NORAH
Lärmwirkungsstudie

Source comparison:

the loudest noise does not cause the most annoyance

Not all traffic noise is the same: busy roads tend to generate a constant hum of traffic, while it can be perfectly silent in the intervals between two trains or planes. But the noise of trains and planes also differs – for example because the noise of a passing train increases more quickly than the noise of a passing aircraft. In order to find out to what extent people feel annoyed by the three modes of transport – car, train and plane –the NORAH team carried out a survey in 2012 on 7,113 persons in the Rhine-Main region who had not participated in the other surveys. All of the study participants stated on a scale of 1 to 5 how severely they were disturbed by road, rail and air traffic noise in their homes.

The NORAH acoustics experts also calculated how much noise from which noise source could be heard at the specific addresses of all participants. The scientists then put these values in relation to the answers of the respondents.

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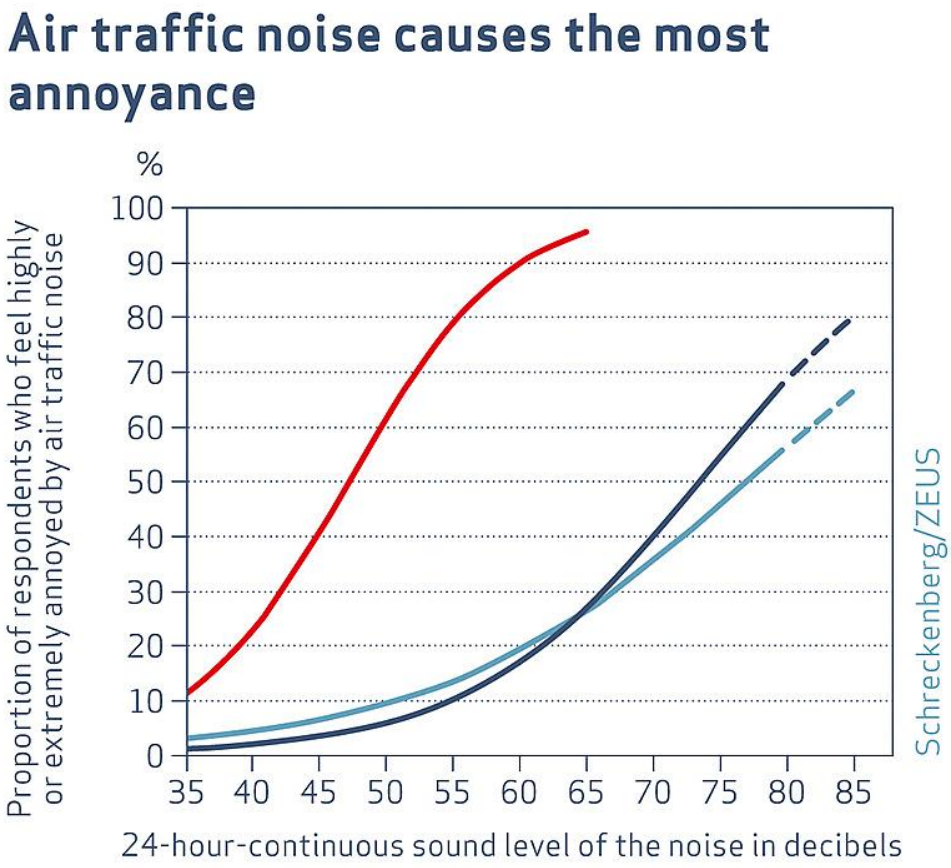

Considerably more people felt "highly annoyed" by air traffic noise (red) than by similarly loud rail (dark blue) or road traffic (light blue) noise. Air traffic noise-continuous sound level exceeds the noise of other modes of transport by at least 2.5 decibels.

The NORAH team found out that the respondents reacted differently in particular to air traffic noise than to rail and road traffic noise: even at very high continuous sound levels between 70 and 80 decibels the average annoyance for road and rail noise rose only slightly above the scale value 3 ("moderately annoyed"). In the case of air traffic noise, however, the average annoyance level rose to 4 as of around just 55 decibels – this means that the respondents felt on average "highly annoyed".

Combined noise: when more than one kind of noise can be heard

What happens when aircraft, road, and rail noise affect us not individually, but simultaneously? And what role does aircraft noise play when multiple sources of noise converge? The NORAH study shows that aircraft noise has a particularly strong impact on annoyance, and simple noise level calculations can significantly underestimate the actual burden from combined noise.

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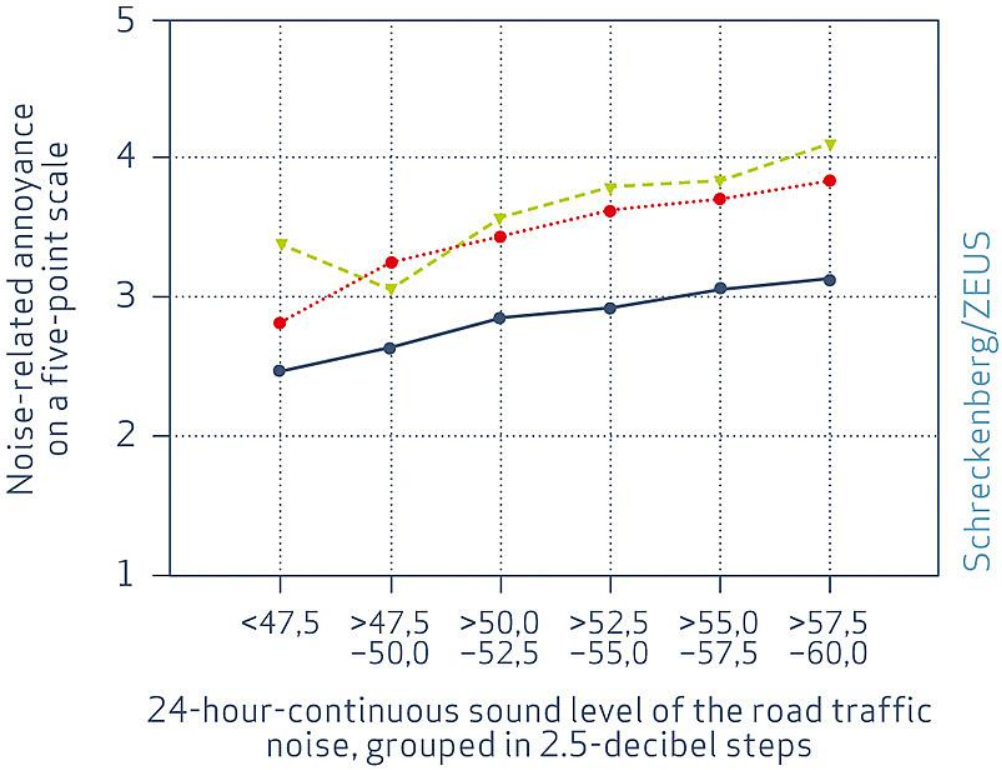
Air and road traffic noise combined



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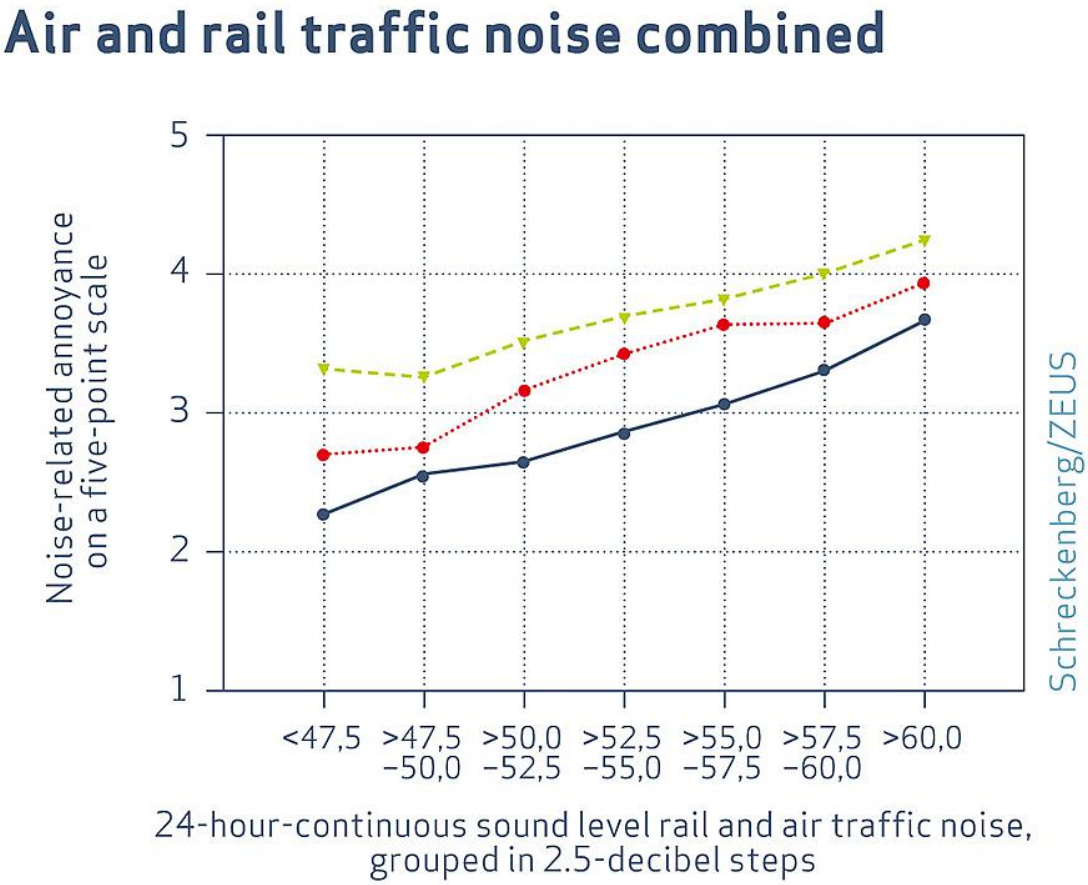

When two traffic noise types were combined, the degree of annoyance differed: for example, the combined noise of aircraft and trains caused more annoyance, regardless of the measureable sound level, when the air traffic noise was dominant.

Noise impact research spent a lot of time trying to find out how individual noise types – e.g. car or air traffic noise – affect people. The NORAH Study goes a step further and attempts to investigate the real noise situation on site: in real life we are exposed to several different traffic noise types at many places. The noise of passing cars is joined by the noise of planes or trains. Physical formulae allow us to calculate how this changes the sound level. It has never been explained, however, how this combined noise affects humans.

This is why the NORAH team carried out a survey in 2012 on more than 7,000 people at whose homes both air traffic noise as well as either rail or road traffic noise could be heard. The scientists proceeded as follows: they asked the study participants how severely they felt annoyed by air traffic noise alone, by rail or road traffic noise alone, and by the combination of two noise sources. They also noted whether both types of noise were equally loud at the address of the respondents or whether one of the two noise sources dominated. Then they compared the answers.

They found out that the air traffic noise had an especially large influence on the degree of annoyance. This means: when, in the environs of an airport, someone hears air traffic noise plus another noise source, the degree of annoyance has much more to do with the air traffic noise

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regardless of the sound level than with the other type of noise. The scientists concluded from this that if we simply add the physically measureable sound level from the two traffic noise sources, there is a risk of underestimating how annoyed people feel due to the combined noise.

Do you have any questions?

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