

# Annoyance

## A Clinical Misnomer ?

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### What does the term annoyance mean to you?

Is annoyance a minor irritant or a potential threat to one's health and welfare?

"Annoyance" has been the term used to describe the community's collective feelings about noise ever since the early noise surveys in the 1950s and 1960s, although some have suggested that this term tends to minimize the impact. While "aversion" or "distress" might be more appropriate descriptors, their use would make comparisons to previous research difficult. It should be clear, however, that annoyance can connote more than a slight irritation; it can mean a significant degradation in the quality of life." [Suter 1991]

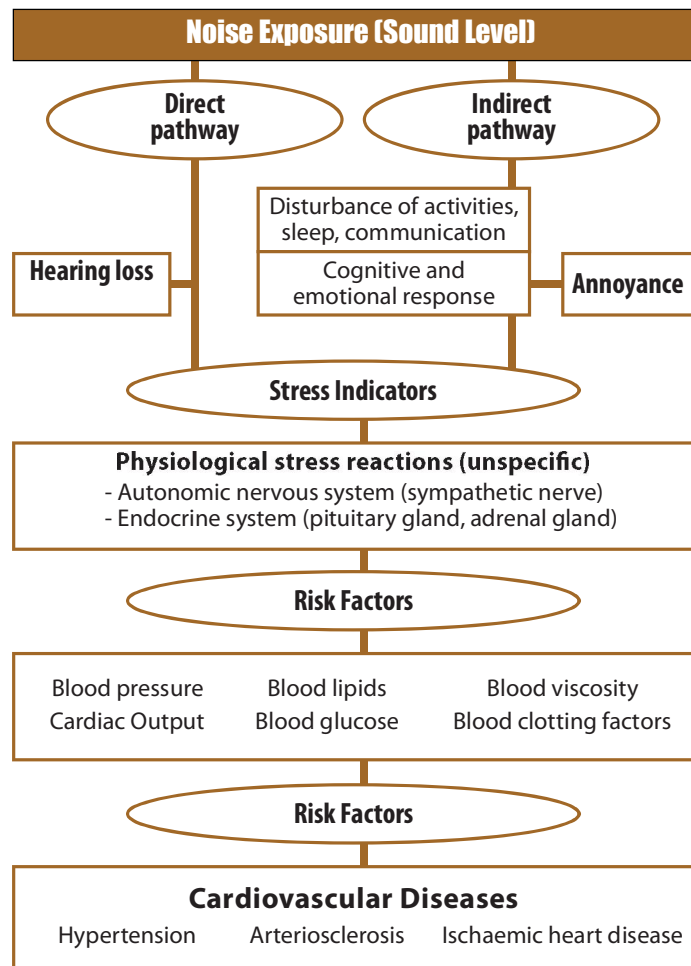
The US Environmental Protection Agency states "...annoyance" can have major consequences, primarily to one's overall health." [http://www.epa.gov/air/noise.html]

The World Organization acknowledges noise induced annoyance to be an adverse health effect. [WHO 1999]

"It is common knowledge that noise is a psycho-social stressor that can affect physiological functioning." [Babisch 2003]

### A Causal Link to Increased Morbidity

"The results of the LARES study -with regard to criteria for causal relations confirmed, on an epidemiological level, an increased health risk from chronic noise annoyance. It has to be assumed that chronic noise annoyance is not only connected with a risk for cardiovascular symptoms, but also with risks for respiratory symptoms like bronchitis as well as arthritis and migraine. With this background, it is urgent that noise in residential areas is reduced to an acceptable level." [Niemann H et.al. 2006]



[Babisch, 2002]

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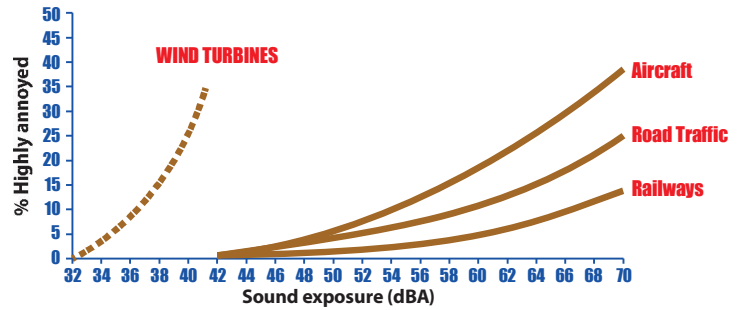
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### Wind Turbine Induced Annoyance, Stress and Sleep Disturbance

Wind turbine noise can cause annoyance, stress and sleep disturbance which may have other consequences. [Colby et al., 2009]

"The sound level associated with wind turbines at common residential setbacks ... may lead to annoyance and sleep disturbance.... Annoyance and sleep disruption are common when sound levels are 30 to 45 dBA." [Rideout et al. 2010]

"Wind turbine noise was more annoying than transportation noise or industrial noise at comparable levels..." [Pedersen et al. 2009]



Sound exposure is for wind turbines calculated A-weighted  $L_{eq}$  for a hypothetical time period and for transportation DNL

[Pedersen, Wayne. 2004]

### Low Frequency Noise Induced Annoyance

Low frequency noise can cause "...immense suffering to those who are unfortunate to be sensitive to low frequency noise and who plead for recognition of their circumstances." [Leventhall et al. 2003]

"Regulatory authorities must accept that annoyance by low frequency noise presents a real problem..." [Leventhall et al. 2004]

"...LFN (low frequency noise) does not need to be considered "loud" for it to cause such forms of annoyance and irritation." [DeGagne et al., 2008]

"...non-aural physiological and psychological effects may be caused by levels of low frequency noise below the individual hearing threshold." [Schust M 2004]

Wind turbines can cause low frequency noise induced annoyance. [Colby et al. 2009], [Chief Medical Officer of Health of Ontario 2010], [Moller 2010]

"The study does acknowledge that wind turbines can be annoying, the sound of wind turbines can be annoying for some individuals and that may cause them to feel some stress etcetera ..."

[Robert Hornung, President Canadian Wind Energy Association BNN Business News Network, March 4, 2010]

etcetera Explained

"The symptoms of... Wind Turbine Syndrome... sleep disturbance, headache, tinnitus, ear pressure, dizziness, vertigo, nausea, visual blurring, tachycardia, irritability, problems with concentration and memory, and panic attack episodes associated with sensations of internal pulsation or quivering when awake or asleep... I am happy to accept these symptoms, as they have been known to me for many years as the symptoms of extreme psychological stress from environmental noise, particularly low frequency noise." [Leventhall 2009]

## Conclusion: Research = Prevention = Protection of Health and Welfare

Special Noise Characteristics Acknowledged to Induce Annoyance *	Which Special Noise Characteristics Do Modern Industrial Wind Turbines Produce? **
Modulated	✓
Low Frequency Noise/Infrasound	✓
Impulse Noise	✓
Tonal Noise	✓
Industrial Noise	✓
Night time Noise	✓

\* Sources: [WHO 1999], [WHO 2009], [Health Council of the Netherlands 2004]

\*\* Sources: [National Research Council 2007], [Rogers 2002, Appended 2007], [Pedersen 2009]

"The need for guidelines for maximum exposure to wind turbine noise is urgent... No generalized dose-response curves have yet been modeled for wind turbines, primarily due to the lack of results of published field studies". [Pederson 2009]

"...practical action to limit and control the exposure to environmental noise are essential. Such action must be based upon proper scientific evaluation of available data on effects, and particularly dose-response relationships." [WHO 1999]