Development of health communication aspect in safe listening devices:
narrative review for policy brief

This document contains review of relevant evidence that guides the development of WHO’s policy brief with respect to the safe listening devices. The review has been undertaken by Prof. Sara Rubinelli, Dr Nicola Diviani and Dr Claudia Zanini of University of Lucerne with inputs from WHO.

February 2018
Development of health communication aspect in safe listening devices: narrative review for policy brief

Prepared by:
Prof. Sara Rubinelli, University of Lucerne & Swiss Paraplegic Research
Dr. Nicola Diviani, University of Lucerne & Swiss Paraplegic Research
Dr. Claudia Zanini, University of Lucerne & Swiss Paraplegic Research

Nottwil, 1.2.2018
Table of Contents

1. Introduction .................................................................................................................. 3
   1.1. WHO initiative on ‘Make Listening Safe’ .............................................................. 3
   1.2. Goal of the policy brief ......................................................................................... 3

2. Methods .......................................................................................................................... 4

3. Recommendations ......................................................................................................... 5
   3.1. General recommendations ...................................................................................... 5
       3.1.1 Health Literacy .................................................................................................. 5
       3.1.2 Results from the narrative review ...................................................................... 6
       3.1.3 Results from the survey-based study ................................................................. 7
       3.1.4 Models to target behavior change ...................................................................... 8
   3.2. Specific recommendations ...................................................................................... 11
       3.2.1 Wording and format .......................................................................................... 11
       3.2.2 Framing ............................................................................................................. 13
       3.2.3 Type of appeal .................................................................................................. 14

4. Conclusion ..................................................................................................................... 15

5. References ...................................................................................................................... 16
1. Introduction

1.1. WHO initiative on ‘Make Listening Safe’

WHO estimates that 1.1 billion young people worldwide could be at risk of hearing loss due to unsafe listening practices (http://www.who.int/pbd/deafness/activities/MLS/en/).

The current trend of regularly listening to music at high volume and for long duration poses a serious threat to one’s hearing. Nearly half of all teenagers and young adults (12-35 years old) are exposed to unsafe levels of sound from the use of personal audio devices, and face the possibility of developing irreversible hearing loss over a period of time. Around 40% are exposed to potentially damaging sound levels at clubs, discotheques and bars.

Hearing loss due to loud sounds can be prevented through certain simple practices, such as keeping the volume within safe listening levels and limiting the time spent engaged in noisy activities.

On the occasion of the World Hearing Day on 3 March 2015, WHO launched the initiative ‘Making Listening Safe’ with the overall vision to ensure that people of all ages can enjoy listening with full protection of their hearing. A main target of this initiative are the manufacturers of listening devices. While, in fact, the growth of technology has posed certain threats to hearing, this same technology could be used to raise awareness about risks of unsafe listening and to promote safe listening practices. In this context, WHO in partnership with ITU are working together with experts in the field of audiology, otology, public health, epidemiology, acoustics, sound engineering, representatives of professional organizations, standardization organizations, manufacturers and users to determine suitable exposure limits to be included in the standards for personal audio devices.

1.2. Goal of the policy brief

This policy brief aims at advising manufacturers of listening technologies on how to promote safe listening practices among users/consumers. Specifically, it aims at presenting evidence-based recommendations on how to communicate the risks of
unsafe listening – through the devices' interface, their packaging and manuals, and supporting users/consumers in adopting appropriate behavior in the field.

2. Methods
The recommendations contained in this policy brief are based on findings from health communication science, that is, the field of research that encompasses the study of communication strategies to inform and influence individual and community decisions about health. For the purposes of this policy brief, three are the main areas of health communication that provide evidence on how to communicate risk of unsafe listening to consumers, that is:

1) Health Literacy research provides evidence on the type of knowledge that consumers need to understand risk communication and adopt appropriate behaviors.

2) Persuasion research and, specifically, the theories and models that focuses on the determinants of health behavior. Persuasion research provides evidence on how it is possible to influence consumers' behavior towards appropriate listening practices.

3) Risk communication research focuses on how to disseminate information about risks. It provides evidence on how to design and frame messages on risks targeted to consumers.

Part of the recommendations presented in this policy brief are grounded in three studies conducted in the preparation phase of the Making Listening Safe Initiative. More specifically, the three studies are:

ii) A narrative review on listening habits, conducted by Sara Rubinelli, Claudia Zanini, Julia Amann, Kit Wan Chui, Nicola Diviani (all from University of Lucerne and Swiss Paraplegic Research, Switzerland), See Annex 1.

iii) A survey-based study aimed at examining listening habits, knowledge and preferences among a generic target groups of adults, conducted by Sara Rubinelli, Claudia Zanini, Juliam Amann, Nicola Diviani (all from University of Lucerne and Swiss Paraplegic Research, Switzerland). See Annex 2.

iii) A Review of Background Materials for Development of Health Communications for Promotion of Safe Listening, conducted by Deanna Meinke (University of
Northern Colorado, US) and William Hal Martin (National University of Singapore, SGP), see Annex 3.

3. Recommendations
This section of the policy brief has the main objective of presenting evidence on how to build effective messages on safe listening to be included in the user interface, in the manuals and on the packaging of personal audio devices. To be effective or persuasive, a message should be able to gain attention, build interest, and reduce resistance. In particular, people should get a clear understanding of why they should pay attention, what is their gain, what are the motivations of those delivering the message, and – perhaps most importantly – why taking action matters. Only by addressing all these aspects it will be possible to motivate the intended audiences to take action.

3.1. General recommendations
This section summarizes some general considerations from the field of health literacy and some main findings from the three studies presented above. It aims at providing grounding knowledge on how to design information material for enhancing safe listening and preventing unsafe listening.

3.1.1 Health Literacy
WHO defines health literacy as “the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health” (World Health Organization 1998). Among these skills, health literacy includes the skill to engage in informed health behaviors. To do so, users require information to build their declarative knowledge, namely exact and user-friendly information on:

- What are the risks of unsafe listening
- What is safe/unsafe listening
- What are the standards of safe listening

In addition to this, users need information to build a procedural knowledge (the knowledge of the how), namely exact and user-friendly information on:
• How to listen safely
• How to limit unsafe listening

3.1.2 Results from the narrative review
The review aimed to examine who are the people using personal audio devices, what are their listening habits and their motivations. In addition, it investigated if users are aware of the risks of hearing loss due to unsafe listening practices and what could be effective ways to modify their listening behavior.

For this review of the literature, five scholarly databases were searched in November 2016: PubMed, PsycINFO, Web of Science, JSTOR, and the Cochrane Database of Systematic Reviews. The search string included a combination of terms related to “hearing” and terms related to “portable listening device”. The search yielded 1977 hits. After abstract screening, 57 papers were retained for full-text screening and 29 were included in the present review. For the full study and related references, see Annex 1. Selected studies provide the following recommendations:

<table>
<thead>
<tr>
<th>Narrative review – Recommendations in a nutshell</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gain the users’ attention and build the users’ interest:</strong></td>
</tr>
<tr>
<td>✓ Inform the users that everyone can be concerned, as many of them do not believe to be at risk.</td>
</tr>
<tr>
<td>✓ Show the users how unpleasant the consequences of hearing loss can be, including the likelihood that daily life will be disturbed and that it might be necessary to wear a hearing aid. The combination with evocative imagery using hearing aids may be an effective approach (see also the section about “Wording and format” below).</td>
</tr>
<tr>
<td><strong>Reduce the users’ resistance:</strong></td>
</tr>
<tr>
<td>✓ Include messages that address the users’ doubts about the effectiveness of protective measures to enhance the users’ belief in their benefits (see also the section about the “Health Belief Model” below).</td>
</tr>
</tbody>
</table>
Motivate the users’ action:

✓ Provide scientific evidence on the causes of hearing loss to increase the knowledge and help people make decisions about their hearing habits.

✓ Prefer educational messages, which encourage either limiting listening time or turning down the volume.

✓ Consider including experts as source for the information you provide as users prefer to be advised by medical doctors or audiology experts (see also the section on the “Survey-based study” below).

3.1.3 Results from the survey-based study

The survey was conducted in February 2017 with a sample of N = 1019 MTurk workers aged 18-35 (45.8% female). The aim of the survey was to examine their listening habits, their knowledge of noise-induced hearing loss as well as their preferred channels for receiving information and their readiness to change their listening behavior. More details about the survey methodology and the results are presented in Annex 2.

Survey-based study – Recommendations in a nutshell

✓ Provide information about safe listening and ways to prevent hearing loss through the user interface of the personal audio device as this is welcomed by the users.

✓ Consider reporting information from healthcare professionals or the WHO, as they are considered trustworthy sources of information about safe listening.

✓ Messages should include risk information (e.g., on how likely hearing loss is to occur at a particular listening level) and concrete recommendations (e.g., *Turn volume down to level “X”*).

✓ Messages should vary in tone and punctuation (e.g. friendly, assertive) (see also the sections on “Framing” and “Type of appeal” below).

✓ Include messages stating that safe listening practices are not going to affect the pleasure of their experience or the quality of the sound (see also the section...
about the "Health Belief Model" below).

3.1.4 Models to target behavior change

This section reproduces the main findings from the study by Mainke and Martin in Annex 3.

Proving information to enhance knowledge does not necessarily result in appropriate health behavior. Indeed, there might be a gap between knowledge and behavior, due to reasons including the fact that human beings do not always behave rationally. In the field of persuasion research, there are two main theories that is important to acknowledge in order to facilitate the translation of knowledge into behavior.

The first model is the **Transtheoretical Model of behavior change** (also known as Stages of Change Model) (Prochaska et al., 1994; Prochaska, 1996). It starts from the assumption that intentional behavior change does not happen overnight, but takes time. Depending on their readiness to change, people go through different stages before achieving the desired behavior.

In the context of safe listening, the stages of behavior change may be conceptualized as follows:

1) **Precontemplation Stage**: the users of personal audio devices are unaware that listening at high volumes for extended periods of time may contribute to hearing loss and tinnitus. They do not consider their behavior as problematic and therefore do not think of changing it.

2) **Contemplation Stage**: the users have seen media reports, read their user manual or spoken with others about this risk. They may also have received a warning message on their personal audio device when the volume level reached potentially hazardous levels. They are aware that the volume level and amount of time they listen to their personal audio devices may harm their hearing. In addition, they know that they need to listen at lower volumes or shorten their listening time to ensure healthy hearing. They are considering a behavior change in the near future.
3) Preparation Stage: the users actively takes first steps to implement safe listening behaviors. This may include implementing a maximum volume lock on the audio device.

4) Action Stage: the users initiate the safe-listening behavior by lowering the volume when warning messages appear on the device interface, or by complying with the volume limit advised from the sound level measurements.

5) Maintenance Stage: the users strive to maintain the safe listening behavior over time, but may revert to unhealthy listening levels on occasion.

6) Termination Stage: the users practice the safe listening behavior consistently and do not revert to unhealthy listening behaviors.

Prochaska and colleagues note that not all individuals proceed through the stages sequentially, and that there may be relapses or a return to earlier stages during the process of behavior change. In the context of safe listening practices, the users may revert to earlier stages when new technology or devices are purchased, software is updated or when other influences contribute to relapses (e.g. peers).

---

**Transtheoretical Model of Change – Recommendations in a nutshell**

In designing the information to be included in the device interface, in the user manual and on the packaging of the audio devices, it is important to provide:

- **exact information** on the risks of unsafe listening and the benefits of safe listening, to generate or reinforce awareness for those who are in the pre-contemplation and contemplation stages;
- **clear instructions** on how to engage in safe listening behaviors, so that to provide guidance for those who are in the action stage;
- **motivational messages** to support the users in maintaining the safe listening behavior.
The second model is **Health Belief Model** (HBM) (Rosenstock 1974; Glanz et al. 1997). The HBM postulates that individuals tend to adopt preventive behaviors if they believe that they are at risk for a health condition and that this condition is severe (perceived susceptibility, perceived severity), if they perceive that they will benefit from implementing the preventive behavior (perceived benefits), and if they think that they can successfully perform it (self-efficacy). Sociodemographic characteristics (e.g., level of education, skills) and cues to actions (e.g., advice from a friend) can also influence preventive behaviors.

In the context of safe-listening, the HBM may be conceptualized as follows:

1) Perceived Susceptibility: the users who have a low perceived susceptibility do not recognize that they increase their chance of getting a hearing impairment or tinnitus when listening to music or other audio sources at hazardous sound levels.

2) Perceived Severity: the users who perceive a low severity do not acknowledge the consequences of unsafe listening behaviors in their daily life.

3) Perceived Barriers: the higher the perceived barriers, the lower the chances that users will adopt safe-listening behaviors.

4) Perceived Benefits: if the benefit of “good hearing” is not sufficiently valued, then the sacrifice of lowering volume level and perhaps having less enjoyment will seem too costly to the users and safe-listening behavior will not be implemented.

5) Self-Efficacy: if the users do not believe in their own ability to control listening time or the sound level of the personal audio devices (e.g. by setting their own volume lock themselves), it is unlikely that they will implement the behavior.

6) Cues to Action: the users can be supported in the implementation of the safe listening behavior by cues to actions (e.g., written or audio messages to inform the user that the volume exceed the recommended limit).

---

**Health Belief Model – Recommendations in a nutshell**

The information included in the device interface, in the user manual and in the packaging of the audio devices could:
- **increase the perceived susceptibility** of those users who feel invincible, for instance by proving wrong that young ears are not at risk or that someone can have “tough ears”;
- **make clear the long-term implications** of noise-induced hearing loss and tinnitus, which may not be readily evident in the short-term;
- **provide resources to overcome widespread barriers** that prevent safe listening behavior (e.g. informing the users that the personal audio device has an integrated app to monitor the listening habits and that the activation of this function is very easy);
- **highlight that the benefits** of adopting safe listening behaviors out-weight the costs;
- **provide cues to action** to support the users in the implementation of the safe listening behavior (e.g., a message to know when to lower the volume or when their “daily dose” of sound has reached the limit advised).

### 3.2. Specific recommendations

This section summarizes indications about wording and format (how the information should be written), framing (positive versus negative information), and type of appeal (evidential or emotional) of the messages to be displayed in the user interface, in the user’s manuals, and on the packaging of personal audio devices. Evidence in this field is still scarce. In particular, most studies on the topic have been conducted in specific populations, making their conclusions hardly generalizable to a wider audience. For this reason, this background document will present advantages and disadvantages of the different types of messages that can be used. These will serve as an evidence-base for stakeholders. As the two most prominent methods to customize health messages in health communication research – namely targeting and tailoring – are not applicable to messages for a worldwide audience, we recommend to include different types of messages to make sure to reach everyone.

#### 3.2.1 Wording and format
Research suggests that clear communication practices and removing literacy-related barriers is beneficial for all individuals regardless of their level of health literacy (Meppelink et al., 2015). Below some evidence-based recommendations to improve the understandability of a text:

- **Readability level.** The U.S. Department of Education’s 2003 National Assessment of Adult Literacy shows that 36% of American adults have Basic or Below Basic literacy skills (Kutner et al., 2006). According to the recommendations delivered by the National Institutes of Health and the American Medical Association, texts should be written below the 8th-grade level to ensure that they can be understood by a majority of users. The readability level of a text can be assessed using, for instance the Flesch–Kincaid readability test for English. This test provides a readability score based on the sentence length (number of words per sentence) and the number of syllables per word. Texts with a very high Flesch–Kincaid score (about 100) are very easy to read. They have short sentences and no words of more than two syllables. Similar tests exist for other languages.

- **Plain language.** “Plain language,” also known sometimes as “plain English” helps people understand health information because the writing style is clear, concise, organized, and jargon-free. Documents written in plain language are less complex and therefore easier for everyone to understand, including people who have limited literacy skills, limited health literacy skills, or both. (Office of Disease Prevention and Health Promotion U.S. Department of Health and Human Services, 2000).

- **Presenting numbers.** Natural frequencies are probably better understood than probabilities (Akl et al., 2011).

- **Written and pictorial information.** Complementing written information with illustrations or animation is the best way to communicate complex health information (Meppelink et al., 2015). For instance, a review in the field of tobacco showed that larger warnings with pictures are significantly more effective than smaller, text-only messages in increasing health knowledge and perceptions of risk and in promoting behavior change. Pictorial health warnings that elicit strong emotional reactions are significantly more effective (Hammond, 2011). Below an example of how a complex message can be translated into plain language and complemented by illustrative images:
This is a multipurpose passenger vehicle which will handle and maneuver differently from an ordinary passenger car, in driving conditions which may occur on streets and highways and off road. As with other vehicles of this type, if you make sharp turns or abrupt maneuvers, the vehicle may roll over or may go out of control and crash. You should read driving guidelines and instructions in the Owner's Manual, and WEAR YOUR SEAT BELTS AT ALL TIMES.

- **Packaging.** Warnings on plain white packages may be more effective at getting attention and enhancing recall than warnings on regular packages (Goldberg, 1999; Munafò et al., 2011).

---

**Wording and format – Recommendations in a nutshell**

To increase the chances that the message is understood by all audiences:

- **Prefer plain language** and check readability level of the message.
- **Combine written and pictorial** information.
- **Prefer natural frequencies** to probabilities and percentages to explain risks.
- **Packaging:** consider positioning the warning on a plain background.

---

**3.2.2 Framing**

- There are two ways to frame a health message: attribute framing and goal framing (Akl et al, 2011). Attribute framing is the positive versus negative description of a specific attribute of a single item or a state, for example, "only one out of three people listening to high-volume music every day will not suffer from hearing loss" versus "two out of three people listening to high-volume music every day will suffer from hearing loss". Goal framing is the description of the consequences of performing or not performing an act as a gain versus a loss, for example, "if you reduce the volume, your hearing last longer" versus "if you don't reduce the volume, your hearing will be damaged".
• It is important to note that after several decades of research on message framing, there is still no clear and consistent answer to the question of when emphasizing positive or negative outcomes in a persuasive message will be most effective (Cesario et al. 2013). In two meta-analyses, a slight persuasive advantage for messages that were framed positively for promoting preventive behavior was found. (O'Keefe & Jensen, 2007; Gallagher & Updegraff, 2012). Some evidence exists on the fact that one or the other frame is more effective for specific population groups. In addition, the recipient’s disposition and prior beliefs were shown to shape how they respond to framed information in the majority of studies in which moderator effects were tested (van ’t Riet et al., 2010; van ’t Riet et al., 2008; Covey, 2014). In the specific field of hearing loss, a study conducted among adolescents showed changes in intention to listen at lower volume only when messages were loss-framed (i.e., presenting negative consequences of not listening to music at reduced volume) with consequences in the short-term (de Bruijn et al., 2016).

<table>
<thead>
<tr>
<th>Framing – Recommendations in a nutshell</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Make sure to include a combination of messages with both positive and negative framing to reach all audiences.</td>
</tr>
</tbody>
</table>

3.2.3 Type of appeal

• Health messages can use different appeals. According to Aristotle, there are three primary types of appeals: logos, pathos and ethos. The first two are nowadays the broadest and prevalent appeals.
  ○ Logos, also known as evidential or logical appeals, are based entirely on evidence and explain how a certain outcome is the logical result of a process. This is the type of appeal used in scientific research and in courts of law.
  ○ Pathos, also called emotional appeals, is an appeal to empathy and sensitivity. Their effectiveness does not lie in the words but in the emotions
that they evoke in the audience. It is an attempt to cause the audience to feel certain emotions in order to persuade them.

- Health messages often use emotional appeals, and in particular the appeal to fear. A meta-analysis concluded that fear appeals are effective at positively influencing attitude, intentions, and behaviors; there are very few circumstances under which they are not effective; and there are no identified circumstances under which they backfire and lead to undesirable outcomes. (Tannenbaum et al., 2015).

- It has however to be noted that both emotional and rational appeals can be persuasive, depending from the audience and its predispositions (Rosselli et al., 1995; Pallak et al., 1983) Similarly, results from persuasion research highlight that some recipients are influenced primarily by rational factors and information relevant to the message content while other recipients are influenced by other factors such as source attractiveness, strength of emotional appeals, or how enjoyable the message is. (Petty, Cacioppo 1979)

<table>
<thead>
<tr>
<th>Type of appeal – Recommendations in a nutshell</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Prefer emotional appeals, but include messages with rational appeals to make sure to reach all audiences.</td>
</tr>
</tbody>
</table>

4. Conclusion
This document present different types of evidence that instruct manufacturers of personal audio devices on how to design communication to promote safe listening. Overall, it is very important to consider that users might not have any knowledge in the field and, thus, they have to be convinced both that a problem might exist and how to deal with it. Information given to users/consumers should always be exact and punctual and provide concrete advice at a conceptual and procedural level. In their effort to use these recommendations, manufacturers should consider that their personal audio devices are used all over the world and, thus, they have the
unique opportunity of distributing products that enrich users’ life and, at the same time, contribute to the health of the global audience.

5. References


Covey, J. (2014). The role of dispositional factors in moderating message framing effects. *Health Psychology, 33*(1), 52.


