

Module 3.

How Loud is Too Loud?

Why...

Students need to be able to recognise risky environments in order to protect themselves from hearing damage. This module assists students' ability to judge their exposure and identify when it is high enough to potentially threaten hearing health.

What...

Module Aim: To inform students how to recognise risky noise-exposure environments.

Students will be able to:

- Understand the relationship between volume, time and risk
- Identify noise environments which might pose a risk to their hearing

Lesson Components:

- Defining noise exposure
- Measuring noise exposure

Preparation

- Arrange a variety of objects to be made available for volume measurements. In the days leading up to the module, if possible, encourage students to bring in objects they may wish to measure the volume of (e.g. musical instruments, toys).

How...

1. Defining Noise Exposure

Description:

This is designed as a basic introduction to noise and how it is measured.

This component should be kept short, highlighting the information most relevant to the students involved. It is likely unnecessary to provide too much detail about how decibels are defined or the more complex calculations that accompany some noise exposure measurements.

Procedure:

The dangers of noise exposure can be taught in a similar way to other traditional health messages in schools that related to cumulative exposure– e.g. sun exposure, or healthy eating. Using such examples not only assists students understanding of noise, but also reinforces their knowledge about identifying risk across these other health concerns.

	Sun	Healthy eating	Noise & Hearing
Intensity	UV index e.g. time of day, time of year	High vs low energy e.g. “sometimes” vs “rarely” foods	Volume of noise e.g. quiet to loud
Duration	Time spent in the sun	Amount of different food types eaten	Time spent in noise
Risk rating	Intensity x duration		

Key ideas to include are:

- Sound by itself is not a bad thing – but needs to be enjoyed in moderation and in a safe way.
- As the noise level goes up, the “safe time” decrease.
- Noise can start to be dangerous once it hits 85dB*.
 - A good approximation of 85dB is any noise that forces you to shout to be heard by someone 1m away (this idea is expanded upon in the next component)
 - Noise at 85dB generally is regarded as “safe” for an exposure time of 8 hours (an approx work day).
- The key element to focus on is that even a small increase can have a big effect on the risk posed by the noise source.
 - A table of exposure levels and times can be shown to students as a guide showing how increases of 3dB, halves the acceptable exposure time.

NB: A fuller description of noise, its measurement, and associated units is outlined in the teaching notes for this module.

2. Measuring Noise Exposure

The following activities all aim to provide students with a better understanding of different noise levels and their relative risk to hearing. Ideally, students are given the opportunity to measure day-to-day noise for themselves (Activity A) and contrast the relative risk of different levels through the online interactive game (Activity B). This can be supplemented or replaced by the more low-tech options (Activity C) as appropriate.

Activity A: Measuring noise using a sound level meter

Description:

This activity aims to give students some hands-on experience measuring the sounds in their day-to-day environment using a Sound Level Meter (SLM). Ideally, measurements can be done by students in small groups (either by running other parallel activities at the same time, or accessing multiple SLMs for the session) to allow all students hands-on experience. Alternatively, the activity can be done as a class exercise with a smaller number of single/pairs of students taking turns to measure items in front of the class group.

Procedure:

Start the activity by showing students the SLM, explaining what it is used for, and how to care for it (e.g. Taking care not to damage microphone).

Discuss what sounds may be useful to measure – e.g. objects teacher or students have brought to class, a school bell, stereo. Some schools may also be able to measure external sounds from within the school premises (e.g., traffic noise if next to a busy road or highway)

Get students to measure different noises*, and record their findings.

When measurements are completed, compile a table of results listing items measured in order of volume. Discuss and classify which activities were “quiet” (under 85dB), which were loud (above 85dB) and any that were very dangerous (100dB+)

Depending on the measurements taken, it may be interesting for students to compare their findings to published sound levels online for similar activities.

***Extension:** For louder noises, get students to measure the noise up close, and at different distances (e.g. 1m away, 3 m away) and record their results

Activity B: Dangerous Decibel Interactive How Loud is Too Loud?

Description: This is an online, interactive activity, whereby students can “test” their knowledge of which sounds pose a risk to their hearing. The test begins with 18 “cards” that can be selected and flipped to display a noise source (e.g. blender, washing machine). The student must then decide whether the noise source shown is potentially dangerous or safe. Once a choice is made, further information about the source is revealed including dB level and “safe” exposure time.

Link: www.dangerousdecibels.org/exhibit/virtual-exhibit/

Procedure:

This activity can be done individually or in groups with students at desktop computers, However it lends itself particularly well to use of a smart board or similar as a full class activity.

Suggested procedure:

Explain/remind students that any sound over 85 decibels will potentially damage their hearing if they listen to it for more than 8 hours. You may also wish to include the information that this safe time halves for every 3 decibel increase. (e.g. Write example/table on the board: 88dB = 4 hour, 91dB = 2 hours etc.)

Explain the interactive game to the students by demonstrating the first example on the smart board with the whole class. Select a hexagon on screen and when the item is revealed discuss with the class if it would be “Safe” or “risky”. NB It may help them to consider if they think they could have a conversation with someone 1metre away while next to the object making noise. Choose “yes” or “no” and check the answer.

Presentation ideas:

- Give students opportunities to select the next hexagon themselves, and/or to answer individual items. E.g., Ask a student to estimate how loud they think the object might be and how long they can listen to it for (refer them to the safe noise table as a reference). The remainder of the group indicate whether they think the student is correct or if the sound is louder/quieter before revealing the answer.
- You may wish to divide the class into “teams” and keep score of who has the most correct answers – e.g. table groups, house groups etc.

- As each item is shown, nominate a student to fill out the dB and time information on a card with the name of the object. At the end of the game, ask students to arrange the cards into order of quiet to noisiest.
- After revealing a noisy item, students can be prompted to think how they might protect their hearing if they were around that noise (thinking about when they might come across the object, and what methods might be available/possible in that environment)

Activity C: Hearing Loss Prevention Strategies

Description:

This is an “offline” version of Activity B which can be used as a replacement for or in addition to. Students explore and compare the sound levels of different items using flash cards:

Resource:

Flash cards + description table (to allow classes to make their own)

Procedure:

As for Activity B, students choose a flash card and the item is shown to the class.

Discuss whether students believe the item is a safe or risky noise source. Check decisions by displaying the dB/time information on the reverse of the card.

A list of the flashcard information is also provided in the resource sheet to allow teachers/students to make their own flashcards. Classes may also want to include flashcards depicting items they have measured or objects that are of particular relevance to their own lives.

Optional Extension Activity:

Activity D1 Personal Stereo Player Volumes

Description:

A topic of concern often raised is young people's use of personal stereo players (PSPs - e.g., ipods, mp3 players etc), and their potential to damage young ears (see teaching notes for more information). PSPs have the potential to play music at high volumes, and for extended periods of time. This activity aims to give students important information about the volumes produced by their music players, so they are better able to make decisions to protect their hearing.

Resource:

PSP Use Survey (or similar) can be used in class – or as a take home activity.

Procedure:

Ask students to complete the PSP use survey at home prior to class. Students may record their own listening habits, but it may be more beneficial to also ask them to survey family members/friends.

Collate and compare the listening habits of class members, and those surveyed.

Compare the volumes for quiet and for noisy environments

As a conservative estimate, 75% volume can be considered potentially “risky”. Count the number of people listening at this or higher volumes, and discuss the impact of long-term vs short term listeners.

Using the 60-80% rule* – count the number of people who are listening at 80% volume regularly or who are listening at 60+ % volume for more than 90 mins a day

Activity D2 Measuring PSP outputs

Description:

Students may create and/or use a Jolene type doll or appropriate equipment to measure their Personal Stereo Players

Resources:

This activity requires some technical equipment to build a measurement tool. Information such as that contained in the Dangerous Decibels' "Jolene Cookbook" may assist.

Suggested Procedure:

Ask students to do three measurements.

1. First students play their music as loud as they would normally listen to it, and measure their "normal" volume
2. Then removing the ear bud from their ears, they measure and record the maximum volume of their player
3. Finally, while connected to the measurement tool, students adjust the volume to a level below 85dBs which is a potentially safe listening level, and note the player volume setting that achieves this (e.g. "60% full volume).

Teaching Notes

*Researchers (Fligor, 2009) suggest that PSP should be limited to volume to 80% of the maximum dial setting if the listening time is 90 min or less per day, and to limit volume to no more than 60% of the maximum setting for longer listening times.

Fligor, B. J. (2009b). Risk for noise-induced hearing loss from use of portable media players: A summary of evidence through 2008. *Perspectives on Audiology*, 5, 10–20