Chickadee research finds cognitive skills impact lifespan

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A tagged mountain chickadee arrives at a feeder awaiting its seed. Credit: Carrie Branch

While there is no denying 'survival of the fittest' still reigns supreme in the animal kingdom, a new study shows being smartest—or at least

smarter—is pretty important, too.

Western animal behavior and cognition researcher Carrie Branch and her collaborators at University of Oklahoma and University of Nevada, Reno tracked the spatial cognition and lifespan of 227 mountain chickadees for more than a decade. They found the birds with better spatial learning and memory abilities (when it came to understanding their surroundings and food storing or caching strategies) lived longer.

The study, published Sept. 5 in the journal *Science*, confirms enhanced cognitive abilities can be associated with longer lifespan in wild chickadees.

"Animals have two interests. They want to survive, and they want to reproduce, so the smart thing for them to do is whatever allows those two things to happen. We found for mountain chickadees that means knowing where to collect food, successfully storing it and remembering where they stored it so they can retrieve it later," said Branch, a psychology professor and a principal investigator at Western's Advanced Facility for Avian Research.

Cognitive ability has long been positioned as a key indicator for survival and lifespan in animals, but experiments and field tests often rely on indirect measures of mental capacity, such as brain size. Chickadees are relatively small birds and correspondingly, have small brains. Despite this seemingly physical limitation, mountain chickadees performed extremely well in the series of experiments Branch and her collaborators designed for them at a remote field site in the Sierra Nevada mountains.

"I think chickadees' specialized cognitive abilities are a product of their social dominance structure, but we are still testing that theory. For now, we can confirm chickadees have figured out how to cache and recover food using spatial cognition and the ones that do it better, live longer,"

said Branch.

Chickadees are native to North America, where they are very common. A chickadee can hide as many as 80,000 individual seeds, which they retrieve during the winter.

Living longer means more offspring too

Branch and her collaborators tested cognitive abilities in mountain chickadees using radio frequency-based feeders, which are spatially organized in groups of eight and feature motorized doors that open automatically for electronically tagged birds providing food reward when they land on the perch.

With more than a decade of data collected, the new study shows mountain chickadees with the best spatial cognitive abilities will live, on average, two years longer than those with the worst spatial cognition. Mountain chickadees breed once per year, with an average clutch size of seven eggs, and individuals with the best spatial abilities may produce more than double the number of offspring (i.e. 14 more offspring) than those with poorer cognition. In past studies, Branch and her collaborators reported females produce more offspring when paired with "smarter" males.

"This study shows that mountain chickadees with better spatial cognitive abilities are more likely to live longer, as these abilities allow them to successfully retrieve cached food while coping with harsh and unpredictable environments, including extreme weather events caused by climate change," said Branch.

More information: Joseph F. Welklin et al, Spatial cognitive ability is associated with longevity in food-caching chickadees, *Science* (2024). DOI: 10.1126/science.adn5633