Why has same-sex sexual behavior persisted during evolution?

August 24 2021, by Brendan Zietsch

Credit: Pixabay/CC0 Public Domain

Same-sex sexual behavior may seem to present a Darwinian paradox. It provides no obvious reproductive or survival benefit, and yet same-sex sexual behavior is fairly common—around 2-10% of individuals in diverse human societies—and is clearly influenced by genes.

These observations raise the question: Why have genes associated with same-sex sexual behavior been maintained over evolutionary time? Given that evolution depends on genes being passed down through the generations via reproduction, how and why were these genes passed down too?

In a new paper published in *Nature Human Behavior*, my colleagues and I tested one possible explanation: that the genes associated with same-sex sexual behavior have evolutionarily advantageous effects in people who *don't* engage in same-sex sexual behavior.

Specifically, we tested whether those genes are also associated with having more opposite-sex partners, which might therefore confer an evolutionary advantage.

To investigate this, we used genetic data from more than 350,000 people who had participated in the UK Biobank, a huge database of genetic and health information.

These participants reported whether they had ever had a same-sex partner, and also how many opposite-sex partners they had had in their lifetime.

We analyzed the association of millions of individual genetic variants with each of these self-reported variables. For both variables, there were not only one or a few associated genetic variants, but very many, spread throughout the genome. Each had only a tiny effect, but in aggregate, their effects were substantial.

We then showed that the aggregate genetic effects associated with ever having had a same sex partner were also associated—among people who had *never* had a same-sex partner—with having had more opposite-sex partners.

This result supported our main hypothesis.

Further exploration

We then tried replicating and extending our findings.

First, we successfully replicated the main finding in an independent sample.

Second, we tested whether our results still held true if we used different definitions of same-sex sexual behavior.

For example, did it still hold true if we tightened the definition of same-sex sexual behavior to cover only those individuals with *predominantly* or *exclusively* same-sex partners (rather than including anyone who has ever had one)?

Our results remained largely consistent, although statistical confidence was lower due to the smaller sub-samples used.

Third, we tested whether physical attractiveness, risk-taking propensity, and openness to experience might help to account for the main result.

In other words, could genes associated with these variables be associated with both same-sex sexual behavior and with opposite-sex partners in heterosexuals?

In each case, we found evidence supporting a significant role for these variables, but most of the main result remained unexplained.

So we still don't have a solid theory on exactly how these genes confer an evolutionary advantage. But it might be a complex mix of factors that generally make someone "more attractive" in broad terms.

Simulating evolution

To investigate how the hypothesized evolutionary process might unfold, we also constructed a digital simulation of a population of reproducing individuals over many generations. These simulated individuals had small "genomes" that affected their predispositions for having same-sex partners and opposite-sex reproductive partners.

These simulations showed that, in principle, the kind of effect suggested by our main result can indeed maintain same-sex sexual behavior in the population, even when the trait itself is evolutionarily disadvantageous.

Crucially, our simulations also showed that if there were no countervailing benefit to genes associated with same-sex sexual behavior, the behavior would likely disappear from the population.

These findings give us intriguing clues about the evolutionary maintenance of same-sex sexual behavior, but there are important caveats too.

An important limitation is that our results are based on modern, Western samples of white participants—we cannot know to what extent our findings apply to other ethnicities or cultures in different places and times. Future studies using more diverse samples may help clarify this.

On a final note, I am aware some people believe it is inappropriate to study sensitive topics such as the genetics and evolution of same-sex sexual behavior. My perspective is that the science of human behavior aims to shine a light on the mysteries of human nature and that this involves understanding the factors that shape our commonalities and our differences.

Were we to avoid studying sexual preference or other such topics due to political sensitivities, we would be leaving these important aspects of normal human diversity in the dark.

More information: Brendan P. Zietsch et al, Genomic evidence consistent with antagonistic pleiotropy may help explain the evolutionary maintenance of same-sex sexual behaviour in humans, *Nature Human Behaviour* (2021). DOI: 10.1038/s41562-021-01168-8

Provided by The Conversation

Citation: Why has same-sex sexual behavior persisted during evolution? (2021, August 24) retrieved 19 April 2024 from https://phys.org/news/2021-08-same-sex-sexual-behaviour-persisted-evolution.html