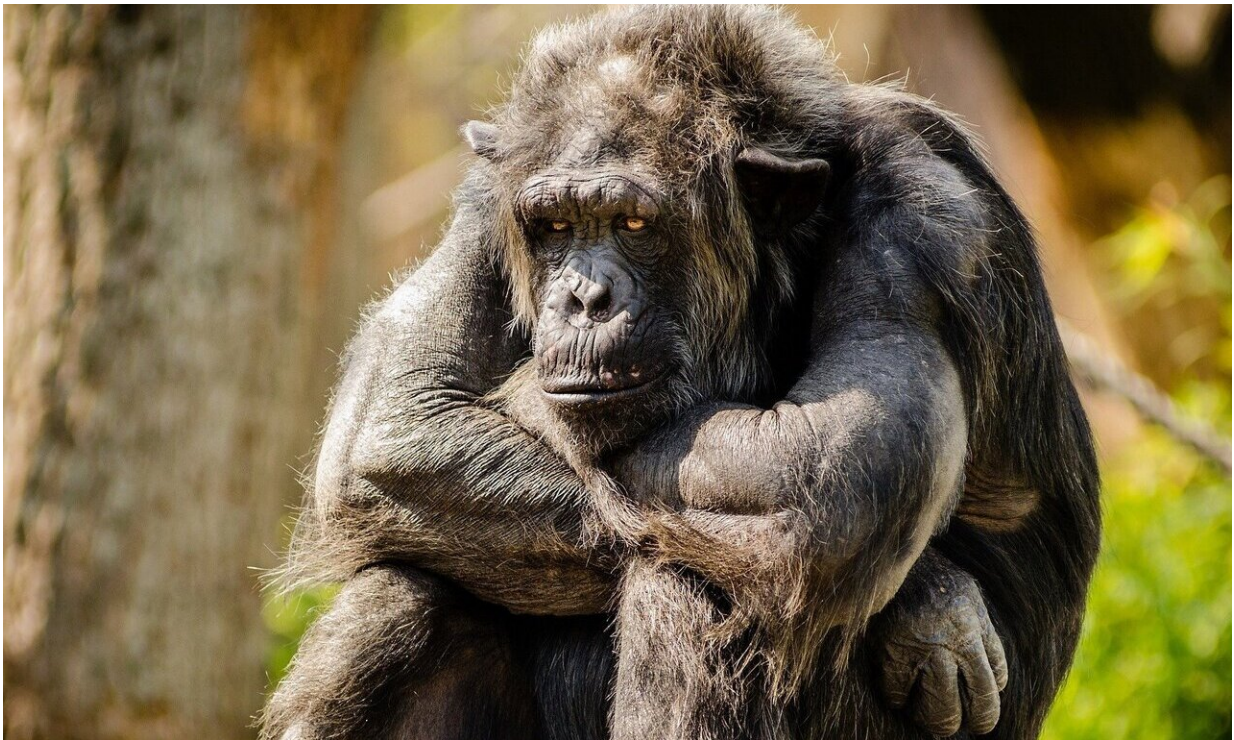


Study shows building bonds between males leads to more offspring for chimpanzees

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If you're a male chimp looking for love—or offspring—it pays to make friends with other males.

A study led by the University of Michigan, in collaboration with Arizona State and Duke universities, examined why male chimpanzees form

[close relationships](#) with each other, and found that [male chimpanzees](#) that build strong bonds with the alpha male of the group, or with a large network of other [males](#), are more successful at siring offspring. The results are published in the journal *iScience*.

"One big question that biologists have had for a long time is why you see so many friendly behaviors such as cooperation and alliance in animals," said lead study author and U-M postdoctoral researcher Joseph Feldblum. "One would expect to see these [social bonds](#)—or strong, friendly social relationships—only if they provide some sort of fitness benefit to the individuals. Males wouldn't spend all this time grooming other males and forgoing trying to find females or food unless you get some kind of benefit from it."

One benefit would be the opportunity to sire more offspring, but no previous studies have looked at the link between social relationships and reproductive success in chimpanzees. Much of the research in this area has been done in female primates, who are primarily concerned with accessing resources in order to reproduce quickly. For males, the biggest task is getting reproductive access to females, says Feldblum, also an assistant professor in the U-M Department of Anthropology and member of the Michigan Society of Fellows.

"Chimps cooperate frequently, and often in these very dramatic ways: You see things like grooming, all kinds of complex alliance formation and group territorial defense," Feldblum said. "The question is: What do males get out of it and how?"

It turns out, they get babies.

One function of these social bonds, the researchers found, is to help males gain access to mating opportunities they wouldn't otherwise be able to get without help from their friends. To examine the link between

sociality and paternity success, the researchers examined behavioral and genetic data from a population of chimpanzees living in western Tanzania. The group is part of the ongoing study of chimpanzees in Gombe Stream National Park, begun by Jane Goodall in 1960.

The researchers began by constructing a base model that captures the effects of male age, dominance rank and genetic relatedness to the mother on male siring success. They first used the model to look at 56 siring events with known paternity between 1980 and 2014. Then, they tested whether adding measures of male social bonds to the models improved their ability to predict which male would sire a given offspring.

They found that males with more strong association ties—males with the highest number of social bonds with other males—had a higher likelihood of siring offspring. In fact, two or more strong association ties meant a male chimpanzee was more than 50% more likely to sire a given offspring, after accounting for the chimp's age, relation to the mother and dominance rank score.

Next, the researchers wanted to understand how a chimp's relationship to the alpha male underpinned male reproductive success. To do this, they examined the role of strong bonds with the alpha male, looking at 45 siring events by non-alpha males. They generated the same base model, this time comparing the model with models that included several measures of bond strength with the alpha male, among other measures.

The model that fit best included what is called the composite sociality index, which includes grooming and association with the alpha male. It showed that subordinate males with strong bonds with the alpha male, as well as those with many strong association ties, were more likely to sire a given offspring.

"Sucking up to the boss is nothing new," said co-author Anne Pusey of Duke University. "We show that it's always paid off."

But the researchers also found that two factors—a strong [bond](#) with the alpha male and many strong association ties—both independently contributed to reproductive success.

In animal behavior, coalition formation is when two or more individuals jointly direct aggression toward a third or another group of individuals. According to previous research, individuals that are more central in the network of coalitions tend to rise in rank and sire more offspring.

In the current work, the researchers showed that males who form stronger ties are also more likely to form coalitions, and the researchers hypothesize that this larger alliance network helps males gain mating opportunities. They also found that forming these many strong bonds leads to chimps' improvement in rank within the group; those that made it to the alpha position were also more likely to sire offspring.

A clearer idea of the benefits of social relationships in chimpanzees provides clues about the evolution of friendship in humans.

"Together with bonobos, chimpanzees are our closest living relatives, and help us to identify which features of human social life are unique. This study suggests that strong bonds among males have deep evolutionary roots and provided the foundation for the more complex relationships that we see in humans," said senior author Ian Gilby, a researcher at ASU. "This research also highlights the value of long-term studies like these, which are essential for understanding the biology of a species that lives for many decades and is slow to reproduce."

Feldblum says more research is needed to tease out how coalition formations and these social bonds lead to siring success.

"Is it that if your ally is nearby, you're more likely to mate with an estrus female, or does having your allies around you protect you from harassment from other males?" Feldblum said. "Or because your ally will support you if a conflict erupts, your stress levels are lower and you can devote more energy to mating efforts? This last step we still don't know."

Gilby is an associate professor at the School of Human Evolution and Social Change at ASU, and a research affiliate in the Institute of Human Origins, which curates the data used in this study. Pusey, professor emerita at Duke, has spent the last 30 years of her career assembling, organizing and digitizing this unique dataset.

Study co-authors also include Joel Bray of ASU and Christopher Krupenye of Duke, Johns Hopkins University and Durham University in the United Kingdom.

More information: Joseph Feldblum et al, Social bonds provide multiple pathways to reproductive success in wild male chimpanzees, *iScience* (2021). DOI: [10.1016/j.isci.2021.102864](https://doi.org/10.1016/j.isci.2021.102864)

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