5 hours in a nightclub where the L_{Aeq} is a relatively low 97 dB are exposing themselves

to ten times the daily acceptable noise dose during this 5-hour period (WorkCover NSW, 2001). When the L_{Aeq} is 103 dB, exposure increases to 40 times the acceptable dose. Such exposure levels would not be tolerated in the workplace, yet many young people routinely experience these noise levels voluntarily, and often with little awareness of the potential for such noise levels to result in hearing damage, tinnitus (ringing in the ears), and permanent hearing loss.

One way to assist patrons to reduce their level of noise exposure at nightclubs is to promote the use of hearing protectors (i.e., earplugs). Those seeking to encourage the use of earplugs in leisure settings face several difficulties, perhaps the most daunting of which is the pervasive appeal of loud music as a kind of 'sensation-seeking' behaviour whereby protagonists seek intense experiences to increase levels of excitation and arousal (Blessner, 2007; Hetu & Fortin, 1995; Malbon, 1999). Although many people who attend nightclubs enjoy loud music played at current levels, this view is not shared by all attendees (Mercier & Hohmann, 2002). Studies have found that 43% of discotheque attendees consider sound levels to be too high (Mercier & Hohmann, 2002), and more than 40% believe music at discotheques should be quieter (Weichbold & Zorowka, 2005). Nevertheless, irrespective of current noise levels, attending nightclubs remains a popular activity for many young Australians (Australian Bureau of Statistics, 2003-04), the number of music festivals is on the rise, and live performance of contemporary music generates the most revenue of any live performance genre in Australia (Live Performance Australia, 2010). Therefore it is increasingly necessary to inform attendees about the potential for harm at loud music venues and provide them with information about hearing protection.

Currently, only a minority of nightclub patrons wear earplugs, with earplug use reportedly between 14% (Chung, Des Roches, Meunier, & Eavey, 2005) and 17% (Goggin et al., 2008). While such low figures are of concern, they also provide a unique opportunity to study earplug use as a health behaviour in the earliest stages of uptake. In this study, a small group of clubbers (i.e., regular nightclub attendees) who routinely wear earplugs at nightclubs and other loud music venues was interviewed about their attitudes towards, and motivations for, wearing earplugs. These earplug wearers are part of a trendsetting minority of 'early adopters' (Rogers, 2003) who have taken the decision to wear earplugs before the majority of their peers, who are yet to adopt the practice. Studying this group has the potential to provide valuable information about the factors that motivate people to start protecting their hearing. In turn, this information may be used to develop education campaigns and awareness strategies to increase earplug use more widely.

A number of theories and models have been developed to explain participation in health behaviours and the factors that drive it. One of the most widely studied is the health belief model (HBM; Becker, 1974; Janz & Becker, 1984), which includes a number of constructs that are said to influence a person's decision to adopt a health behaviour. These are: perceived severity, susceptibility, benefits, barriers, cues to action, and self-efficacy. If we consider earplug use as a health behaviour within the HBM framework, the model suggests that clubbers who choose to wear earplugs believe in the seriousness or *severity* of hearing loss and tinnitus as significant health problems. They would also believe they are at risk or *susceptible* to developing these conditions because of their exposure to loud noise. Furthermore, the HBM would predict that earplug wearers are aware of the *benefits* of earplugs, i.e., that wearing earplugs will reduce their risk of hearing damage and eventual

hearing loss. They are also able to overcome any perceived *barriers* or negative features of earplugs which might prevent their use. The HBM suggests that earplug users would have been prompted to wear earplugs by a particular *cue to action*. This could be a physical symptom of hearing damage such as ringing in the ears or a temporary loss of hearing, or an external event such as a campaign poster or media story. The HBM also predicts that earplug users would have high *self-efficacy*, defined as confidence in one's ability to perform a health behaviour in a particular situation (Bandura, 2004). This means that earplug users would be happy to wear earplugs in loud music environments despite any social or environmental pressure not to do so.

The aim of this study was to examine earplug use as a health behaviour by examining the motivations of a group of early adopters of earplugs. Using qualitative research methods underpinned by the theoretical framework of the HBM, the study aimed to answer the following questions: i) What cues to action prompted earplug use in this group of early adopters? ii) How does this group view the seriousness of, and their own susceptibility to, tinnitus and hearing loss? iii) What does this group perceive are the benefits of, and barriers to, wearing earplugs? iv) How does self-efficacy influence earplug use in this group? v) Are there any other variables which have influenced this group to wear earplugs?

METHOD

Recruitment

Approval for this research was received from the Australian Hearing Human Research Ethics Committee. A purposive sample of 24 experienced clubbers who regularly wear earplugs

was compiled by recruiting members of www.inthemix.com.au, an Australian online dance music community, most of whom had previously made online contributions stating that they regularly wore earplugs at loud music venues. Of the 24 earplug wearers recruited, four were excluded because, once interviewed, it became clear they could not be considered regular *and* experienced wearers of earplugs. That is, three only wore their earplugs at certain venues and one had worn earplugs only once. In contrast, the remaining 20 participants confirmed that they always or almost always wore earplugs at loud music venues.

Participants

The 20 regular earplug wearers (5 females; 15 males) were aged between 21 and 42 years, and all attended nightclubs, concerts, gigs, and music festivals regularly. As shown in Table 1, participants attended loud music venues on average once per week with a mean visit duration of 5.1 hours. Participants had been using earplugs for an average 4.2 years and more than half had been wearing them for at least 3 years. Twelve participants were involved in one or more music- or nightclub-related activities, such as disc jockeying (n=8), music production (n=5), audio engineering (n=2), playing in bands (n=3), and club photography (n=2). The majority of participants had achieved post-secondary qualifications and lived in areas of above-average socio-economic advantage (Australian Bureau of Statistics, 2006), factors which have been shown to influence the use of hearing protection (Olsen Widén & Erlandsson, 2004) and early adoption of other health protective behaviours (Rogers, 2003; S. L. Williams, DiMatteo, & Haskard, 2009).

Insert TABLE 1 about here

Earplugs Used. Participants reported using one of three earplug types while attending music venues: disposable foam earplugs (n=6); Etymotic ETY High Fidelity ER-20 earplugs (Etymotic Research Inc. Elk Grove Village, Illinois, USA) (n=7); or custom earplugs, also known as musicians' earplugs (n=7).

Interviews

Structured telephone interviews of approximately 20 minutes duration (range: 11 to 29 minutes, mean: 21 minutes) were conducted by a psychologist (author 1), with no experience of wearing earplugs of any type in loud music venues. The interviewer asked a series of open questions about earplug use, attendance at loud music venues, motivations for wearing earplugs and attitudes towards noise, hearing loss, and earplugs. Some of these questions, such as those related to hearing loss severity and personal susceptibility to hearing damage were adapted from Vogel, Brug, Hosli, van der Ploeg, & Raat (2008). Participants were also questioned about perceived advantages and disadvantages of earplug use and a detailed analysis of these results has been published elsewhere (Beach, Williams, & Gilliver, 2010).

All interviews were transcribed verbatim and content analysis was conducted. Participants' statements were coded into 23 categories, 19 of which were classified into four nodes based on the HBM constructs. As shown in Figure 1, the six HBM constructs were condensed to four by combining severity and susceptibility; and benefits and barriers. Severity and susceptibility are often grouped together (e.g., Nutbeam & Harris, 1998) because they both relate to the 'perceived threat' a person experiences when considering

whether or not to undertake a health behaviour. Similarly, benefits and barriers were combined because together, these form a person's 'outcome expectations' relating to a particular health behaviour. A further three categories were identified as falling outside the HBM and these were included in a fifth node called 'other contributing variables'. The remaining category (club environment) was excluded from the analysis because, rather than providing insight into earplug use, comments in this category simply confirmed the regularity of participants' exposure to loud music and provided details of the types of venues frequented. Data coding and analysis was performed using NVivo qualitative data analysis software; QSR International Pty Ltd. Version 8, 2008.

Insert FIGURE 1 about here

RESULTS

Participants' attitudes towards, and motivations for, wearing earplugs are presented below under the five nodes: four HBM nodes, and the fifth node, which details the other contributing variables. Examples of participant comments are included throughout to illustrate and validate the findings.

Cues to action

A range of cues prompted participants to use earplugs. While some participants cited personal concerns about their hearing, others mentioned external triggers such as internet research and advice from friends as their cue to action. However, the cue which prompted most participants (13/20) to wear earplugs was the personal experience of noise injury symptoms, such as tinnitus/ringing in the ears, or temporary loss of hearing, e.g., *The*

driving force... for getting my earplugs is that I already had a slight ringing in my ear, and I just don't want it to get any worse.' (28-year-old female).

In addition to these 13 participants, a further six participants also said they suffered from tinnitus or had experienced ringing in the ears following exposure to loud noise, although it was not their nominated cue to action. The single participant who had never experienced ringing in the ears had learned about hearing protection from friends and commenced wearing earplugs when he started clubbing, aged 17 years. Whether or not noise injury symptoms were nominated as the motivating reason for adopting earplugs, all participants recognised ringing in the ears/tinnitus as a sign of damage, e.g., *'After being at a particularly loud event...my ears are really ringing and sometimes that ringing can go on for a day after which I know has been really, really bad for me.'* (22-year-old male).

Severity/Susceptibility

The analysis of interviews revealed that this group of earplug users believed that hearing damage is a serious health concern, and that they were at personal risk of hearing damage from loud noise. All participants stated that loud music can damage one's hearing, and as mentioned previously, all but one had experienced signs of damage after exposure to loud music. Importantly, most participants were aware that noise damage is irreversible and permanent. Many comments revealed that participants were taking a long-term view of their hearing health: They believed that by taking protective action now, hearing loss would be avoided 20 or 30 years hence, e.g., *'I know how damaging loud music is to my hearing and I know that, in the future, it's going to be severely damaging to me.'* (24-year-old male); *'I worry about what my hearing will be like in 20, 30 and more years' time.'* (27-year-old male).

Nearly all participants believed they were more sensitive to noise than other people and almost half believed their hearing had already been damaged as a result of their music exposure. Fifteen participants considered they were at risk of hearing loss, and most of these admitted to being worried about this, particularly at times when their tinnitus worsened. The majority of participants knew a relative or friend with a degree of hearing loss, and not surprisingly, all participants believed that if their own hearing were to be damaged, it would have a negative impact on their lives, particularly their ability to communicate, enjoy music, and perform their work duties, e.g., *'I spend a lot of time doing a lot of things that rely on my hearing and if that was to be compromised I don't know what I'd do.'* (22-year-old male).

Benefits/Barriers

During the interviews participants were asked to nominate the advantages and disadvantages of the various earplug types (see Beach et al., 2010 for a full discussion). Although some participants identified a number of barriers to earplug use, particularly related to cheaper foam earplugs, these barriers did not prevent participants from performing the health behaviour. In many cases, participants were able to avoid perceived barriers by choosing to wear a different earplug type or, where this was not possible, users tolerated the negative aspects of earplugs because they were considered insignificant compared with the benefits of earplugs, e.g., *'Wearing [earplugs] all day long or all night it can get a bit uncomfortable... but it's a small price to pay.'* (24-year-old male). Participants nominated several benefits of earplugs, including the ability to facilitate communication with others, and in some cases, the ability to enhance the wearer's enjoyment of music.

However, the main benefit identified by participants was the protection that earplugs provide. All participants, without exception, commented that earplugs protect hearing in the long term, e.g., *'I have peace of mind that my hearing will be, if not fine, better, in the long run.'* (24-year-old male), and minimise symptoms of hearing damage in the short term, *'At the end of the night, I don't come home with ringing ears.'* (28-year-old female). For this group, the protective benefit of earplugs outweighed, and in effect, negated any perceived barriers.

Self-Efficacy

Self-efficacy was a strong theme throughout the interviews. All participants were confident in their ability to wear earplugs, as demonstrated by the fact that they always or almost always wore earplugs at loud music venues, e.g., *'I use [earplugs] without fail whenever I go out.'* (27-year-old male); *'[I wear earplugs] pretty much every time that I go clubbing or to a music festival.'* (23-year-old male). In many cases, participants' high self-efficacy was evident in their willingness to wear earplugs despite the possibility of disapproval from peers. When participants were asked what they believed other clubbers thought of their decision to wear earplugs, many responded with disinterest, with the majority explicitly stating that they 'don't care' what other people think, e.g., *'I don't care if anyone points out that I'm wearing [earplugs]... because I sort of care about my hearing more than anything.'* (23-year-old male).

This attitude is consistent with these participants being trendsetters or 'early adopters', and therefore more likely to exert influence on others than to be susceptible to influence from others (Rogers, 2003). Indeed, when asked whether they would be likely to

encourage other people to wear earplugs, all but two interviewees confirmed that they would do so or had done so in the past.

Other Contributing Variables

In addition to the HBM constructs, the interviews revealed a number of other variables which appeared to be instrumental in this group's decision to wear earplugs. For example, participants demonstrated a high internal health locus of control, which is defined as the belief that one's health is controlled by one's own behaviour (Hinote, 2007). In response to a question asking who was responsible for hearing protection, nearly all participants expressed the view that the individual was primarily responsible for ensuring their own hearing health, so long as they were aware of the risks. Although many felt that nightclub operators had a role to play, the likelihood of nightclubs reducing noise levels was regarded as low, and thus personal responsibility was seen as a more viable method for reducing the risk of injury for this group, e.g., *'Ultimately it comes down to the individual, but people need to be educated more.'* (28-year-old female).

Another particularly strong theme that was repeatedly raised throughout the interviews was the concept of self-image, both as it relates to one's appearance, and also in terms of considering oneself a music lover. The vast majority of participants explicitly referred to self-image and pointed out that earplugs could be problematic for those who are concerned about their image. Earplugs were described as 'daggy', 'nerdy', 'dorky', 'not trendy', and 'not cool'. However, the majority of interviewees claimed to be unconcerned about their appearance or the idea that others may perceive them to be 'uncool', and believed that hearing protection is more important than appearance or image, e.g., *'A lot of*

people I know are very image conscious... I look like a dork anyway so I'm not really too worried about looking like a dork... I don't really care what people think a lot of the time.' (27-year-old male); *'A lot of people ...can get a bit self conscious about [earplugs] sticking out their ears at a dance festival...but I don't really care.'* (23-year-old male).

The second facet of self-image that emerged was the notion that earplug wearers are music lovers. The majority of study participants perceived themselves as music aficionados, and half the participants were actively involved in music-related activities. Many participants described their 'love' and 'passion' for music and said it would be 'devastating', 'awful' or 'really upsetting' if their hearing was compromised. These comments show how highly participants valued music, and when combined with a tendency to take a long-term outlook, it seems this was one of the main motivators which compelled this group to protect their hearing, e.g., *'If you want to enjoy the music in 10, 20 years' time, you really need to protect yourself.'* (33-year-old male).

DISCUSSION

The results of this study showed that each of the HBM constructs, cues to action, severity/susceptibility, benefits/barriers, and self-efficacy, is relevant to understanding what motivated this group of early adopters to use earplugs. The main cue that prompted earplugs use was the personal experience of noise injury symptoms, which has previously been associated with earplug use by musicians (Laitinen, 2005), rock concert attendees (Bogoch, House, & Kudla, 2005), adolescents (Olsen Widén & Erlandsson, 2004), and young adults in the workplace (Rawool & Colligon-Wayne, 2008).

There was also clear evidence that this group of early adopters believed in the severity of hearing loss and tinnitus, considered themselves susceptible to these outcomes, and also sensitive to noise, a condition previously associated with earplug use among adolescents (Olsen Widén & Erlandsson, 2004). All participants had considered the future consequences of noise exposure, a trait which also plays a role in adoption of other health behaviours, such as avoidance of alcohol consumption (Beenstock, Adams, & White, 2010), aggressive driving (Moore & Dahlen, 2008), and unprotected sex (Rothspan & Read, 1996). Participants recognised the benefits of earplugs and any negative features were either avoided by choosing another earplug type, or tolerated because the protection provided by the earplugs outweighed the drawbacks. A high degree of self-efficacy was also evident in this group's consistent and regular use of earplugs despite any negative social pressure from peers.

Importantly, this study demonstrated that, in addition to the HBM constructs, a number of non-HBM factors also play a role in the early adoption of earplug use. A high internal locus of control is often found in early adopters of health behaviours and other innovations (Jenkins, 2003; Rogers, 2003), and the results of this study suggest that earplug use is no different, with this group taking personal responsibility for their hearing protection. This group also placed more importance on their hearing than the views of peers or appearance concerns, a finding that is consistent with previous research which shows that those who are concerned about their appearance are significantly less likely to wear earplugs, even if provided free (Bogoch et al., 2005). Importantly, participants also regarded themselves as music lovers, and this was one of the main motivating factors that influenced earplugs use in this group.

Although it is unrealistic to expect all those who are exposed to loud music to think and behave exactly as this group of music-loving early adopters does, there are lessons to be learned from this group. In particular, we can draw on this group's appreciation of the benefits of earplugs, identification as music lovers, awareness of the long-term implications of hearing damage, and their attitude towards self-image to devise ways of encouraging more widespread use of earplugs amongst clubbers.

Benefits of earplugs. To encourage earplug use amongst non-wearers, there is a need to communicate the positive features and benefits of the different earplugs. Non-users could be encouraged to try earplugs for themselves, perhaps via distribution of free earplugs at music events (Bogoch et al., 2005). If non-users were offered a tangible experience of earplugs, and an opportunity to become familiar with them, this could dispel some of the negative views about earplugs and help non-users recognise and appreciate the benefits of earplugs.

Identification as Music Lovers. Although not all patrons of loud music venues are passionate music lovers, those non-earplug wearers who attend music venues most frequently, and who are therefore most at risk, are likely to have an affinity for music. Appealing to the music lover in non-earplug users could mean promoting earplugs that are designed for listening to music and do not interfere with music quality. The music-lover concept could also be exploited by encouraging both music consumption *and* hearing protection as a means of ensuring long-term access to music (Lalor, 2011; RNID, 2011).

Long-term view. Many patrons at loud music venues may be unaware that loud music can lead to permanent hearing damage because the short-term symptoms, such as ringing in

the ears, disappear after hours or days, leading some to believe that any damage has also been rectified. If awareness campaigns explicitly informed non-users that short-term hearing damage can manifest as permanent hearing loss, this may encourage greater consideration of future consequences and more widespread earplug use.

Image concerns. For those who are more concerned about their image and more susceptible to peer pressure than the group studied here, making earplugs 'cool' via improved design or celebrity endorsement may be effective. Celebrity endorsement has been suggested previously (Federman & Picou, 2009) and is a feature of several awareness campaigns, although as yet, there is no research regarding the usefulness of this strategy. Similarly, there have been attempts to devise new-look earplugs which are more like fashion accessories than protective devices (Dong, Green, & Thomas, 2007; 2008) but despite the importance young clubbers place on appearance (Malbon, 1999), earplug manufacturers have been slow to offer alternative earplug designs.

Although each of the strategies described above may be effective in encouraging wider use of earplugs, we need to ask if an education campaign or intervention program can ever be as effective as a personally experienced cue to action such as tinnitus. This study showed that tinnitus was the main cue that prompted earplug use, and although it would be preferable for people to take steps to protect their hearing *before* they experience symptoms, perhaps some personal experience is necessary for the reality of the danger to become apparent. The results of this study lend support to the proposal that noise awareness campaigns include activities which expose people to tinnitus and hearing loss (Widén, Holmes, Johnson, Bohlin, & Erlandsson, 2009) as a kind of pseudo cue to action.

Conclusion

Increasing the use of earplugs at loud music venues is a challenge that can only be met by taking a multifaceted approach. This study suggests that, in addition to a firsthand experience of noise injury symptoms, earplug use may be encouraged by appealing to clubbers' affinity for music and encouraging a long-term view of hearing protection. Earplug use could also be increased by promoting the benefits of earplugs either by communicating the advantages of earplugs more effectively, encouraging personal experience of earplugs, or by improving earplugs' appearance and desirability, such that music lovers come to regard earplugs as an essential accessory for maintaining their enjoyment of music well into the future.

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	Age (years)	Years of educatio n	Started clubbing at (yrs)	Total years of clubbing	Club visits per week	Typical duration of each club visit (hrs)	Started using earplugs (yrs)	Total years of earplug use
Avg	28	15.9	18.1	10.0	1.0	5.1	24	4.2
SD	(6)	(1.8)	(1.3)	(6.3)	(0.6)	(0.8)	(4.6)	(3.7)
Range	21 – 42	13 – 20	16 – 21	3 – 25	0.3 – 2.5	3.5 – 7.0	17 – 33	0.25 – 14

Table 1: Participants' attendance at loud music venues and earplug use.

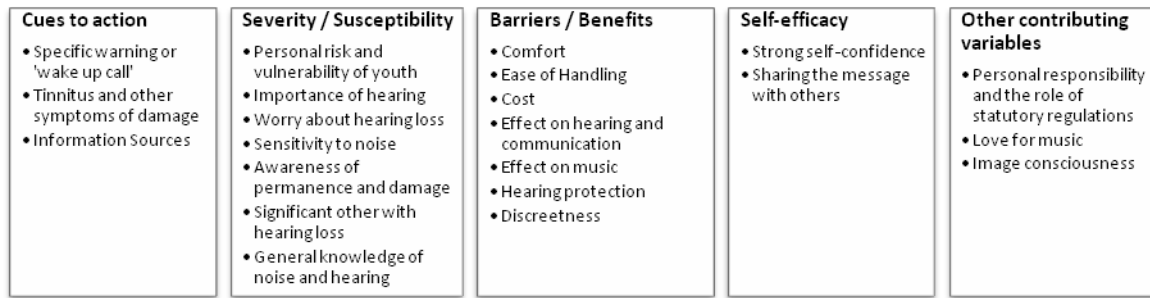


Figure 1: Data categories grouped into five nodes: Cues to action, Severity/susceptibility, Barriers/benefits, Self-efficacy, and Other contributing variables.