

Submission to Bristol Airport Public Enquiry

Colin Davis, 16th September 2021

My name is Colin Davis. I am a professor of psychology at the University of Bristol. I would like to make three points today. I'll start by focusing on two of the consequences of increased aircraft noise. In discussing this evidence I will draw on my own professional expertise as well as on my own experience. I'll then finish by making an appeal as a concerned local resident and global citizen.

1. Effect of noise on children's cognitive processes

The first point I'd like to consider is the impact of noise on cognitive processes, particularly in children. There is very good evidence that aircraft noise has a negative effect on cognitive processes. This has been studied in particular with reference to the effects on children's learning and especially on reading comprehension, which is a good proxy measure of how well children are learning. Reading comprehension is important for many reasons. Early on in schooling children are learning to read, but later on they are reading to learn, and high levels of reading comprehension give children a great advantage in expanding their vocabulary, their knowledge and their understanding of the world. Children with lower levels of reading comprehension have fewer opportunities - it affects their ability to go on to further study, the jobs that they are able to apply for, how much they will earn and even their likelihood of spending time in prison. Reading comprehension is important for the individual in that it allows them to travel to different worlds of the imagination, but it is also important for society, because a workforce with high

levels of literacy is more productive and this is associated with greater economic benefits.

In my research I've spent several years studying methods to improve children's reading comprehension and other aspects of literacy. I've published over 50 peer-reviewed scientific articles on the topic of visual word recognition – what happens in the initial 100 ms after the reader's eyes land on a printed word, and the nature of the neural codes that are used to store and recognise familiar words. I've also led a major randomised control trial funded by the Nuffield Foundation, which took place across 13 primary schools in and around Bristol. As part of this research we assessed reading comprehension and other measures of literacy in well over a thousand children; based on that screening, a few hundred children were randomly allocated to one of two reading intervention conditions and were followed up over the course of two school years. This research was published this year in the journal *Reading Research Quarterly*. I mention all this in order to establish that I have relevant expertise in conducting and evaluating research on children's reading comprehension.

One thing I can say on the basis of that research, is that learning to read is a difficult skill that many children struggle with, and it is not an easy thing to help those children. Many different methods of reading instruction have been proposed, but most of these have little or no evidence base. The consensus position is that phonics instruction is the teaching method that's associated with the best outcomes, but even here the evidence is somewhat mixed, and many children continue to have difficulty with reading after intensive phonics instruction. For those children the best practice is

considered to be one-to-one instruction, which can be effective, but is extraordinarily resource-intensive.

However, although we've had difficulty in establishing reliable methods of improving children's reading comprehension, we do know that we can make their reading comprehension worse by exposing them to aircraft noise. Given what we know about reading, and in particular its dependence on attention and memory, both of which are sensitive to exposure to chronic noise, it is not surprising that exposure to aircraft noise results in deficits in reading performance. But this is not simply an assumption, but a well-established empirical finding. A systematic review by the World Health Organisation described this evidence as medium quality, which in the context of public health is strong evidence.

There are at least 14 published studies that have examined aircraft noise exposure effects on reading and oral comprehension. Of these 14 studies, 10 observed a statistically significant association between higher aircraft noise exposure and poorer reading comprehension. Two further studies found a trend for aircraft noise exposure to influence reading comprehension.

A good example is the study by Stansfeld and colleagues that was published in the Lancet in 2005. This was a cross-national epidemiological study that assessed 2844 children at 89 schools in the Netherlands, Spain and the UK. The researchers used noise contour maps and on-site measurements to establish the extent of exposure to external aircraft noise at school, and they used standardised tests to measure reading comprehension. Schools were matched within countries for socioeconomic status, so as to

control for any effects of this variable. The results showed a linear association between exposure to chronic aircraft noise and impairment of reading comprehension. The statistical significance of this effect implied that the likelihood of it being a chance result is less than 1 in 100. The researchers' conclusion was, and I quote, "Schools exposed to high levels of aircraft noise are not healthy educational environments."

I noted that this evidence was not considered by Mr Pyper in his review of public health impacts. He made the point as have others, that any negative impacts must be weighed against the positive economic impacts associated with airport expansion. But as far as I can tell, there has been no consideration of the negative economic impacts of expansion that would result from the negative impact on children's learning. This inquiry should carefully consider those impacts when it is weighing the evidence.

Children have a right to education, and in order to uphold this right it is important that the environmental education context should be conducive to learning.

2. Noise and climate anxiety

Another impact of aircraft noise that I would like to consider concerns its impact on mental health. There is various evidence to support an association between aircraft noise and increased levels of Depression and Anxiety. But I would like to focus on an even more specific aspect of anxiety which is becoming especially prevalent among young people – not only young people, but especially among the young.

There are many stressors that affect young people today, but we know from surveys that one of their greatest concerns is the impact of climate change on their future. And they have very good reason to be worried - this is not an irrational concern. When the IPCC tells us that we are at code red for humanity they are trying to ensure everyone hears that message. Young people do hear it, and it alarms them. One of the things that is most concerning for young people is the sense that our leaders are not taking this existential threat seriously. Let me read you a quote from a recent paper about young people's experience of climate anxiety: "At its root, our climate anxiety comes from this deep-set feeling of betrayal because of government inaction."

That quote comes from a study recently reported by my colleagues from the University of Bath. They surveyed 10,000 young people across ten countries: it is the largest study of its kind, and it highlights the degree to which young people are scared about their future. More than 45 per cent of young people said their feelings about climate change negatively impact their daily life and functioning, and 75 per cent said they feel the future is frightening.

Over half of the young people in this survey agreed with the statement that humanity is doomed. Now, at one level this is really striking and an appalling indictment of climate inaction and our government's indifference to young people's concerns. But at another level, it's not at all surprising to me, as someone who works with young people. My students are terrified by climate change. They feel despair. They are grieving the loss of their future. They say quite openly that they don't believe it would be safe or responsible for them to have children of their own – to bring a baby into an uncertain future.

It was in large part as response to those concerns that my university declared a climate emergency 2 1/2 years ago. Our VC talked about the role of climate change anxiety in young people's mental health problems.

Following that declaration I spoke to many students at other universities who wanted to know how they could encourage their university to follow suit. That was something they wanted to bring about because they felt it was a powerful acknowledgement of the reality of this threat and that having this sense of acknowledgement would have a positive impact on their mental wellbeing. And there are now several thousand universities that have declared a climate emergency.

But as time goes, on those declarations, whether by universities or councils or parliaments start to ring hollow when they are not accompanied by action. When people see fossil fuel developments going ahead as if there were no climate emergency this exacerbates this sense of unease that leaders are still not taking this threat seriously.

Climate anxiety is a natural response to a threat. And it's a very real threat. Perhaps one might say to anxious young people that they should try not to think about it - don't read the news and avoid reading about new coal mines and new oil fields in the North Sea. Try to avoid the things that are stressing you.

But one thing that's hard to avoid is the sound of planes going overhead. Every one of those planes with its engines roaring screams a message that we are proceeding with business as usual as it carries us over the abyss. I'm not aware of any studies on the topic, but I can tell you that I have spoken to people who describe aircraft noise as something exacerbates their climate anxiety.

So for the residents of Somerset and Bristol there will be people who will experience increased aircraft noise not simply as an annoyance but as a tangible manifestation of the way in which perceived (and probably illusory) economic benefits are being used to justify further death and destruction.

3. Morality

And this brings me on to my final point.

You will be aware that this week our regional metro mayor Dan Norris has announced that he is tabling a motion to oppose the expansion of Bristol Airport. In explaining this he said, "We are in the midst of a climate and biodiversity emergency. The vast majority of people across North Somerset, Bristol, Bath & North East Somerset and South Gloucestershire know this and are rightly extremely concerned. So I'm calling on the local leaders to show moral leadership and courage and do what is right."

I tried searching some of the reports that have been submitted to this enquiry, but I was unable to find any that included the word "morality". Some will ask what morality has to do with it.

In that context, I want to draw your attention to a paper was published this year in *Nature*, one of the pre-eminent scientific

journals. The title of the paper is “The mortality cost of carbon”, and it’s the best attempt to date to estimate the impact of carbon dioxide emissions on deaths due to heatwaves. The results of this analysis is the introduction of a new metric: the mortality cost of carbon. This metric implies that adding 4,434 metric tons of carbon dioxide to the atmosphere will cause one excess death globally between 2020 and 2100. And again, this is only deaths related to excess temperature, so it doesn’t consider deaths due to other extreme weather events such as flooding, cyclones, drought and increased disease. So it’s clearly a considerable underestimate of the true mortality cost of climate change. Nevertheless, it allows us to compute a lower bound on the number of people we are killing when we fail to reduce our emissions, or, as in this case when we increase our emissions.

According to the figures I was able to find, the projected carbon emissions of Bristol Airport in 2026, if expansion proceeds, are 1184 kilotons per year. And this itself is an optimistic assessment, as it depends on the planes in 5 years time emitting less CO₂ than they do now.

So we can use that projection to ask the question: how many people will die of heat death because of emissions from Bristol Airport? The answer, according to mortality cost of carbon metric, is that 267 people will die for each year that we emit those projected 2026 levels. Thousands of people for every decade. And of course that number will increase if the emissions increase.

Now, to be clear, we’re not saying that those 267 people will die in the same year that the emissions are released. But nor should we

imagine that heat-related deaths are all off in the future, when we're gone. This summer we saw hundreds of deaths in the Pacific Northwest and Canada due to the very high temperatures there. We've also seen excess deaths associated with heatwaves in the UK regularly over the last few years. More than 70,000 people died in Europe in the heatwave of summer 2003, according to peer-reviewed analyses.

So when the Metro Mayor says that this is a moral question he is absolutely correct. Many people will die if this expansion is allowed. And that might be an uncomfortable fact to dwell on, but I hope that it will be in the forefront of your mind as you are making this decision. Planning decisions are serious – we all understand that, we realise they have important consequences on people's lives. But in the case of this decision you have a button in front of you, and if you press that button, you are effectively consigning thousands of people globally to die very unpleasant deaths.

Some people will say that moral questions should not impinge on inquiries like this. That is a matter for you to decide. Is this an amoral enquiry? Should we ignore moral considerations here and hope that they are considered elsewhere? But if so, where is the morality in this process? Who will show moral leadership? The councillors of North Somerset already have. But it's not enough. We need more decision makers to be courageous and show moral leadership. So I urge you to be bold in your interpretation of your remit and to take on that responsibility. I and many others will thank you for it.

References

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