Why do women go through menopause?

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Credit: AI-generated image (disclaimer)

Menstruation is a reproductive quirk that humans share with only a few other mammals. But even stranger is the fact that women stop menstruating when they have a whole third of their lives left to live.

All animals have a finite reproductive life. But more often than not, their reproductive system winds down at roughly the same time as every other system in the body – the menopausal killer whale is a notable exception.

The ability to bear children gradually declines throughout a woman's reproductive life. The average age at which a woman's ability to natural conceive ceases is 38.

But when the fertility free-fall of menopause kicks in between the ages of 45 and 55, complete sterility is the inevitable result. No more ovulation, no more menstruation, and no more opportunities to procreate.

In contrast, males experience only a slight decrease in fertility in their senior years.

Giving kids a head start

Evolutionary theory predicts that life span and reproductive span should synchronise – why go on living if you are unable to go on breeding, bolstering the contribution of your genes to the next generation?

One reason for dialling back reproduction could be to maximise the level of nurturing available for children that already exist. Human infancy is marked for its length and also for the degree of dependence that infants have on their parents. Perhaps menopause is a reproductive compromise to ensure that a woman's last born makes it out of the nest safely.

But this would only account for a ten or 15 year difference between menopause and death – much less than usually occurs.

Grandmothers and daughters-in-law

Another suggestion – dubbed the grandmother hypothesis – is that menopause enables women to provide for their grandchildren.

In evolutionary terms, a person is said to be "fit" if they are able to pass on their genes to future generations by reproducing. Given that our children bare 50% of our genes – the other 50% from our partner – and our grandchildren share 25% of our genes, a grandmother providing for her grandchildren still results in evolutionary fitness.

The numbers don't add up, though. The fitness benefit of caring for grandchildren is less direct and, in the end, less potent than if the grandmother were simply able to have more children of her own.

A more recent hypothesis centres on the age-old conflict between women and their mothers-in-law. This intergenerational reproductive argy-bargy is apparently the result of ancestral daughters-in-law joining a partner's family. The daughter-in-law gains nothing by helping her partner's mother to reproduce, but the mother-in-law does benefit in an evolutionary sense by helping her own grandchildren to be raised.

Instead of having two competing females in the one clan reproducing, the older female relinquishes her own reproduction in favour of helping her daughter-in-law raise her grandkids.

Similarly to the grandmother hypothesis, the reproductive conflict hypothesis could explain why reproduction ceases at around the same time as a woman reaches the age at which she is likely to become a grandmother.

But a recent study of pre-industrial Norwegian women casts doubt on this reckoning of evolutionary events. The study found that grandmothers who had a reproductive overlap with their daughters-in-law had more grandchildren, not less.

A fluke of nature

So, perhaps it is to happenstance that we must turn for an explanation for menopause. Could it be that menopause is simply an evolutionary hitchhiker; a trait that has come along for the ride without providing any adaptive benefit?

It's possible, for example, that menopause could be the result of a physiological trade-off that favours efficient reproduction early on.

In searching for an answer to why women live for so long post-fertility, palaeontology has reminded us of a very important fact: old age is actually relatively new age. Early human fossils are invariably young, and it wasn't until a few thousand years ago that anyone lived into the senior years we have now grown to expect.

It is highly likely, therefore, that our long-lost great-great grannies didn't live long enough to experience the hot flushes, night swears and yo-yo-ing hormones of the modern-day menopause. They never lived long enough to be denied the children that menopause robbed them of, because they may not have reached menopausal age at all.

We can be thankful for our longer lives, but menopause may be the cost women endure for it.

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