

Science for Environment Policy

Does environmental noise lead to depression and anxiety?

People who are annoyed by environmental noise are also more likely to suffer from depression and anxiety, a new, large-scale study from Germany suggests. The results do not prove that noise causes mental health issues but suggest a possible link, which the study's authors are exploring further. Of all the types of noise considered in the study, aircraft noise was reported to be the most annoying.

Noise, such as traffic and industrial noise, is now recognised as a serious environmental problem and is regulated in Europe under the EU's [Environmental Noise Directive](#). It is associated with a number of cardiovascular [health](#) problems, including heart disease, heart failure and stroke.

It is also well known that [noise](#) can cause annoyance, which can be accompanied by negative, stress-related emotions, such as irritability, distress and exhaustion. However, very little research has considered whether this annoyance and potential stress could lead to mental health disorders. Therefore, this study investigated whether there is a link between noise annoyance and depression and anxiety. It also explored the annoyance levels caused by different sources of noise.

The researchers analysed questionnaires completed by 14 635 residents, aged 35–74, in and around the city of Mainz, Germany, between 2007 and 2012. Part of this area is in the flight path of nearby Frankfurt Airport, one of the busiest airports in the world.

The questionnaires asked the residents how annoyed they had been in recent years (rated on a five-point scale, from not annoyed to extremely annoyed) by six different types of environmental noise: road traffic; aircraft; railways; industrial/construction; neighbourhood indoor noise; and neighbourhood outdoor noise.

The results show that 20.7% of participants reported no annoyance to the sources of environmental noise, 26.6% slight annoyance, 25% moderate annoyance, 17.3% strong annoyance and 10.5% extreme annoyance.

Of the six types of noise considered, aircraft noise was the most problematic. Nearly 60% of the population reported being annoyed by it to some degree, and 6.4% were extremely annoyed by it. Results in Table 1 show annoyance levels caused by the noise sources.

Source of noise	Percentage of participants affected (slightly, moderately, strongly or extremely annoyed)	Percentage of participants extremely annoyed
Aircraft	59.9%	6.4%
Road traffic	43.5%	1.9%
Neighbourhood outdoor	31.8%	1.2%
Neighbourhood indoor	19.6%	0.9%
Industrial/construction	19.6%	0.9%
Railway	15.8%	0.7%

Table 1: annoyance caused by six sources of environmental noise among study participants. Note: the study does not relate these figures to noise exposure levels.

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<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0155357>.

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They asked the participants to indicate whether they suffered symptoms of depression and anxiety, and the researchers assigned a score for each condition. Participants were also asked if they had ever received medical diagnoses of depression or anxiety.

They found that indicators of depression and anxiety increased steadily with levels of annoyance to the noise.

Average **depression** scores increased from 3.5 (out of a possible total of 27) among the 'no annoyance' group, to 5.1 for the 'extreme annoyance' group.

The percentage of each group with a depression score of 10 or more (a 'clinically significant' level of depression) increased from 6.1% of the 'no annoyance' group through to 12% of the 'extremely annoyed' group.

The percentage of the population with medical diagnoses of depression was also higher with each level of annoyance, for instance, 10.1% of the 'no annoyance' group and 14.8% of the 'extremely annoyed' group had been diagnosed with depression by a doctor.

Average **anxiety** scores steadily increased from 0.7 (out of a possible total of 6) in the 'no annoyance' group, to 1.1 among the 'extreme annoyance' group.

The percentage of each group with a clinically significant anxiety score of 3 or more increased from 4.5% of the 'no annoyance' group through to 10% of the 'extreme annoyance' group.

6.3% of the 'no annoyance' group had been diagnosed with anxiety disorders, but the figure was 9.9% for the 'extreme annoyance' group.

The study did not assess actual noise levels, just personal responses to noise. It also points out the possibility that people who are already depressed or anxious may be more sensitive to noise and, therefore, report higher annoyance; it is not necessarily the case that noise annoyance leads to mental health issues.

However, the association between annoyance and mental health disorders in these data is very strong and the researchers say their results are 'compatible' with the hypothesis that annoyance leads to stress, which in turn can lead to depression and anxiety, or worsen existing symptoms. They are, therefore, conducting regular follow-up assessments with the participants to explore the possible relationship between noise and mental health further.

