

# Urban density strongly correlates with house sparrow health

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Female House Sparrow ([Passer domesticus](#)). Credit: Wikipedia, [CC BY-SA 3.0](#)

House sparrows (*Passer domesticus*) have adapted to urban environments, which are changing and growing faster than ever before. A range of both biotic and abiotic factors—including habitat fragmentation, changing food availability, heavy metals, nighttime light, noise and urban density—change the way birds live in an urban environment. Understanding how cities affect birds can help scientists understand and predict how bird populations may change in the future and help birds and humans coexist.

For urban ecologists like Jenny Ouyang, they are the perfect study animal: a way to gain an insight into how birds adapt—or don't—to human environments.

"House sparrows are really an ideal way to study urban ecology," Ouyang said. "They're human commensals, so they exist everywhere, they're easily observable, and they're charismatic."

In a new study published in the journal *Ecological Applications*, Ouyang and her team used fine-scale methods to assess the impact of nighttime light, noise and [urban density](#) on [house sparrows](#)' health and physical condition. They also examined the birds' lead and glucocorticoid concentrations and compared them with the birds' reproductive success. Their efforts led them to discover that urban density, more than light pollution or [noise levels](#), affects sparrows. The sparrows also carried a much higher load of lead in their bodies than the researchers expected.

Most urban ecology studies have used satellite images to estimate urban environment and human population density and have viewed the rural–urban divide as a dichotomy. Ouyang's study is one of a growing number studying urban environments along a continuum and at a fine scale: in this case, in patches of two square meters each.

"We look at the environment in small parcels, at the scale the bird would

inhabit," Ouyang said. "A sparrow doesn't care about the whole city. It's really inhabiting one area, and listening to the noise from that area, and it cares about the number of people from that area. The urban density factor takes into account that cities can be small but dense, and that vertical structures are as important to consider as horizontal ones."

Ouyang was startled by how closely the birds' health correlated with urban density, rather than any of the other components they studied. She was also startled by how high the lead levels were in the blood of the birds they studied and intrigued by the puzzle of where the lead is coming from.

"They could be eating little bits of gravel the way birds for millennia have eaten pebbles to help digest their food," Ouyang said. "Or the lead could be in the water or in the insects via bioaccumulation."

She and her lab will continue to investigate the link between [urban environments](#) and bird health, to understand the effects of cities on birds and how urban expansion is changing ecosystems, individuals, populations and genetics.

**More information:** Justin H. White et al, Increased lead and glucocorticoid concentrations reduce reproductive success in House Sparrows along an urban gradient, *Ecological Applications* (2022). [DOI: 10.1002/eap.2688](#)

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