

HEARING LOSS PREVENTION AND MUSIC

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Introduction:

Of the many causes of permanent hearing loss, the one that is most preventable is noise and music exposure. Although music and noise appear to be quite different; one being a good thing and the other, less good, both have a similar (but not identical) effect on our hearing.

Although recent research have unveiled several parameters that can affect one's hearing status, there are two main factors that contribute to noise or music related hearing loss- the sound level (also known as the intensity) and how long one is exposed to the noise or music. There is nothing wrong with going to a rock concert on Friday night as long as you don't mow your lawn on Saturday morning. In other words, it is the combination of higher sound levels of noise or music, and how long we are exposed to it. Sometimes this is called the noise exposure "dose". If we exceed 100% of the dose often enough, there is the potential for subjecting ourselves to permanent hearing loss.... but not immediately.

Noise and Music hearing loss takes many years to show itself:

In some sense the slow and subtle effects of being exposed to too much noise or music would be easier to observe if our ears began to bleed, or even if there was pain associated with it. Unfortunately (or fortunately depending on your point of view) a damaging level (and dose) of noise or music exposure is not painful and is rarely noticed- its effects are invisible, at least in the short term. The effects may not be noticed for many years.

And to make matters worse, a potentially damaging sound level (measured in decibels or dB) is amazingly quiet. We know from research of large numbers of workers that prolonged exposure to 85 dB or greater will eventually cause some measureable hearing loss. But 85 dB is roughly the sound of a dial tone or flushing the toilet (while your head is leaning over the toilet bowl). Nobody feels that a dial tone is all that loud; yet prolonged exposure of this can cause hearing loss.

The 3 dB "exchange rate":

The relationship between the sound level (dB) and the duration of exposure (in hours) is actually quite straightforward. We know that 85 dB exposure for 40 hours each week is *identical* to the exposure of 88 dB for only 20 hours each week, 91 dB for 10 hours each week, and so on. That is, for each 3 dB increase in the sound level, the damage is doubled, or equivalently you should only be exposed for one half the time. There is nothing wrong with listening to loud music at 91 dB as long as it's not for longer than 10 hours each week. There are some Smartphone apps that can be used to measure your dose- one is called "Sound Log" and another is from the National Institute for Occupational Safety and Health (NIOSH). Both are only available on the iPhone and not Android. The Android platform, for a number of reasons, is less controlled than the iPhone (OS) platform, and as such has a number of limitations.

MP3 players and hearing loss:

The effects of portable music have been studied since the early 1980s with the advent of the Walkman. In the 1990s, we had portable CD players, and since the late 1990s, we have had portable MP3 players. The important word is “portable”. Simply because one uses earphones or earbuds in your ears, this is not the problem. One will always adjust the volume to a comfortable level regardless of whether the loudspeaker is 10 meters away or the earphone is 10 mm away. But with portability comes noisy environments. In the quiet of your home, a comfortable listening level may be volume 3/10, but while walking next to a construction site or listening on noisy public transit, this same comfortable volume may be 6/10 and may be potentially damaging. In both cases the music was the same “loudness” but while listening in a noisier place, the “sound level” was much higher and potentially damaging. As a starting point, the 80/90 rule is a useful tool. One can listen at “80%” volume for “90 minutes” each day. For most earphones, this provides roughly 50% of your final dose of music exposure. If your favourite song comes on, go ahead and turn up the volume; just return it to a quieter volume setting after.

Sound Level and loudness:

The phrase “sound level” and the word “loudness” sound like they may just be synonyms. They are related, but they are quite different. The sound level is measured in dB and is an actual physical measurement of vibrations in air- this is what is related to hearing loss. In contrast, loudness is merely a subjective measurement that allows us to make rough judgements of quiet or loud. There is no such thing as a “loudness meter” and there is a “sound level meter”. In music, rock and roll needs to be loud; but it does not need to be at a high sound level!

Some strategies to minimize the potential for hearing loss:

People are incredibly accurate at ascertaining whether music is sharp or flat. Small pitch differences can be quite noticeable, but alas, we are not as good at judging changes in sound level. Even well-trained musicians can play what they feel to be equally loud musical notes, but they may be at different sound levels. This provides us with an easy strategy to minimize the potential for hearing loss from loud music. If one reduces the sound level by a mere 3 dB, something that may not be readily noticeable, the potential for hearing loss has been cut in half. Saying this differently, we can now be exposed, or listen to music, twice as long as before.

One strategy to reduce the sound level by 3 dB is to turn up the bass setting of the music. Increasing of the bass sound (which provides a slightly better awareness of the music) has no ill effect but the bass-increase can significantly increase the “loudness” but at a lower sound level. The music appears to be sufficiently loud, but at a less damaging sound level.

Another strategy is to use “isolator” earphones. These are earphones that can fit in the ear canal, or even over the ear type earphones that use noise-cancellation. Because these earphone separate you from the environment, one does not turn up the volume on the MP3 player as much. Lower acceptable volumes mean lower sound levels with less potential of long-term hearing loss.

And for people who like to go to concerts and musicians, there is a special type of hearing protection that treats all of the sound of music equally, thereby maintaining the balance and enjoyment of music. Various manufacturers offer this Musicians’ earplug and they have been available since the late 1980s. Musicians’ earplugs offer roughly 15 dB of hearing protection and this is the same protection for the bass notes, the mid-range notes, and the treble notes. Music still sounds like music, but at a safer level.

Based on the “3 dB exchange rate”, a reduction of the sound level of music by 15 dB means that this musician (or listener of music) can now be exposed 32 times as long. Go ahead and enjoy loud music; just at a lower sound level.