

## The risk of personal stereo systems to hearing loss

Personal stereo systems offer a convenient way to listen to music in public without disturbing others. A typical system combines a method of playing music or radio with headphones or earphones. The majority of MP3 players are sold with the earbud style of headphones. Preferred listening levels are higher with this style of headphone compared to the over-the-ear style. Moreover, as the noise level in the environment increases, earbud users are even more susceptible to background noise and consequently increase the level of the music to overcome this. The result is an increased sound pressure level at the eardrum. Sound levels from earbud headphones vary significantly from person to person, because the level depends on how well the buds fit into your ears. Tight-fitting earbuds tend to produce higher sound levels than other commercially available headphones. Scientific studies suggest that personal stereo systems may cause hearing loss if they are not used with a degree of caution.

### Tests

Scientists measure the levels of different sounds with a unit called the A-weighted decibel (dBA). Free-field equivalent sound pressure levels measured at maximum volume control setting ranged from 91dBA to 121dBA. Output levels varied across manufacturers and style of headphone, although generally the smaller the headphone, the higher the sound level for a given volume control setting. These are the results from a [Canadian study](#), which is also supported by those of a [Chinese study](#).

**Sounds with levels below 70dBA pose no known risk of hearing loss**, no matter how long they last. If you listen to music at 70dBA, the sound level is about the same as what you experience when in a four door family car on the motorway with the windows closed.

**For sound levels higher than 70dBA, the duration of daily exposure becomes an important risk factor.** For example, sounds with levels of 85dBA pose no known risk of hearing loss if you are exposed for no longer than 45 minutes a day. However, sound levels of 85dBA or higher can pose a significant risk of permanent hearing loss, if you are exposed for eight hours per day.

### The findings

All combinations of headphones/earphones and MP3 players could generate potentially harmful sound levels. Pop music sound levels ranged from 86-102dBA when researchers used the headphones that came with the MP3 player. When researchers combined MP3s with headphones purchased separately the sound levels reach 114dBA and test results also suggested that this was not necessarily the limit. If you played the pre-packaged systems at maximum volume, it would take from 12 minutes (at 102dBA) to seven hours (at 86dBA) to exceed the occupational noise limit noted above. Furthermore, you would exceed the limit in just one minute if you played heavy metal or pop music at full volume on the combination that produced sound levels at 114dBA. At this sound level, exposure for longer durations can pose a risk of immediate, serious and permanent hearing loss.

Noise Levels	
A quiet room at night	20dBA
An ordinary spoken conversation	60dBA
A busy street	70dBA
A pneumatic drill	100dBA
Personal music players (high volume)	105+dBA
Aircraft taking off	110dBA

### Recommendations

**Limit headphone use to 1 hour or less per day (supra-aural style) at a gain control setting of 60% of maximum.**

### Know the early signs of hearing loss

If you experience the early signs of hearing loss, you should contact your doctor to discuss the need for a test or examination. These early signs include:

- Difficulty when trying to follow a conversation in the midst of background sounds (e.g. at a social gathering or in a café)
- The perception that people around you are mumbling
- Hearing a ringing, buzzing or rushing sound in your ear when nothing is making these sounds (tinnitus)

### References

CBS report: <http://www.cbsnews.com/news/mp3s-may-threaten-hearing-loss/>

Vogel, I *et al* (2007) Young people's exposure to loud music: a summary of the literature *Am Jour Prevent Med* 33/2: 124-133.

Fligor, BJ & Cox, LC (2004) Output levels of commercially available portable compact disc players and the potential risk to hearing *Ear and Hearing* 25/6; 513-527