



Noise and Its Effects on Children

INFORMATION FOR PARENTS, TEACHERS, AND CHILDCARE PROVIDERS

Children often participate in recreational activities that can harm their hearing.

These activities include attending music concerts and sporting events, fireworks, playing with noisy toys and video games, and listening to personal music players. Because of excessive exposure to noise, an estimated 5 million children suffer from Noise-Induced Hearing Loss (NIHL). In addition, noise exposure can harm a child's physical and psychological health.

This fact sheet offers information on:

- adverse health effects of noise on children
- steps to prevent these harmful effects
- ways to identify whether your child has hearing loss

What Is Noise?

Noise is defined as any unwanted or disagreeable sound and is often dismissed simply as a "nuisance." However, noise can become harmful when it interferes with a child's normal activities, such as sleeping or talking, or disrupts or diminishes a child's health or quality of life.

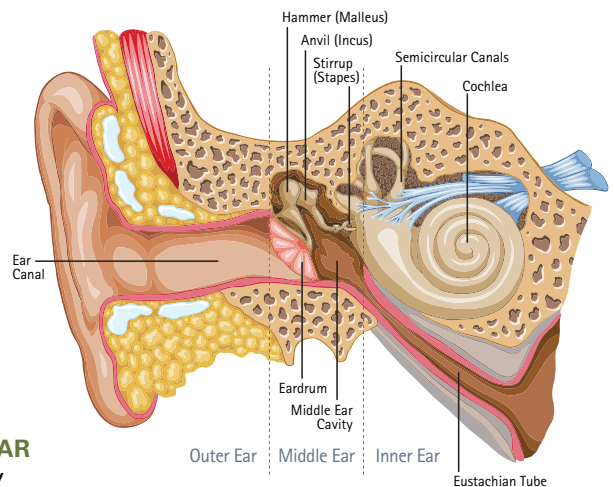
Measurement of Noise

Noise, like all sounds, is measured by the intensity and frequency of the sound waves that hit the ear. The unit used to measure the volume of sound is the decibel (dB). The greater the number of decibels, the louder the noise and the more harmful it is to your ears.

How the Ear Works

The ear is divided into three parts—the outer ear, middle ear, and inner ear—that work together to enable us to hear sound.

- The **OUTER EAR** acts like a funnel to direct sound waves from the air to the eardrum (tympanic membrane).
- Sound causes the eardrum to vibrate, which causes three bones (malleus, incus, and stapes) in the **MIDDLE EAR** to move mechanically.
- The middle ear then sends these mechanical vibrations to the **INNER EAR** (cochlea), where they are picked up by small sensory hair cells and sent as electrical impulses along the auditory nerve to the brain. Noise-Induced Hearing Loss (NIHL) is caused by damage to or loss of those tiny hair cells after prolonged exposure to high levels of noise or sudden high-level (impulse) noise, such as a fireworks explosion.



Adverse Health Effects

Noise can pose a serious threat to a child's physical and psychological health, including learning and behavior. For example, noise can:

INTERFERE WITH SPEECH AND LANGUAGE. Repeated exposure to noise during critical periods of development may affect a child's acquisition of speech, language, and language-related skills, such as reading and listening.

IMPAIR LEARNING. The inability to concentrate in a noisy environment can affect a child's capacity to learn.

IMPAIR HEARING. Tinnitus, often described as a ringing or buzzing sound in the ear, is a symptom associated with many forms of hearing loss.

NIHL is a permanent hearing impairment resulting from prolonged exposure to high levels of noise or by sudden high level (impulse) noise.



DISTURB THE CARDIOVASCULAR SYSTEM. Elevated blood pressure and other cardiovascular ailments can be found in children who are chronically exposed to loud noise.

DISRUPT SLEEP. Noise can awaken a child or disrupt his or her sleep patterns.

Minimizing the Risks

Take the following steps to protect your child from the physical and psychological effects of noise:

- Instruct him or her to walk away from sources of loud noises.
- Limit the amount of time spent on noisy activities.
- Lower the volume.
- Have your child's hearing tested if he/she routinely participates in noisy activities, such as playing an instrument or attending concerts or sporting events.
- Ensure that he or she wears child-sized hearing protection, such as earplugs or earmuffs, during noisy activities and events.
- Create a quiet learning and sleeping environment.

When to Seek Help

Consult an **audiologist** (a person who tests and measures hearing) or an **otolaryngologist** (a doctor who treats diseases and problems of the ear, nose, and throat) if your child experiences any of the following symptoms:

- Asks people to repeat themselves.
- Regularly hears ringing, roaring, or hissing sounds.
- Speaks loudly or raises voice to be understood by someone standing nearby.
- Does not react to unexpected loud noises.



More Information

EPA's Office of Children's Health Protection and Environmental Education is working to protect children from environmental hazards, through risk management and prevention strategies, education, and research. For more information, visit www.epa.gov/children.

For information on noise pollution, visit:

Office of Air and Radiation
www.epa.gov/air/noise.html

Noise Pollution Clearinghouse
www.nonoise.org

Additional Resources

American Speech-Language-Hearing Association www.listentoyourbuds.org

Centers for Disease Control and Prevention www.cdc.gov/healthyyouth/noise/index.htm

National Hearing Conservation Association www.hearingconservation.org

National Institute for Occupational Safety and Health www.cdc.gov/niosh/topics/noise

National Institute on Deafness and Other Communication Disorders
www.noisyplanet.nidcd.nih.gov

References

Children & Noise, League for the Hard of Hearing, www.lhh.org/noise/children/index.html

Efforts Aim to Curb Number of Kids Who Suffer From Noise-Induced Hearing Loss, American Academy of Audiology, January 16, 2008, www.audiology.org/news/pr/Pages/pr20080116.aspx

Noise Effects Handbook: A Desk Reference to Health and Welfare Effects of Noise, U.S. EPA, Office of Noise Abatement and Control, July 1981, www.nonoise.org/library/handbook/handbook.htm

Bronzafn, A. The Effect of a Noise Abatement Program on Reading Ability, *Journal of Environmental Psychology*, 1981.

Dangerous Decibels®, Types of Hearing Loss, www.dangerousdecibels.org/hearingloss.cfm

Evans, G, Hygge, S, and Bullinger, M. Chronic Noise and Psychological Stress, *Psychological Science*, 2006.

Griefahn B, Spreng M. Disturbed sleep patterns and limitation of noise, *Noise Health*, 2004;6:27-33.

Noisy Toys Can Be Dangerous Too, December 10, 2007, www.consumeraffairs.com/news04/2007/12/noisy_toys.html

Recommendations for a Noise Standard, www.cdc.gov/niosh/docs/98-126/chap1.htm

Listen Up

Noise Induced Hearing Loss (NIHL) is preventable.

Some toys (talking dolls, musical instruments, etc.) can emit sound that can be hazardous to children.

Personal music players (iPod, MP3, etc.) should be played at low levels. If you can hear your child's music, that might mean it's too loud. Turn down the volume.

Sound Thermometer

(Courtesy of Dangerous Decibels)

The noise levels (in decibels) on the thermometer are approximate as measured at a typical listener's distance. Use this sound thermometer to judge your or your child's noise exposure. Noise levels at 85 dB or above can be harmful to your hearing and require protection.

