

Are White Noise Machines Bad? Here's What the Latest Science Says

Analysis by [Dr. Joseph Mercola](#)

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STORY AT-A-GLANCE

- › White noise machines, often used as sleep aids, may produce dangerously loud noise exceeding safety guidelines. Research shows potential risks to auditory and cognitive development in children when used at high volumes
- › Studies suggest limited evidence for white noise improving sleep quality. While it may help in specific settings like NICUs, the risks may outweigh benefits in typical home environments for children
- › Noise pollution, including from white noise machines, can cause hearing loss, sleep disturbances, stress, and cardiovascular issues. It's estimated that 10 million Americans have permanent hearing loss due to noise-related trauma
- › A study in New Jersey linked 1 in 20 heart attacks to transportation noise. High noise levels may trigger chronic stress and sleep disturbances, affecting cardiovascular health through stress hormone production
- › To use white noise safely, keep volume low (60 decibels or less), place machines 7 feet away from sleeping areas, and consider gradually weaning off. Use decibel meters to monitor sound levels

White noise is a constant, uniform sound that combines all audible frequencies simultaneously. A fan running, steady rainfall, television static or the sound of a white noise machine are all examples of this type of sound.

Many people embrace white noise as a sleep aid to mask disruptive sounds, helping them fall asleep and stay asleep longer, particularly for infants and children. But while some research suggests white noise improves sleep quality,¹ there are potential downsides to be aware of.

White Noise Machines Could Damage Hearing and Cognitive Development in Children

Many white noise machines may play dangerously loud noise, according to research published in the journal *Sleep Medicine*.² While they're often used as sleep aids for infants and young children, the maximum volume is unregulated and reaches levels that pose risks to auditory and cognitive development.

The National Institute for Occupational Safety and Health (NIOSH) recommends an exposure limit of 85 decibels over an eight-hour day and 82 decibels over a 16-hour day.³ Lawn mowers, vacuums and power tools are examples of machines that produce noise at about 85 to 90 decibels.

In a review of 20 studies, however, researchers revealed that white noise machines at maximum volume may be higher than 91 decibels (dB), which exceeds NIOSH safety guidelines for a two-hour work shift in adults. Further, all 24 white noise machines and six phone apps evaluated could produce noise at levels that exceeded NIOSH guidelines for an eight-hour shift.

“Most parents probably aren't setting the machines at the loudest setting,” study authors Dr. Isaac Erbele and Dr. Russell De Jong wrote in *The Washington Post*. “But this finding means that during a typical night's sleep, a white noise machine at maximum volume exposes children to noise that can cause permanent hearing loss.”⁴

Research also found continuous exposure to moderate-intensity white noise had adverse effects on early development in animal studies, which suggests humans may be similarly affected. While some studies also suggest low-intensity noise exposure may

be beneficial during sleep, the researchers concluded, “Caregivers should avoid exposing their children to loud or extended white noise.” They added:

“Apps are potentially the most dangerous as these are governed by the maximum output of the cellular phone hardware, which can reach levels around 100 dB. These standards are set for adults but are used here as a surrogate marker for dangerous noise levels for children and infants as there are no comparable scales dedicated to this age group.

Moreover, as these devices are commonly used in younger children who have extended sleep duration (i.e., 10+ hours), the potential negative developmental effect of long-term noise exposure may be magnified.”

Do White Noise Machines Cause More Harm Than Good?

Another study – a systematic review published in Sleep Medicine Reviews – also found that the use of noise as a sleep aid may be overrated, and potentially dangerous. The review found only very low quality evidence that continuous noise improved sleep:⁵

“Conventional wisdom contends that continuous noise, such as so-called ‘white noise machines,’ may improve sleep. After systematically reviewing published scientific literature, we conclude that the quality of evidence supporting this assertion is very low.

Continuous noise tended to reduce sleep onset latency [the time it takes you to fall asleep] and sleep fragmentation [sleep interruptions during the night]; however, the effects were either not significant or not statistically analyzed.”

Among preterm infants in a neonatal intensive care unit, other research suggested white noise reduced pain level, heart rate and respiratory rate and promoted weight gain in the infants, providing “a practical and potentially useful therapy.”⁶ This may be a unique case in which white noise makes sense, as it helped reduce pain levels, which are regarded as the No. 1 risk factor for long-term neurodevelopment in preterm infants.⁷

Outside of a noisy hospital environment, in a typical home bedroom, however, the risks may outweigh the benefits. Even low-frequency noise exposure, which includes the hum of an air conditioner, bass sounds in music and thunder, may negatively affect higher-order cognitive functions, such as logical reasoning, mathematical calculation and data processing.⁸

In terms of exposing infants and children to white noise for hours every night, neuroscientist Dr. Edward Chang explained:⁹

“I think that there is a cost, you know, to think a little bit about. We’re not exposed to continuous white noise naturally ... There is a value to having really salient, structured sounds that are part of our natural environment to actually have the brain develop normally. So, whether or not that has an impact while you’re sleeping, it’s not clear. I don’t think that those studies have been done.”

The Health Risks of Noise Pollution Are Well-Established

Noise pollution is the presence of excessive or unwanted sound that disrupts the environment and negatively impacts human health and quality of life. This often-overlooked form of environmental pollution comes from various sources, including traffic, industrial machinery, construction work, loud music and even home appliances. Its effects on health can be significant, ranging from hearing loss and sleep disturbances to increased stress, anxiety and cardiovascular issues.

It’s estimated that 10 million Americans have permanent hearing loss due to noise pollution or noise-related trauma.¹⁰ Beyond human health, noise pollution also disrupts wildlife behavior and ecosystems, affecting animal communication, behavior and reproduction.¹¹

Exposure to loud noise, including noise pollution, also contributes to hearing loss over time. A PLOS Biology team explained that a lifetime of loud noise exposure exacerbates and may trigger age-related hearing loss. “The high level of noise exposure in modern

society makes presbycusis [age-related hearing loss] a mixture of acquired auditory stress, trauma, and otological disease superimposed upon an intrinsic aging process.”¹²

Unsafe listening practices in young people using personal listening devices (earbuds) and attending loud venues also increase their risk of hearing loss, which one study estimates may affect more than 1 billion 12- to 34-year-olds worldwide.¹³

Noise May Be Responsible for 1 in 20 Heart Attacks in New Jersey

Living near a busy highway or airport isn't just annoying, it may also put your heart health at risk due to the high levels of noise. A study presented at the American College of Cardiology's 71st Annual Scientific Session, in fact, attributed **1 in 20 heart attacks** in New Jersey to noise from nearby highways, trains and air traffic.¹⁴

The study divided patients hospitalized for a heart attack into two groups – one experiencing high levels of transportation noise, defined as an average of 65 dB over a day, and one experiencing low levels of less than 50 dB daily. Results showed that 5% of heart attack hospitalizations were due to elevated levels of noise, and the heart attack rate was 72% higher in areas with high transportation noise.

While it's possible some of the increased risk is due to increased levels of air pollution in the region, as “air pollution and noise go hand-in-hand,” the study authors suggested noise may trigger chronic stress and sleep disturbances that affect cardiovascular health.¹⁵ Research published in *Circulation Research* also highlights that your cognitive response to noise pollution can influence your endocrine balance by triggering an overproduction of stress hormones.¹⁶

“The noise-induced activation of the hypothalamic-pituitary-adrenal axis and the sympathetic nervous system triggers the release of stress hormones such as cortisol and catecholamines,” the researchers explained.¹⁷ Chronic stress also **promotes cortisol release**, which is a potent suppressor of mitochondrial function and biogenesis.

If You Use White Noise, Do This to Make It Safer

For those who choose to use white noise at night, be sure to keep the volume low – avoid turning it up to its maximum level. According to the Sleep Medicine researchers:¹⁸

“White noise within reasonable limits may help children – and parents – sleep without causing harm. We found studies showing that white noise applied at 60 decibels or less – about the volume of a quiet conversation – showed a decrease in night-time waking, increased sleep time, and increased sleep efficiency (time spent asleep while in bed).”

You can use a decibel meter or sound level app to check the sound level of your white noise machine to be sure it’s not at an unsafe volume. Turn the white noise machine on and place the decibel meter where you or your child sleep to get an accurate reading. Generally, the noise machine should be at least 7 feet away from where you’re sleeping.¹⁹

If you want to ween yourself or your child off the noise machine entirely, do so gradually by lowering the volume until you no longer need it.²⁰

Tips to Protect Your Health From Noise Pollution

Prolonged exposure to high noise levels can have cumulative effects on your health, so it's important to be proactive in protecting yourself. If you're concerned about noise levels in your area, consider discussing the issue with local authorities or joining community initiatives to address noise pollution. In the meantime, to protect your health from noise pollution, you can take several practical steps:

Practice safe listening habits by lowering the volume of your personal audio devices.

Download a decibel meter app on your smartphone to receive warnings if the volume reaches hazardous levels.

Wear earplugs in noisy environments, and always wear ear protection if you work around loud noises.

Use carefully fitted noise-canceling earphones/headphones, which allow you to listen comfortably to sounds at a lower volume. Choose wired options, as wireless earbuds can expose you to electromagnetic fields (EMF).

Limit the amount of time you spend engaging in noisy activities, like attending concerts or sports events.

Take regular listening breaks from using personal audio devices to give your ears a rest.

Restrict daily usage of personal audio devices to under one hour to minimize prolonged exposure.

Consider moving if you live in a noisy area. If that's not feasible, consider noise-proofing your home by adding acoustical tile to your ceiling and walls. Installing double-paneled windows, insulation, heavy curtains and rugs can also help reduce noise volume. You can also plant trees or install fences around your property to act as sound barriers.

Use sound-blocking headphones to eliminate occasional sound disturbances like those from traffic or lawnmowers. Wear ear protection when using your lawnmower or leaf blower.

Consider the noise level when purchasing new appliances or tools, and maintain your appliances to reduce unnecessary noise.

Sources and References

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