

# Female barn swallows shown to prioritize the needs of their offspring over their own health

August 23 2023, by Rachel Sauer

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Research found that even with increased physical cost—which in the study was a one-gram weight attached to their leg—barn swallows still laid as many eggs as they likely would have without the weight. Credit: University of Colorado at Boulder

From an evolutionary standpoint, the drive to reproduce is

fundamentally guided by an instinct to pass genes along to the next generation. But in practice, reproduction is often much more nuanced and varied. In species after species, parents prioritize the needs of their offspring—sometimes at the expense of their own health.

Take the barn swallow, for instance. New research demonstrates that [females](#) with increased self-maintenance costs—in this case, an approximately one-gram weight attached to their legs—still laid as many eggs as they likely would have without the weight and its physical toll.

"In ecology and evolution, there's this constant trade-off between the health of the parent and the health of the offspring," explains Molly McDermott, the study's lead author, who earned her Ph.D. in the University of Colorado Boulder Department of Ecology and Evolutionary Biology in May 2022. "There's only so much time, only so much energy, only so many resources that each individual has, and every organism has its own strategies for how it's going to allocate those resources in reproduction.

"If you're a really long-lived animal like an elephant or a human, it makes sense to balance your health with that of your offspring so that you can live to reproduce another day. But you may not have that many chances if you're short-lived, so it makes sense to throw everything you've got at the chance to reproduce."

## **The cost of offspring**

McDermott's barn swallow research grew from a longtime interest in reproduction and parental care and the spectrum on which it exists—from species that provide no [parental care](#) at all to the human species, which provides 18 years of it.

She was especially interested in the sacrifices parents make with their

own health to prioritize their offsprings' health. Working with faculty mentor Rebecca Safran, a professor of ecology and [evolutionary biology](#) and noted barn-swallow expert, McDermott focused on the common songbird, in part, because its average lifespan is two years.

"That's a relatively short lifespan, so we designed an experiment to try figuring out what is the cost of having a lot of offspring," McDermott says. "There's a lot of variation in barn swallows—some females only lay three eggs in a year, and some lay up to 15, which about twice their body weight in offspring. Some even have multiple nests in a season. We wanted to understand what was happening in individuals that were caring for a lot of offspring, so we designed the experiment to change the cost."



McDermott and her co-researchers studied barn swallows in barns, along trails and in underpasses throughout Boulder County. Credit: University of Colorado at Boulder

Working with barn swallow colonies around the Boulder area, McDermott and her co-researchers identified a study population and attached a small GPS tag to half of them. The tag represented about 5%

of their body weight, comparable to carrying a six- to 10-pound backpack. They also moved eggs between nests, giving some females more chicks to care for and some fewer chicks. Each female's health was measured at the beginning and end of the study period—physical markers such as blood glucose, weight, feather growth and immune status.

"Essentially, we changed the cost," McDermott says. "Some females were now carrying the equivalent of a small backpack and had more chicks to care for—all the way down to females with no extra weight and fewer chicks because we'd removed some and put them in a different nest."

## **'Really remarkable animals'**

As it happens, McDermott was in her second trimester of pregnancy during her second season of field work, so there was an aspect of relating to the females with the increased cost as she navigated fields and spent hours along trails and in barns, gazing through a pair of binoculars.

What she and her colleagues learned is that there was no difference in egg laying. Females with the increased weight of a GPS tag were just as likely to lay the same number of eggs as females without the tag. However, the females wearing tags showed more signs of stress, including altered immune function, and were in overall worse health at the end of the experiment than their untagged peers.

"Barn swallows can have multiple nests in a summer," McDermott explains. "We did all of our manipulations on the first nest of the season, and all the females were equally likely to go on and have a second nest and lay the same number of eggs."

In a previous study, McDermott's CU research colleague Sage Madden

had shown that among barn swallows, as with most songbirds, females do most of the incubation and nestling feeding; males do anywhere between 5% and 50% of feeding. Madden found that males who were paired with tagged female [barn swallows](#) did tend to feed the offspring more, but the females still did the same amount of feeding.

"One thing that's really important to me from this research is to look around and realize there are things we have in common with every living thing," McDermott says. "We all reproduce, and reproduction is a really fundamental aspect of our existence on this planet. And part of that story is the tradeoffs we all make between our own [health](#) and the amount of care we put into our offspring.

"Barn swallows are really remarkable animals. They're one of the few that have learned to live alongside humans and be very successful in doing that, and they're really recognized and appreciated for their agricultural value in pest control. But beyond that, they're beautiful, complex animals, and they're a lot like us. They make similar choices and sacrifices to ensure their [offspring](#) are OK."

The study is about songbirds, but reading between the lines of research, it might also be about many species—human included—and the price of parenthood.

**More information:** Molly T McDermott et al, Females with Increased Costs Maintain Reproductive Output: A Field Experiment in a Common Songbird, *Integrative And Comparative Biology* (2023). [DOI: 10.1093/icb/icad042](#)

Provided by University of Colorado at Boulder

Citation: Female barn swallows shown to prioritize the needs of their offspring over their own health (2023, August 23) retrieved 2 May 2024 from <https://phys.org/news/2023-08-female-barn-swallows-shown-prioritize.html>

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