

In most ways, women age better than men and live longer. Scientists are trying to figure out why

November 22 2021, by Stacey Burling



Credit: CC0 Public Domain

Consider 100 baby boys and 100 baby girls born in 1950. Experts predict that 46 of the men and 61 of the women—a third more—will still be alive at age 80 in 2030.

Even Steven Austad, an expert on aging at the University of Alabama at Birmingham, didn't give statistics like that much thought until about 10 years ago. Everyone knew that women outlived men. He figured it was just because men had more heart disease.

But Austad, who is senior scientific director of the American Federation for Aging Research, is a sucker for topics that others take for granted, and he dug deeper. He learned that girls started out-surviving boys even before they were born and that their survival advantage lasted throughout life. It was present in virtually every country, rich or poor. Women were more likely to live through natural disasters, famines, pandemics (including COVID-19) and many of the diseases that most often kill human beings. "Under almost any condition we can imagine, women do better," he said.

A rare upside for men was that those who made it to their senior years were less disabled than female peers. There were also surprising studies that found that a few drugs that extended the life of male mice did nothing for females. "That's a really stunning result," said Richard Miller, a biogerontologist who directs the Paul F. Glenn Center for Aging Research at the University of Michigan and has been studying life-extending drugs in mice. One medication, he said, worked in both sexes.

Austad and a growing cadre of researchers started to think that these

differences in aging between men and women were fundamental to human biology and potentially much more complex—and divergent—than many had assumed. They are now in the early stages of studying how our chromosomes and genes, hormones and immune systems influence how long and how well we live, with an eye toward expanding our healthy lifespans.

"If we could find a way to make men live as long as women and make women be as healthy as men later in life, then we would have an enormous impact on our lives," Austad said.

Candace Kerr, a stem cell biologist in the division of aging biology at the National Institute on Aging, agreed that understanding these sex differences could improve the health of both men and women as they aged. It paves the way to finding sex-specific targets for disease, she said.

How different are we?

For decades, scientists assumed that information they gleaned from male patients and male lab animals would naturally apply to females, as well. Since 2016, the National Institutes of Health has required scientists to incorporate males and females into the design, analysis and reporting of clinical research studies of people and vertebrate animals.

Now researchers are finding unexpected differences throughout our bodies, but they say it's too soon to draw sweeping conclusions. "I think that we are in a renaissance of sorts in really beginning to understand and appreciate the differences," said Dena Dubal, a neurologist at University of California-San Francisco who studies how to slow aging with a focus on hormones and genetics. Her research has found fascinating evidence of the benefits women may derive from their second X chromosome.

The signs that women are the tougher sex when it comes to health are copious. Eighty-five percent to 90% of centenarians are women. All of the world's 10 oldest people with credible birth records were female, Austad said. In 2018, women died at a lower age-adjusted rate of 13 of the top 15 causes of death, according to the National Center for Health Statistics. There was no sex difference for stroke. Women were more likely to die of Alzheimer's disease, although men who get dementia die of it more quickly, said Michelle Mielke, a Mayo Clinic epidemiologist who studies sex differences in neurodegeneration.

"Women tend to die of the same basic things that men do, but they die at later ages," Miller said.

At the cellular level, women's brains look four to five years younger than men's, Dubal said. Many biological markers indicate faster aging in almost all of the tissues in male bodies, Kerr said. Women get heart disease later. Their vascular health is generally better than men's, although they have more disease in small blood vessels in late life, Mielke said. Women's immune systems respond more quickly to viral invasions. This is one explanation for why they're more likely to recover. It may also be why they're more prone to autoimmune diseases than men.

Then we come to what Austad calls the "morbidity-mortality" paradox. Men who survive into late middle age and old age tend to have less disability than women. One theory is that men die of diseases that women survive, but the women do not emerge unscathed. "Many women will survive and remain fairly functional after diseases that men would have died from," Miller said.

Anne B. Newman, a geriatrician and epidemiologist at the University of Pittsburgh, added that women are more prone to arthritis, which causes disability. Everyone loses muscle mass with age, and women start out

with weaker muscles and a higher percentage of body fat. Women are also more prone to osteoporosis after menopause, and that puts them at risk for broken hips. There are more older women with frailty, partly because frail men don't live long.

"Women are just physically less endowed to keep moving as they get older," Newman said.

It's never too late to start moving, but you may not catch up to lifelong exercisers

As to why women live longer, the theories are many and complex.

The gap between male and female lifespan widened during the 20th century. Caleb Finch, a biologist at the University of Southern California who studied that phenomenon, thought lung cancer and heart disease accounted for most of the difference. He also studied an indigenous Bolivian population whose pre-industrial lifestyle included exercise and a healthy diet. People there had very little coronary artery disease, but men still had more evidence of blood vessel damage than women.

Newman added that women began living longer when better medical care meant they less often bled to death or became infected during childbirth. She thinks that qualities that allow women to successfully carry a child, such as the ability to tolerate stress and store additional nutrition, may lengthen their lifespans.

You can't ignore behavior. Men are more likely to smoke and eat fatty food. They're also less likely to see doctors regularly and get cancer screenings and flu and COVID-19 vaccines. They more often age in isolation. "Behavior feels like more than half of the picture," said Aroonsiri Howell, a Temple Health geriatrician.

Young men are prone to risky and potentially deadly activities, a period that Austad calls "testosterone dementia." Their death rate compared to women's slows after 35 or so, but it's still higher.

Finch said trying to tease out what's affecting our aging is like analyzing a "hoard of arrows shot into the air" at the same time but traveling at different rates. Genes and hormones matter, but "the role of culture and society in shaping the outcomes is also huge and not easy to define at the molecular level."

Two x's may be better than one

Beyond behavior, much current research focuses on hormones and sex chromosomes. Women have two X chromosomes, one from their mother and one from their father. Men have an X from their mother and a Y from their father.

Those two X's give women a richer dose of X-related genes. In each cell of a woman's body, one X dominates and the other is mostly inactivated, but it's not always the same X. Early in life, the mom and dad X's may split the work fairly evenly, but, as women age, the fitter X may take on a bigger role, Austad said. Plus, scientists now know that the "inactivated" X isn't really inactivated. About 15% of its genes are functional.

Austad thinks the Y deserves more attention than scientists are giving it, but it's clear that it codes for many fewer genes (55) than the X (900). While the second X may give women a safety net of sorts if one of their X's is faulty, a man's Y chromosome is not much help when there's a problem with his X. This is why certain X-lined diseases, such as fragile X syndrome, hemophilia A, and Duchenne muscular dystrophy are more common in men.

Dubal's work with mice suggests that women's extra X complexity also gives women a longevity advantage. She used a technique that allows researchers to grow the gonads of one sex in the bodies of another, thus exposing them to the other sex's hormones. So, genetically female mice could have testicles and penises and male mice could have ovaries and vaginas. She compared four groups of mice: XX mice with ovaries, XX mice with testicles, XY mice with testicles and XY mice with ovaries. The XX mice lived the longest, regardless of their gonads.

The X accounts for about 5% of our genome, Dubal said, and it is rich in brain-related genes. This may help explain why women are more cognitively resilient. One of her studies found that 19 of those genes were associated with slower cognitive aging in women, but not in men. Three genes, meanwhile, were linked to higher levels in men but not women of misformed tau, a protein seen in the brains of people with Alzheimer's.

What about hormones?

Women may reap the benefits of the double-dose of X throughout their lives, but there's little doubt that things go downhill from an aging perspective after menopause, so hormones are clearly also a factor. Estrogen, the most important female hormone, drops markedly as a woman enters menopause. Testosterone production also slows in men.

"Estrogens are thought to be protective against a variety of diseases, whereas testosterone seem to enhance the risk of disease progression," wrote Bérénice Benayoun, a geneticist and cell biologist at the University of Southern California's Leonard Davis School of Gerontology, in a 2020 paper.

The average woman reaches menopause at 51. Studies show that later menopause is associated with longer life.

Jennifer Garrison, a neuroscientist and chemist at the Buck Institute for Research on Aging, focuses on the impact of ovarian aging in [women](#). Menopause makes a woman's body age about 6% faster, she said. It "unleashes this negative cascade of health effects," including more heart disease, cognitive decline, and bone weakening. She said the ovaries are involved in important communication channels with the brain that have systemic physical implications.

She would like to do away with menopause entirely. "There's no biological imperative to have it," she said. She thinks menopause should be a choice, "not something imposed on you by some out-of-date biology." She realizes that not every woman dreams of extra decades of periods and pregnancy fears. "Pregnancy and fertility and menstruation can potentially be uncoupled from having functioning ovaries," she said.

No doubt it will take a while to figure out how to do that, and there is no similar fix available to aging men.

In the meantime, Temple's Howell counsels male and female patients differently. She tells the men to worry about [heart disease](#) and high-fat diets. Women need to worry about preventing osteoporosis and falls.

And we all can do the usual things that promote healthier aging: Eat good food, avoid smoking and exercise.

©2021 The Philadelphia Inquirer
Distributed by Tribune Content Agency, LLC.

Citation: In most ways, women age better than men and live longer. Scientists are trying to figure out why (2021, November 22) retrieved 9 May 2024 from <https://medicalxpress.com/news/2021-11-ways-women-age-men-longer.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private

study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.