

Researchers weigh in on the negative consequences of noise on overall health

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The combined toll of occupational, recreational and environmental noise exposure poses a serious public health threat going far beyond hearing damage, according to an international team of researchers writing today in *The Lancet*. The review team, including a Perelman School of Medicine at the University of Pennsylvania expert, examined the latest research on noise's impact on an array of health indicators—hearing loss, cardiovascular disease, cognitive performance and mental health, and sleep disturbance—in order to inform the medical community and lay public about the burden of both auditory and non-auditory effects of noise.

"In our 24/7 society, noise is pervasive and the availability of quiet places is decreasing. We need to better understand how this constant exposure to noise is impacting our overall health," said Mathias Basner, MD, PhD, MSc, assistant professor of Sleep and Chronobiology, Department of Psychiatry at Penn, and lead author of the new review. "From earbuds blasting music during subway commutes to the constant drone of traffic heard by those who live or work near congested highways to the beeping of monitors that makes up the soundtrack heard by hospital patients and staff, what we hear all day impacts many parts of our bodies."

Occupational noise and its negative impact on hearing has been the most frequently studied type of noise exposure. But in recent years, research has broadened to focus on social noise, such as noise heard in bars or through personal music players, and [environmental noise](#) from road, rail,

and air traffic. "Our understanding of how different types of noise impact aspects of health other than hearing loss, including sleep, cardiovascular function, community annoyance, and even a patient's ability to heal in a hospital environment, is continuously increasing," Basner said.

With both noise-related hearing issues (auditory) and broader deleterious effects of noise on physical and mental wellbeing (non-auditory) in mind, the research team – consisting of members from the International Commission on Biological Effects of Noise (ICBEN), a global panel of experts in various areas of noise and [public health](#) – convened to summarize current findings related to noise exposure and overall health. The team concentrated on studies published during the past five years in the fields of otolaryngology, cardiovascular medicine, sleep medicine, psychology, and hospital medicine to best determine the state of current evidence of noise's impact on health.

In general, the medical community knows that high noise levels can cause hearing loss, as noise-induced hearing loss is the most common occupational disease in the United States. "Approximately 22 million U.S. workers are exposed to hazardous noise levels at work, and, annually, an estimated \$242 million is spent on compensation for hearing loss disability," said Basner. Preventive and therapeutic compounds to treat noise-related hearing loss are being developed and will probably be available within the next 10 years, but the authors stress that additional educational efforts need to be planned in order to prevent the aging population from unnecessary [hearing loss](#).

Relating to non-auditory effects, the authors conclude that because of the ubiquitous exposure of environmental and social noise, its public health effect is easily underestimated. According to the World Health Organization (WHO), more than one million disability adjusted life years are lost in western European member states alone due to

environmental noise exposure, most of these caused by sleep disturbance and community annoyance.

Accordingly, the authors found evidence that long-term exposure to environmental noise affects the cardiovascular system, with connections to hypertension, ischemic heart diseases, and stroke. In addition, numerous studies pointed to associations between environmental noise exposure and sleep disturbance, children's cognition, and negative effects in hospitals for both patients and staff.

The authors note that for auditory effects, there is still debate about what [noise levels](#) are considered safe, and that prospective studies with adequate control groups could help shed additional light on the discussion. For the non-auditory effects, Basner says large-scale prospective epidemiological studies, dedicated primarily to the health effects of noise, are needed to strengthen the link between acute and long-term environmental and social noise exposure and the various health outcomes, especially cardiovascular disease.

The authors hope that their review will increase awareness about the manifold negative health consequences of noise, and stimulate educational campaigns for children and adults that will promote both noise-avoiding and noise reducing behaviors, and thus, mitigate negative health consequences. "Efforts to reduce noise exposure will eventually be rewarded by lower amounts of annoyance, improved learning environments for children, improved sleep, lower incidence of [cardiovascular disease](#), and, in the case of [noise exposure](#) in hospitals, improved patient outcomes and shorter hospital stays," they conclude.

Basner and colleagues at Penn have just been awarded federal funding through the Federal Aviation Administration (FAA) to study the impact of [aircraft noise](#) on sleep and work on developing models that predict sleep disruption for different aircraft [noise](#) levels and profiles.

Provided by University of Pennsylvania School of Medicine

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