

Study shows costs and benefits of testosterone in birds

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Do nice guys finish last, or will the meek inherit the earth? A new study published in *The American Naturalist* suggests that, at least for birds, the right answer is somewhere in between.

Individual male birds can differ dramatically in their behavior, and this difference is often due in part to how much testosterone they produce. In many species, some males produce high testosterone and are more aggressive, while others produce lower levels and are more parental.

Testosterone and the behaviors it mediates may predict how well a male succeeds. For example, an aggressive male may be more likely to obtain high-quality territories that attract females. At the same time, [aggression](#) might pose a survival risk, because aggressive males might be more likely to engage in costly fights. These considerations suggest that hormones like testosterone might be under strong [natural selection](#) in the wild.

To test this idea, a team of researchers from Indiana University studied a common [songbird](#), the dark-eyed junco in the Appalachian Mountains of Virginia. They tested how much testosterone a male could produce by using an injection of a hormone produced in the brain that causes the bird to increase its testosterone levels temporarily, mimicking what they do naturally when fighting with other males. The researchers then followed the birds, measuring their survival and success at reproduction, both in their own nest and those of their neighbors.

They found strong relationships between testosterone and both reproduction and survival, demonstrating that natural selection is currently acting on testosterone production in this population of juncos. The exact pattern of selection they found was surprising, however. "The males that did the best at both survival and reproduction had testosterone production very close to average," said Joel McGlothlin, the lead author of the study who is now a postdoctoral fellow at the University of Virginia. "It was bad to produce either really high or really low levels of testosterone." High-testosterone males did have one universal advantage—they were more likely to be the genetic father of the offspring raised in their nests.

These results indicate that the trade-offs that testosterone regulates are quite complex. "It's not as simple as saying testosterone is good for reproduction and bad for survival," McGlothlin said. "[Testosterone](#) seems to underlie this delicate balance between competing traits and behaviors, and the right balance might be different for different males."

Provided by University of Chicago

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