

# Tiny fish surprise scientists with 'volunteer's dilemma'

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Trinidadian guppies. Credit: Rebecca Padgett

Tiny fish called Trinidadian guppies have surprised scientists when faced with the so-called "volunteer's dilemma."

The idea of the dilemma is that individuals are less likely to cooperate if they are in a large group. Various studies have demonstrated this in humans—but guppies appear to buck the trend.

In a new study, by the University of Exeter, guppies in larger groups were more likely to risk approaching a predator to gather information for the shoal. The paper, published in the journal *Proceedings of the Royal Society B*, is entitled "Guppies in large groups cooperate more frequently in an experimental test of the group size paradox."

"When faced with a possible predator, guppies have to balance risks," said Rebecca Padget, from Exeter's Center for Research in Animal Behavior.

"At least one guppy needs to approach, to find out if there is a threat.

"An individual that does this could get eaten. However, if none of the guppies take this risk, the whole group is in danger.

"In this 'volunteer's dilemma,' mathematical models suggest that individuals in larger groups should be less willing to cooperate.

"In a larger group, there's more chance another guppy will take the risk."

To test this, the researchers placed a clay model of a pike cichlid (a natural predator of guppies) in a tank containing small (five), medium (10) and large (20) groups of guppies.

Surprisingly, guppies in the large groups were most likely to approach and inspect the predator. Individuals in large groups inspected an average of 14 times in the seven-minute trials. Guppies in medium groups were least likely to approach—going an average of seven times each.

Members of these medium groups also spent the most time in "refuges" (behind plants or near the gravel at the edge of the tank). "We can't be sure why guppies in large groups cooperated more," Padget said.

"We know guppies have different personalities, so it could be that larger groups are more likely to contain more cooperative individuals—and others then follow their lead."

After inspecting a predator, [guppies](#) return to the group. Previous research has shown that their behavior then signals danger to the others.

In the study, an "inspection" was recorded when a guppy went within 30cm of the [predator](#). This was usually done either by individuals or small sub-groups of the main [shoal](#).

**More information:** Rebecca F. B. Padget et al, Guppies in large groups cooperate more frequently in an experimental test of the group size paradox, *Proceedings of the Royal Society B: Biological Sciences* (2023). [DOI: 10.1098/rspb.2023.0790](https://doi.org/10.1098/rspb.2023.0790)

Provided by University of Exeter

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