

Men May Share More Genes With Sisters' Kids Than With Wife's

A University of Utah study produced new mathematical support for a theory that explains why men in some cultures often feed and care for their sisters' children: where extramarital sex is common and accepted, a man's genes are more likely to be passed on by their sister's kids than by their wife's kids.

The theory previously was believed valid only if a man was likely to be the biological father of less than one in four of his wife's children - a number that anthropologists found improbably low.

But in the new study, University of Utah anthropology Professor Alan Rogers shows mathematically that if certain assumptions in the theory are made less stringent and more realistic, that ratio changes from one in four to one in two, so the theory works more easily.

In other words, a man's genes are more likely to be passed by his sisters' children if fewer than half of his wife's kids are biologically his - rather than the old requirement that he had to sire fewer than a quarter of his wife's kids, according to the study published online in the journal *Proceedings of the Royal Society B*.

"Imagine a mutation that encourages its bearers, if they are men, to be helpful and invest resources in the children of their sisters," Rogers says. "If that man lives in a society where most of his wife's children were fathered by other men, then this gene may not be in many of his wife's children. A man really doesn't know if any of his wife's kids were fathered by him, but he knows he and his sister have the same mom. So this gene may, in fact, be in more of his sisters' children."

"Thus, over time, the frequency of this gene increases because men are increasing the survival and fitness of their sisters' children - the ones more likely to carry the gene," he adds.

The new study "shows that it is much easier than we thought for your niece to be a closer relative than your wife's daughter," Rogers says.

Why Men Help their Sisters' Kids: Theory and Debate

"Men invest in children in many ways; they care for them, feed them and leave them resources when the men die," Roger says. "But in some human societies, these are the children of sisters rather than those of wives. For decades, anthropologists have wondered why."

Extramarital mating is common in some cultures, including in central Africa and South America, he says, but not in the U.S. or other Western societies where infidelity, as prevalent as seems, much is less common by comparison.

"In some societies it is expected; it isn't seen as cheating," Rogers says. "And it isn't really just about promiscuity. Even where extramarital sex isn't common, women get divorced and remarried and have households with offspring from several men."

Rogers says: "In many societies where extramarital mating is the norm, men may not share genes with the children of wives. There is less doubt about relatedness to sisters' children. This suggests an interesting hypothesis: perhaps natural selection has shaped this practice, by encouraging males to direct investment toward genetic relatives."

"There was great enthusiasm for this idea during the 1970s, until a problem came to light," he continues. "Simple calculations suggested that the explanation collapses unless men father fewer than about one in four of their wife's children. Many have doubted that the number - the paternity threshold number - could really be this low."

Rogers' new study shows it is much easier than that for the idea to be true - for natural selection to favor men who help their sisters' kids. He shows the theory holds true if men father fewer than half their wife's kids rather than fewer than one-quarter of those kids - something much more likely to happen in reality.

The study shows this mathematically by relaxing assumptions previously made as part of the uncle-caretaker theory.

Rogers says it isn't enough to take into account the probability of paternity - the odds that a child's biological father also is his mother's husband. The new study shows that if the assumptions made in old studies are relaxed, another parameter also must be measured: "the probability a brother and sister had the same biological father. The higher that probability, the more closely related a man is to his sister and his sister's kids."

Making Old Assumptions More Realistic

Rogers examined four assumptions made in previous studies and changed them to be more realistic. In this more

realistic theory, men are more likely to share genes with their sister's children than under the old theory.

The first two assumptions of the existing theory were that "women are equally receptive to extramarital affairs and that each has an infinite number of paramours," says Rogers. "These assumptions both lower estimates of relatedness between men and the children of their sisters. Relaxing either assumption increases our estimate of the fitness payoff to men who invest in children of sisters."

[Rogers notes the theory applies to a man's sisters' children, but not to his brothers' children "because your brother has no more confidence than you do about the paternity of his wife's children. Sisters are a better bet, because they know who their kids are."]

"Previous calculations assume every woman in the population is equally promiscuous," Rogers says. "If you relax that assumption and instead assume some women are more promiscuous than others, it means men are more likely to share genes with their sisters' children."

"The earlier theory also assumed every woman had an infinite number of boyfriends," instead of a range from one to infinity, he adds. "It made the math simple - and it gave you a wrong answer."

The new study showed mathematically that a man's relatedness to his sister's kids increases if his wife has fewer rather than more extramarital partners and if she allocates sex - and thus having children - unevenly among them.

A third problem with previous studies is that they assumed resources given to any child were equally valuable. Rogers says that didn't account for the fact that giving your wife's kids twice as many resources isn't necessarily twice as good - once the kids have what they need - but may be only half again as good for them. So the man may be better off also giving resources to his sisters' kids.

"The old model didn't account for that, and because of that, it biased things in favour of the wife's children. When the nieces and nephews share fewer genes, they end up getting zero resources rather than some reduced share, as they should."

The fourth problem with most previous calculations was that they didn't account for a simple reality: "The best thing for a man to do depends on how his wife is going to respond," Rogers says. "If wives punish their husbands one way or another for delivering goods to their nieces and nephews, it's not just the husband deciding what is best for the husband. Women have an active role in all of these decisions and that role was ignored in the previous model."

Another study published recently took that into account, making it easier to understand how natural selection might favour men who invest in their sisters' offspring.

Rogers believes that natural selection and genetics ultimately contributes to people helping their relatives in most cultures, even if the primary motivation may be tax breaks for those who provide cash gifts to relatives rather than passing on one's genes.

"People are nice to relatives all over the world, and I think selection has something to do with that," he says.