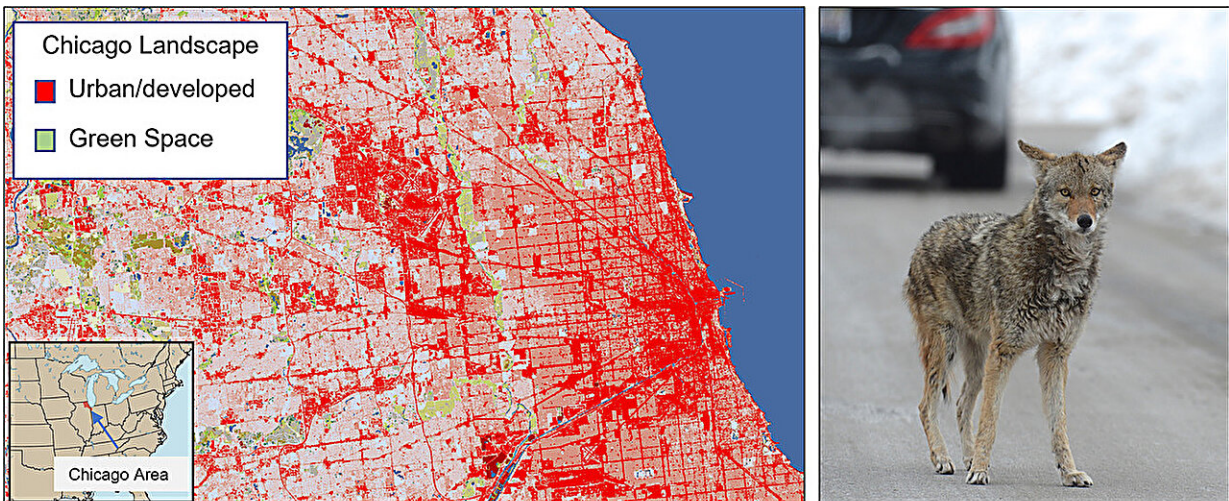


# It's not just humans: City life is stressful for coyotes, too

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## Chronic Stress in Urban Coyotes



Increased use of developed land  
Poor physical condition  
Dominant social status

Graphical abstract. Credit: *Science of The Total Environment* (2023). DOI: 10.1016/j.scitotenv.2023.165965

Though cars are the biggest threat to coyotes taking up residence in U.S. cities, a new study suggests urban living poses a different kind of hazard to coyote health—in the form of chronic stress.

Researchers from The Ohio State University examined the concentration of the stress hormone cortisol in the hair of almost 100 coyotes living in the Chicago Metropolitan Area. Results showed that coyotes that lived in the most-developed areas had higher cortisol levels—a proxy for [chronic stress](#)—than animals living in suburban or natural areas.

Two other factors stood out for their association to higher stress: poor body condition, mostly related to sickness with the skin disease mange, and being either a loner or an alpha in a pack—the males and females that constitute breeding pairs. Whether the stress linked to these factors can be traced directly to urban living or is just part of [coyote](#) life remains a bit of a mystery.

"This is the first mammalian carnivore that has been evaluated for stress in an [urban environment](#)," said lead author Stan Gehrt, a wildlife ecologist at Ohio State. "The city does present challenges for them, even though they're really good at doing what they're doing. This is helping us understand how well animals are adjusting to [urban systems](#)—or not adjusting to them.

"And we found that with coyotes, it's complicated."

The study was published online recently in the journal *Science of the Total Environment*.

Gehrt, a professor in Ohio State's School of Environment and Natural Resources, leads the Urban Coyote Research Project that has monitored coyotes living in Chicago since 2000. He and his colleagues spend a lot of time with the animals, collecting [biological samples](#), microchipping

them and tracking their movement, and documenting their [reproductive success](#), dietary habits and other behaviors in the urban wild.

For this study, first author Katie Robertson, who completed the work as a Ph.D. student at Ohio State, shaved a bit of hair from the rump just above the tail of 97 coyotes—most alive, but some captured after death from illness or being hit by a car. The animals were also outfitted with radiotracking devices that enabled researchers to monitor their space use and determine their social status. Data collection occurred between 2014 and 2018.

The hair samples were analyzed for their concentration of cortisol, a hormone produced as part of the body's response to stress. Analyzing hair, as opposed to blood, was intended to provide an estimate of long-term stress over the previous weeks or months before collection rather than a reaction to an immediate stressor. Statistical modeling revealed the factors that were associated with higher stress.

The researchers predicted that coyotes living in the more developed areas of Chicago would have higher concentrations of cortisol—and stress—than coyotes whose packs had more flexibility of movement and less exposure to people in the less dense areas in which they lived.

The results bore out that hypothesis, but the findings also showed there is more to the story of modern coyote life: Poor physical condition is linked to higher stress—which poses a chicken-and-egg question of which problem came first. Sarcoptic mange infection itself doesn't kill coyotes, but the loss of hair makes them susceptible to succumbing to cold Chicago winters.

In addition, the analysis suggested the responsibility of running a pack, or living outside a pack, is stressful.

"The alphas are the dominant animals in their pack, so they're the ones that are responsible for all of the territorial defense and they're the only ones that are breeding," he said. "So there's a lot going on with the alphas, whereas the subordinates and the pups, they have a pretty easy life. Their parents are doing all the hard work and they're just coasting a little bit. And that was actually reflected in the cortisol levels."

Transients, on the other hand—adult coyotes that have left their parents but not yet established or joined a pack—have a different set of worries.

"Transients were right up there with the alphas in terms of stress. They don't have to defend a territory, but they have to avoid getting attacked by resident coyotes—they're going through territories on a constant basis—and are trying to avoid people and trying not to get hit by cars," Gehrt said.

In 2014, Gehrt reported that some coyotes in Chicago had learned to look both ways before crossing a street—a finding that speaks to both their frequent exposure to risks that threaten their survival and their ability to deftly adapt to hostilities in their environment.

This new study showed plenty of individual variations in stress levels of animals even in the highest-stress groups, which Gehrt said makes sense based on their track record of thriving in the face of growing urbanization.

"We see them on a regular basis living in some pretty challenging areas, and it seems to me they're adjusting quite well—their survival rates are high, and the food supply is great," he said. "And that's what we found, that there are trends related to higher stress, but there are also [coyotes](#) that are doing quite well in the city with fairly low stress levels—even alphas in some pretty intense environments.

"Even without the urban system, this is the first free-ranging coyote population to be evaluated for stress. And we see there's stress associated with their very complicated social system and a lot of rules they're following—intrinsic sources of [stress](#) that other species don't have to deal with. It's an interesting look into another window of their lives."

**More information:** Katie E. Robertson et al, Stress in the city? Coyote hair cortisol varies with intrinsic and extrinsic factors within a heavily urbanized landscape, *Science of The Total Environment* (2023). [DOI: 10.1016/j.scitotenv.2023.165965](#)

Provided by The Ohio State University

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