

Running on rocket fuel

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In the world of "cut and thrust," humans try to bank money to obtain financial security, and often form cooperatives to reduce risks and increase gains. Many humans also end up in poverty traps, where because of meager resources and an increasingly high cost of living they find themselves unable to raise their heads above the parapet and "never make it."

Over a 20-year period, Gregory Rasmussen, currently at Lady Margaret Hall Oxford, intensively studied every move of African wild dogs in Zimbabwe to the extent of "living with packs" for periods of up to a month in order to work out how much energy they were spending eating, sleeping, and running. He came to the conclusion that "whilst to date we have seen poverty traps as being something intrinsically human, they are not!"

Nature's currency is energy, and in theory, keeping the cost of living low leaves more in the "piggy bank" for reproduction. However, staying in nature's fast lane isn't easy, and necessitates that evolution comes up with a "business plan" to bank energy (nature's surrogate for wealth!) to survive. In the face of bigger competitors like lions and hyenas, whose larger stomachs cater for irregular meals, and which maximize returns by having low foraging costs, the dogs' evolved a unique plan.

Now highly endangered, the African wild dog opted for extreme metabolic adaptations to running, thus ensuring they caught a regular supply of food, and by forming packs, had many runners to reduce capture costs and stomachs to maximize on the returns. This great



strategy, however, has an Achilles heel as packs fewer than five are less effective hunters, and thus have to undertake energetically expensive extra hunts to secure their prey. The results from this study highlighted a weakness in the business plan, for when the financial energetic annual accounts were done, the benefits of having fewer individuals to feed in a smaller packs was outweighed by the greater costs of running. To chase their prey, wild dogs need to be lithe and athletic, a design that ensures their stomachs can't be too big, which in turn limits the amount they can gorge in a sitting: a physical limitation on their gluttony which biologist call "a morphological constraint."

In the same way that Size Zero women can struggle to have children, and bouncing babies, this study highlighted an Achilles heel where energetic poverty translated into reproductive poverty, and a vicious circle whereby small packs have fewer pups, leading to even smaller packs, and driving them into an extinctive vortex.

From a conservation standpoint, these results demonstrate how evolutionary strength gained by sociality can be undermined by an Achilles heel that can push species into extinction. Professor David Macdonald, Director of the Wildlife Conservation Research Unit, known as the WildCRU, which specializes in the science to underpin practical solution to conservation problems, said "This study, unique in its detail, shows the power of energetic theory to enable us to not only understand the evolution of packing power, and facets that dictate the survival of this stunningly beautiful species, but better understand how to conserve other social species of which we are one."

Citation: "Achilles' Heel of Sociality Revealed by Energetic Poverty Trap in Cursorial Hunters," by Gregory S. A. Rasmussen, Markus Gusset, Franck Courchamp, and David W. Macdonald. *American Naturalist* (2008) 172:508 DOI: 10.1086/590965



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