Study shows human ear impacted by low frequency noises

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The Shepherds Flat Wind Farm is an 845 MW wind farm in the U.S. state of Oregon. Credit: Steve Wilson / Wikipedia.

(Medical Xpress)—A new study by a team of researchers in Germany has resulted in findings that suggest the human ear is more impacted by low frequency sounds than has been previously thought. In their paper published in the journal *Royal Society Open Science* the team describes acoustic experiments they conducted with volunteers and what they

found in doing so.

Humans can hear sounds in the range 20 and 20,000 Hz—sounds above and below that range enter the ear but cannot be heard. In recent years some people, inside and outside the science community, have begun to wonder if sounds that fall below that range might be having an impact on us that we don't know about. Some have suggested, for example, that low noises emitted by wind-farms cause a wide variety of problems from sleeplessness to headaches. Others have suggested jet engines, office equipment or air-conditioning units might be causing problems. To learn more about low range noise impacts, the researchers enlisted the assistance of 21 normal hearing volunteers, both male and female and between the ages 18 and 28, Each was exposed to a low frequency sound for 90 seconds and were then tested for what impact it caused to their ears.

Testing was done by using a sensitive microphone that picks up sounds (known as spontaneous otoacoustic emissions or SOAEs) that actually emanate from the ear—a normal byproduct of inner ear mechanics. Normally SOAEs are quite stable over a short period of time. With the volunteers, however, the researchers found the SOAEs began to oscillate after the low frequency exposure, between stronger and weaker emissions until eventually subsiding after about 3 minutes. These findings are troubling because prior research has shown that changes to SOAEs can be tied to hearing damage and they disappear completely when hearing is lost altogether.

The researchers acknowledge that their findings don't prove that low frequency sounds cause permanent hearing loss or offer any hint of what long term exposure might mean for hearing or health in general, but they do note that what they've found does offer some evidence that we might be causing damage to ourselves without even knowing it.

More information: Low-Frequency Sound Affects Active Micromechanics in the Human Inner Ear, *Royal Society Open Science*, 2014. dx.doi.org/10.1098/rsos.140166