

Unheard, Unfelt? Researchers Find No Evidence of Effects from Wind Turbine Infrasound

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Wind power—the second most common form of renewable energy in 2021, after hydroelectricity¹—may also generate annoyance and stress for those who live near wind projects.^{2,3} Besides the characteristic whooshing sound of the blades, wind turbines also emit infrasound—below 20 Hz—which humans are often unable to hear.⁴ Some people claim even inaudible infrasound poses a risk of sleep disturbances, dizziness, and other symptoms in what is known as wind turbine syndrome (WTS).⁵ However, a 2015 review concluded that the evidence linking wind turbine infrasound with health problems was insufficient to draw definitive conclusions and called for more research.⁶ Now, an experimental study recently published in *Environmental Health Perspectives* assessed exposure to simulated wind turbine infrasound and measures of sleep quality and other health end points.⁷

The researchers enrolled 37 adults—19 males and 18 females—who spent three 72-hour periods in sleep laboratories modeled after studio apartments. During each exposure period, participants experienced one of three different types of auditory

stimuli in random order: simulated wind turbine infrasound; recorded traffic noises that peaked in volume between 4:00 a.m. and 7:00 a.m. (when deep sleep is most likely to occur, according to Marshall); and a sham infrasound exposure. Traffic noise ensured that the study participants “were not the sort of people who will sleep through anything and be immune to infrasound’s hypothesized effects,” Marshall explains. Participants returned home for 10 days between each exposure period.

The infrasound levels used in the study, which ranged between 1.6 and 20 Hz, were “inaudible to any human tested, including all our staff and investigators,” says first author Nathaniel Marshall, an epidemiologist at the Woolcock Institute for Medical Research in Sydney, Australia. Although speakers were visible in each test room, neither the investigators nor study participants were aware of when they emitted real or sham infrasound.

The investigators were interested in whether infrasound would disrupt a parameter called wake after sleep onset (WASO), which is the amount of time a person spends awake after initially going to



The new study reported no effects from simulated infrasound exposure on sleep or dozens of other psychological, behavioral, and physiological end points evaluated by the research team. Image © Sue Ogrocki/AP Photo.

sleep and before they are supposed to rise. WASO was assessed using sensors that measured brain activity as well as muscle activity of the eyes and chin, which indicates a person's stage of sleep.⁸ The team assessed dozens of psychological, neurobehavioral, and physiological end points as well, including working memory, drowsiness, cardiovascular markers, and self-reported experience of headaches, blurred vision, nausea, anxiety, difficulty concentrating, and more.

According to study results, WASO was increased by traffic noise, reducing sleep by an average of just over 6 minutes compared with sham infrasound. However, there was no significant difference in WASO during either the sham or real infrasound exposures. Similarly, the investigators found no detectable effect from infrasound on any of the other nonsleep parameters. "We couldn't find any sign of any effects which would be consistent with infrasound causing the hypothesized wind turbine syndrome," Marshall says.

Michael Gerard Smith, a researcher who specializes in environmental stressors and sleep at the University of Gothenburg, Sweden, who was not involved in the study, believes Marshall's conclusions are backed by the findings. The laboratory study provides strong evidence that infrasound is not important, at least regarding sleep, he says, adding that the investigatory approach "was absolutely reasonable." If the study had been conducted in the field, around turbines, he says, "then any findings would have been confounded by possible audible noises."

Smith adds that "chronic exposures, including noise, may lead to effects in the long term that aren't captured with short-term studies like this one." But whether infrasound will sensitize people in the long run is difficult to say, he says: "In the case of chronic exposures, other factors are at play, such as the audible part of the sound and changes in lifestyle or health."

His point is echoed by Irene van Kamp, a senior researcher at the Dutch National Institute for Public Health and the Environment, in Utrecht, the Netherlands. She specializes in noise and health—

including the effects of wind turbine sound—and was also not involved in the study. "Future research should evaluate self-reported environmental sensitivity to wind farms because from a care and prevention point of view, once people think they are exposed to some invisible hazard they suffer accordingly," says van Kamp, who also emphasizes that WTS is not an acknowledged medical syndrome and that Marshall's conclusions are justified based on the evidence provided. "This is a well-designed study with an impressive level of detail," she says.

Charles W. Schmidt, MS, is an award-winning journalist in Portland, ME, whose work has appeared in *Scientific American*, *Nature*, *Science*, *Discover Magazine*, *Undark*, *The Washington Post*, and many other publications.

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