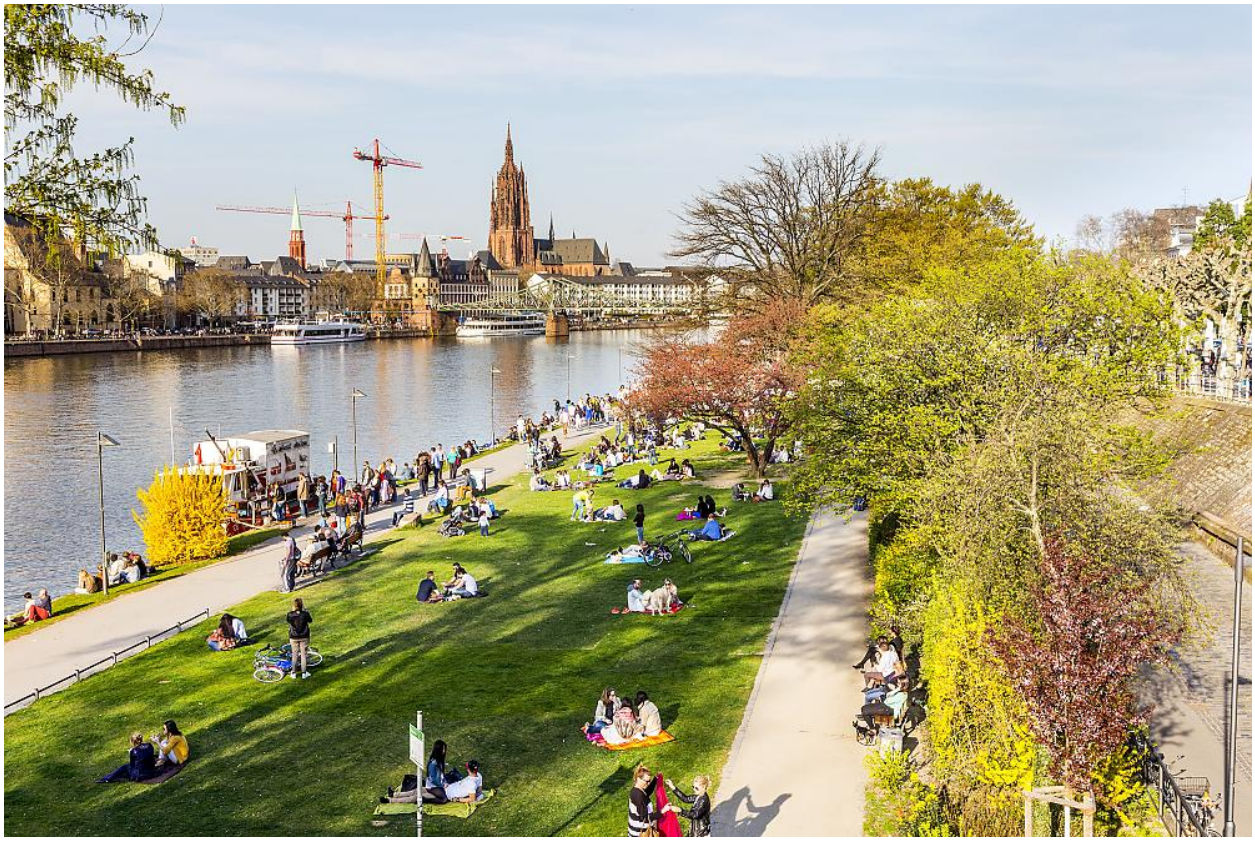
NORAH
Lärmwirkungsstudie

Overview of the quality of life study



Whether rail, road or air – a lot of people are disturbed by traffic noise. When people perceive noise as disturbing, the scientists call this "annoyance". To what extent a person feels annoyed by traffic noise is subjective, i.e. it differs from person to person. We make a distinction between "annoyance" and "exposure"- the objectively measureable sound level. If the noise exposure increases, then the annoyance also increases. Or, in other words: the louder it gets, the greater the annoyance.
This is not surprising and has been scientifically proven. But other factors, including the type of noise source and the personal noise sensitivity, can also influence how severely annoyed someone feels. Although several studies have already investigated which factor accounts for which proportion of the annoyance, not all of the scientific questions have been answered here. The NORAH Quality of Life Study thus tried to answer a number of these open questions on noise-related annoyance and quality of life.
To do this, the NORAH team surveyed almost 19,000 people in the Rhine-Main region as well as more than 10,000 in the environs of the airports Cologne/Bonn, Stuttgart and Berlin-Brandenburg. In terms of its content, the study was divided into three sub-areas: a time comparison, a location comparison and a noise source comparison. Special attention was paid to the so-called "change effect".

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This is what noise researchers call the phenomenon that people react not only to the noise exposure in itself, but also to changes in the noise exposure by feeling more annoyed by an increase in noise and less annoyed by a reduction in noise than one would expect them to feel at the respective sound level.

Time comparison: change effect confirmed in the Rhine-Main region

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Frankfurt airport's new North-West runway began operations in October 2011. This gave the NORAH team an opportunity to identify a possible change effect. The study results do, in fact, suggest that such a change effect took place around Frankfurt airport: in 2012, the year after the new runway was opened, the people felt substantially more annoyed by higher sound levels than residents whose homes were subject to similar noise levels before the opening of the runway. In 2013 the annoyance had fallen again slightly, but was still above the level of 2011. The scientists suspect that the persons concerned got used to the new noise situation to a certain degree, but not entirely. The comparison with an older study from the Frankfurt region also suggests that the annoyance has increased generally over the last ten years. According to this, the residents felt substantially less annoyed by noise at the same sound level in 2005 than in 2011.

Location comparison: annoyance is highest in Frankfurt

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The four airports around which the NORAH team carried out surveys of the residents differ considerably from each other –in terms of their size, planned construction projects, and also in terms of the occurrence of night-time air traffic. It was shown that people in the Frankfurt region subject to the same continuous sound level experience a higher degree of annoyance than the people around the other airports. This is followed in second place by Cologne/Bonn airport. People living around Stuttgart airport are subject to the lowest degree of annoyance due to air traffic noise. However, the annoyance at all four investigated airports was higher than the EU standard graphs developed in 1998 to estimate annoyance would suggest – the graphs thus appear to underestimate the present-day level of annoyance.

Noise sources comparison: planes cause more annoyance than cars or trains

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Alongside the air traffic noise, the NORAH Study also calculated the road and rail noise in the Rhine-Main region, and asked the residents to what extent they felt annoyed by which type of noise. It was shown that many people already found air traffic noise at relatively low sound levels more annoying than considerably louder rail and road traffic noise. In addition to these results on annoyance, the NORAH scientists also gained further insights – for example about how the residents around

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Frankfurt airport assess their own quality of life, or what effects there are when people are exposed to more than one source of noise. We will present these and other results in more detail in the following pages.

The questions and methods of the quality of life study

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Almost 30,000 people took part in the Quality of Life Study. Each of them answered extensive questionnaires; some of them even took part in the surveys over three successive years. A team of acoustics experts calculated for all of study participants how much air, road and rail traffic noise could be heard at their addresses in the respective year before the surveys. The scientists then put the answers from the surveys in relation to the individual noise exposures of the participants. This allowed them to calculate so-called exposure-effect graphs – an important objective of NORAH. Exposure-effect graphs state how people on average will respond to which noise exposure – for example, how annoyed the residents feel at a certain loudness or how they assess their quality of life in this situation.

In this chapter we only provide a brief overview of the questions and methods of the Quality of Life Study. If you would like to know more about it, we recommend NORAH Knowledge 7 – Research questions and methods of the Quality of Life Study.

Overview of surveys and participant numbers in the Rhine-Main region

2011	2012	2013	Totals
1st survey wave 9,244 persons	**2nd survey wave** 4,867 persons from wave 1	**3rd survey wave** 3,508 persons from waves 1 und 2	**9,244 persons**
No additional survey	Survey focused on rail, road, multiple noise: 7,113 persons	New group of persons: 2,400 persons	**9,513 persons**
Total number surveyed: 18,757 persons			

Overview of participant numbers at the other airports:

Cologne/ Bonn	Stuttgart	Berlin	Total
2,955 persons	1,979 persons	5,548 persons	**10,482 persons**

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Who took part?

With the aid of information from the resident registration authorities, as of 2011 the NORAH team made contact with people living in the environs of the airports Frankfurt, Stuttgart and Cologne/Bonn and in the proximity of the planned Berlin-Brandenburg airport, and invited them to take part in the Quality of Life Study. This procedure was previously approved by the data protection officers of the participating federal states. Some of the respondents in the Rhine-Main region took part again every year after 2011. In 2012 the scientists surveyed a further group of participants who also answered additional questions on combinations of various traffic noise sources. The NORAH team took great care to select sufficient participants with different levels of noise exposure in each investigation area. The NORAH team carried out one survey around each of the airports Cologne/Bonn, Stuttgart and Berlin.n.

	noise-related annoyance	
	Please ask noise sources in **blue** in random order	
19	If you think back over the last 12 months at your address: how strongly did you generally feel disturbed or annoyed **– all things considered – by noise at home?** Did you… (in the last 12 months)	1# not at all 2# slightly 3# moderately 4# highly or 5# extremely … disturbed or annoyed?
20	Regardless of your overall impression, what about the individual noise sources? If you think back over the last 12 months at your address: how strongly did you generally feel disturbed or annoyed by the **noise of road traffic**? Did you… (in the last 12 months)	
21	And what about the noise from …	
22	… **rail traffic**	
23	… **air traffic**	
24	The **traffic noise at your address taken as a whole:** If you think back over the last 12 months at your address, how strongly did you generally feel disturbed or annoyed by **noise from the various traffic noise sources –road rail or air traffic**?	
25	And what about **industrial and commercial noise**? Have you felt…	

SUZ GmbH

The Social-Scientific Survey Centre (SUZ) in Duisburg carried out a telephone survey using standardized questionnaires (here an extract). Questions were asked, among other things, about the noise-related annoyance due to air, rail and road traffic.

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The questionnaire

Each questionnaire took around 20 to 25 minutes to complete. The participants were able to answer the questions either on the telephone or online. In order to receive robust and valid results, NORAH only used questionnaires that have already proved their quality in many studies and are regarded as the scientific standard. The questions covered three theme areas:

- Questions on traffic noise reactions: here the participants stated, for example, to what extent and at what times they felt disturbed or annoyed by traffic noise.
- Questions on possible influencing factors: this was about details of the personal residential and life situation that could have an influence on the perception of noise – for example, whether the home has noise insulation, how many hours the respondents spend at home daily, and whether they have a positive or negative attitude towards air traffic.
- Questions on the health-related quality of life: here the respondents gave their assessment of their own mental and physical health.
  Questions on sociodemographic data: NORAH also asked for a series of personal details, such as the educational status, income or possible migration background. This made it possible to determine whether certain social groups react differently to noise.
- Some of the participants completed another questionnaire on the extent to which they feel annoyed by noise from multiple sources.

Do you have any questions?

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