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Noise Pollution Takes Toll on Health and Happiness

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Everyday Noise Can Overstimulate the Body's Stress Response

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In the beginning there was silence, and it was good.

From silence came sound, not all of which was good. And the sound that was not welcome was called noise. And there got to be more and more of it, because who wants to rake when you can blow?

Let me be honest. I don't get along with noise. I see it, or rather hear it, as the essayist Ambrose Bierce did around the turn of the last century: as "a stench in the ear."

And by "noise" I don't mean only the noises that everyone agrees are bad for your hearing -- those ear-splitting sirens and the stand-right-next-to-the-speaker heavy metal concerts. Even everyday noise eats away at my nerves.

You may say I'm thin-skinned, but I have science on my side. A growing body of evidence confirms that the chronic din of construction crews, road projects, jet traffic and, yes, those ubiquitous leaf blowers, is taking a toll on our health and happiness.

Providing scientific proof of this has not been easy -- in part because noise, defined as "unwanted sound," is to a large degree a matter of personal taste and sensitivity. The romantic hears a train whistle differently from the insomniac. And no small number of Americans pay good money to hear the same rock-and-roll music that was used to torture the holed-up Panamanian dictator, Manuel Noriega, and Waco's David Koresh and induce cooperation from prisoners in Iraq and Guantanamo Bay, Cuba.

But study after study has found that community noise is interrupting our sleep, interfering with our children's learning, suppressing our immune systems and even increasing -- albeit just a little -- our chances of having a heart attack. It is also tarnishing the Golden Rule, reducing people's inclination to help one another.

"Everyday noise is under the radar, yet it affects everyone's life," said Louis Hagler, a retired physician in Oakland, Calif., and an advocate for quiet, who recently published in the Southern Medical Journal a review of studies linking noise exposures to health problems. "We don't say to

people, 'You just have to learn to live with sewage in your water,' " Hagler said in an interview. "Why should we tolerate sewage coming into our ears?"

As I write -- from home today, the better to concentrate, I told my editor -- there is a person up the street blowing leaves and dust from one part of his property to another. To accomplish this task, he is generating a sound that is only a little less intense than the 85 decibels that the National Institute of Occupational Safety and Health says is physically damaging over a period of hours, and more than loud enough to make it almost impossible for me to think.

Leaf blowers may be my pet peeve, but it is modern transportation -- cars, motorcycles, trucks and air traffic -- that accounts for most of the background noise that disturbs and even sickens people.

More than 40 percent of Americans whose homes have any traffic noise at all classify that noise as "bothersome," according to the 2005 American Housing Survey, conducted by the U.S. Census Bureau. One-third of those say the noise is so bothersome they want to move. All told, more than 100 million Americans are regularly exposed to noise levels in excess of the 55 decibels that federal agencies have recommended as a reasonable background intensity.

Here in the Washington area, a battle over airport noise is posed to erupt this summer as the Senate considers adding as many as 20 new daily takeoffs and landings at Reagan National, a move opposed by neighbors already fed up with the steady roar of low-flying jets.

A now-classic study conducted in the 1970s was among the first to indicate that such noise is more than an annoyance. It found that children living on the lower, noisier floors of an apartment building overlooking a busy Manhattan bridge had lower reading scores than those living on higher floors.

But was noise really the major factor explaining that difference? After all, people tend to move away from extremely noisy neighborhoods if they can, and those who don't are more likely to be poor, which by itself is a risk factor for delayed educational advancement and ill health.

To answer such questions, scientists have taken advantage of unusual situations in which people's exposure to noise changed over time while other factors remained relatively constant. In a study of students attending an elementary school near noisy train tracks in New York, for example, researchers showed that by the time the students reached sixth grade, those whose classrooms faced the train were a year behind those whose classrooms were on the quiet side of the building. After noise reduction materials were installed in the classrooms and around the tracks, reading scores in the two groups equalized, strengthening the case that noise was the culprit.

Another clue came from a study of children whose schools were located near West London's busy Heathrow airport.

"We found a straightforward linear effect from aircraft noise and impairment in reading on standardized tests," said study leader Stephen A. Stansfeld, a professor of psychiatry at Queen Mary's School of Medicine and Dentistry in London, noting that the close correlation strengthened the case that noise was to blame.

But it was a "natural" experiment in Germany that helped clinch the case, when the old Munich

airport was shut down and a new one was opened at a distant site. Tests done on third- and fourth-graders -- before that switch, soon after it and again later on -- showed that students near the old airport initially scored lower than others on tests of memory and reading but improved after the airport closed, while their counterparts living near the new airport saw a decline in scores after the switch occurred.

A Chronic Emergency

Noise that invades a classroom may make it hard for students to hear the teacher, of course. But blood tests done on the Munich children helped reveal a more insidious biological mechanism through which noise wreaks much of its havoc. Children near the working airports had significantly higher levels of adrenaline and cortisol -- the body's so-called stress hormones.

Those hormones are part of the body's "fight or flight" response, which helps a person deal with sudden emergencies. Blood pressure and heart rate go up in preparation for action. The blood becomes thick with oxygen-toting red blood cells. And the immune system gets suppressed as part of the shift toward fulfilling short-term needs rather than longer-term health.

That response can be lifesaving in an attack, but it is counterproductive when activated chronically. Over months and years it can literally corrode the body, eating away at blood vessels and other organs and predisposing a person to other medical woes.

"This is the most disturbing thing about noise, because it means you are being exposed to this reaction all the time," said Roberto Bertollini of the World Health Organization's Special Programme on Health and Environment.

As a result of that hormonal activation, children near the working Munich airports had significantly higher blood pressure than children in quieter neighborhoods -- adding to their risk of having a heart attack or stroke later in life. Similar impacts have been documented among adults near Amsterdam's Schiphol airport and Stockholm's Arlanda airport, where chronic noise as low as 55 decibels correlated with more doctor visits, high blood pressure and treatments for heart troubles.

Whether traffic noise actually increases one's chances of having heart disease or a heart attack has been harder to determine, because such studies require large numbers of people. But the evidence for at least a modest effect is growing.

A highly respected Dutch analysis combined the results from 43 studies that tracked chest pains, heart attacks and related problems with community noise levels. Using a statistical technique called meta-analysis, it concluded that there is "a slight increase in cardiovascular disease risk in populations exposed to air traffic and/or road traffic noise."

Face the Music

Even if chronic exposure to noise is unlikely to kill you, it can simmer under the surface and take a toll on your well-being.

Studies have shown that chronic night noise not only leaves you shrouded in a fog of fatigue,

irritability and poor concentration, but also activates the stress response as you sleep. And while the number of awakenings per night may decrease as you adjust to the din, the increased heart rate, blood pressure and breathing changes persist.

"The idea that people get used to noise is a myth," the Environmental Protection Agency has reported. "Even when we think we have become accustomed to noise, biological changes still take place inside us."

The Health Council of the Netherlands found that high levels of mechanical noise, such as that from a hospital's own air-conditioning equipment, can delay recovery in patients -- a reflection, perhaps, of the immune suppression that comes with an activated stress response.

Another insidious effect of noise is its cultivation of what scientists call "learned helplessness." Children given puzzles in moderately noisy classrooms are not only more likely to fail to solve them but are also more likely to surrender early.

"They just give up," said Gary W. Evans, a professor of human ecology at Cornell University who studies noise and behavior. The implications of learned helplessness on a child's success in life "are potentially pretty powerful," he said.

Perhaps most disturbing in these times of political and economic polarization is that noise undermines generosity.

In one study, people were less likely to help someone pick up a bundle of dropped books when the noise of a lawn mower was present. Another showed that in a noisy environment, people playing a game were more likely to see their fellow players as disagreeable or threatening. Yet another found a drop in helpful behavior when loud "annoying music" was played.

Interestingly, helping behavior *increased* when similarly loud "uplifting music" was played. Which gets to the weird thing about noise: its mysterious psychological component.

Something to Yell About

Researchers still know very little about how attitudes toward noise affect its impact on health. It may be that people with upbeat attitudes -- people, for example, who do not believe that this blowhard up the street ought to be jailed -- will live longer, healthier lives than I will. After all, anger alone is a potent producer of stress hormones. Am I killing myself by caring?

Some research suggests so. People report being far less annoyed by noises they willingly accept or actively select (riding a motorcycle, for example) than by those they have no control over (the car alarm outside your window).

On the other hand, the hormonal systems of even the mellowest of people in noisy places may still be quietly seething.

After runway patterns were changed at an airport in Australia, researchers studied two neighborhoods -- one that was now noisier because of the change and one that got quieter -- both of which now had

the same noise levels. People whose neighborhoods had become quieter were less anxious, angry and depressed than those whose neighborhoods had grown noisier. But the two groups' stress hormone levels were indistinguishable, suggesting that a good attitude may not be powerful enough to save you -- and a bad one won't necessarily kill you.

As an inveterate ranter against noise, I find that last point gratifying. It means I can complain as noisily as I want without losing the benefits of whatever quiet I win. ·

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