Dad brains: How fatherhood rewires the male mind

1 day ago

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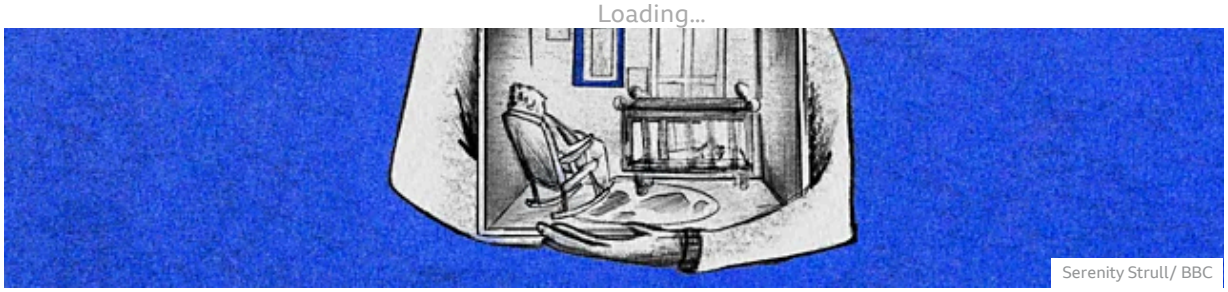

(Credit: Serenity Strull/ BBC)

From before their babies are born, men undergo serious hormonal changes that can powerfully influence their behaviour – with consequences for their child's wellbeing.

In the months before my son was born, my partner and I attended an active birth workshop, a breastfeeding session and the hospital-run antenatal course, read a small pile of pregnancy and baby books and scrolled through loads of websites. Our notepads quickly filled up.

Among my notes of that time are details of the many ways women's bodies prepare for birth and motherhood: hormones rise and drop, organs move, brains reshape.

No one, however, told me that my brain and body were also readying for fatherhood.

My son was over a year old when I first came across that idea in **Father Time**, a book by primatologist Sarah Blaffer Hrdy in which she argues that men have all the necessary biological wiring to be "every bit as protective and nurturing as the most committed mother".

This piqued my curiosity. I am a resolute believer in active fathering, but I had imagined this was a cultural decision by my generation of men. Hrdy's book, however, introduced me to an entire academic field saying that our approach is rooted in biology, just dormant and waiting to be triggered.

After interviewing Hrdy and other experts and delving into the studies, I came to a simple conclusion: fatherhood changes men in ways that echo how motherhood transforms women. The more involved a father is with their baby's care, the deeper this transition becomes. These shifts in our endocrine and neural system show that the nurturing father is not a modern aberration, but a deeply rooted biological trait.

Falling testosterone

The earliest research on how fathers are physically changed by babies came from observations of other animals. These late 20th-Century studies found that many mammalian males – including other primates – show **clear hormonal shifts**, including rises and drops in hormones like testosterone, vasoprin and prolactin, typically associated with motherhood, as they engage in active parental care.

When the American anthropologist Lee Gettler, then an undergrad student, heard about these findings in the early 2000s, he was hooked.

"I asked [my lecturer] whether anyone was studying these questions in human fathers, and the answer at that point was largely no", says Gettler, now the director of the Hormones, Health, and Human Behavior Laboratory at the University of Notre Dame in Indiana.

The **first-ever study demonstrating hormonal changes in men** had just been published in 2000 by two Canadian scholars – Katherine Wynne-Edwards and Anne Storey. By the time Gettler looked into this field, it was already an established fact that **fathers had lower testosterone** that men without kids.

"But there's a chicken and the egg problem there, right?" Gettler explained to me. "Are low testosterone men more likely to become fathers? Or does the transition to fatherhood kind of lead to this cascade of biological changes in men?"

To answer this question and others, Gettler teamed up with the scientists running a decades-long project in Cebu City, Philippines.

In 2005, this team collected saliva samples from 624 men, with an average age of 21 years old and without partners, and tested them for testosterone, then four years later tested them again. They wanted to answer two questions: would men that become fathers in the interim have lower testosterone, and would it be even lower in fathers that spent more hours doing childcare?

When **the results came back**, the answer to both questions was "yes". The men that had babies showed significantly lower levels of testosterone compared to non-fathers. And the men that had **spent longer looking after babies** showed the largest drops in testosterone. Those that **shared a bed with their infants** also had lower levels.

"I think it was the first clear message in the scientific literature that men have this capacity to prepare for fatherhood," Gettler told me. In a way, he explains, this is their biology preparing them for caregiving.

Serenity Strull/ BBC

US.

"My assumption," Rilling told me, "was that it would happen during the postnatal period after fathers spent some time interacting with their infants."

> *The lower their testosterone, the more involved they become with the mother and infant postnatally – James Rilling*

What **they found surprised them**. When they tested expectant fathers only four months after conception, two hormones were already lower than in their control group: testosterone and vasopressin. "And what's interesting is that the lower their testosterone, the more involved they become with the mother and infant postnatally," says Rilling, who in 2024 published **Father Nature**, a book exploring the science of fatherhood. He said vasopressin had a similar effect.

Rilling is intrigued about why this happens. Is there a pheromonal cue that fathers-to-be get from their pregnant partners? Is it a psychological shift once they know they are expecting a baby? As with many surprising findings in this relatively young field, we do not know. What is certain is that the changes go beyond testosterone.

A wave of the love hormone

Take, for instance, oxytocin, the **so-called love hormone**. This is one hormone I recall from my prenatal courses: we were encouraged to keep things relaxed and smooth during labour so my partner's oxytocin would flow and ease up the delivery.

Once my son was born, we were told, a huge surge of oxytocin at birth and repeated boosts through breastfeeding would help him and my partner bond. But I wasn't aware that in the first hours after his birth, as he napped on my naked chest, oxytocin was also rising in me.

Many studies around the world have found higher oxytocin in fathers, **including those with kids aged one to two years old** and those **interacting with babies** under **six months** – and that seems to correspond to the amount of time spent with our kids.

For instance, fathers that **engaged in more playful games and contact** with their children showed a rise in oxytocin, and a similar change was even evident when **the fathers first held their newborns**.

Oxytocin supercharges our paternal instinct. You can test this, Rilling explains, by spraying men's noses with the hormone and taking note of what happens.

"There's **this one study I absolutely love**," he says. "They give [dads] intranasal oxytocin as they are interacting with their infant, and they find that it makes the fathers move their head around faster." In the videocall, Rilling jolts his head from left to right and up and down, in what looks like a very convincing overexcited dad.

Such results suggest a positive self-reinforcing loop with oxytocin: as the hormone rises, a dad is more likely to engage with their child, which then triggers a further rise.

The more scientists look into this topic, the more changes they find in other hormones too. In a study published in 2025, Rilling and his team found that vasopressin – a hormone that in animals is often involved in territoriality and male-male aggression – was **suppressed in new fathers before their babies were born**.

Another surprising candidate is prolactin. In humans, this chemical is best known for its role in lactation and maternal care, but biologists have linked it with **paternal care in other animals**, including birds, fish and marmosets, a South American monkey known for its paternal instinct.

In 2023, a team led by American clinical psychologist Darby Saxbe **looked at prolactin levels in expectant fathers** and concluded that those who felt stronger bonds to their unborn child had higher levels of the hormone, and that pre-birth prolactin levels predicted how involved these fathers would be in their care.

As we have already seen with the levels of oxytocin, both of these hormonal changes are more pronounced in dads taking greater care of their babies. "It's not the case that only new moms can be hormonal", says Darbe. "It looks like men are showing some of the same kinds of adaptations and some of the same kinds of consequences."

A second adolescence

Saxbe has been investigating whether the consequences of these hormonal shifts leave their marks on **dads' brains**. "I thought fathers are actually a very interesting, almost a special population in the sense that they experience the transformations of parenthood without biological pregnancy," she told me.

Birthing mothers get a blast of hormones while carrying their children and then get another boost at childbirth. But their partner's experiences are more subtle. "So they almost allow us to disaggregate the effects of pregnancy from the effects of parenting experience," explained Saxbe, **whose book Dad Brain** is coming out this 2026.

A few years ago, her team joined forces with colleagues in Spain to scan the brains of first-time fathers before and after their children were born. They **discovered that there were neural changes underway**. Their brains were adapting to adjust to new experiences and information.

Saxbe compares this transition into fatherhood with adolescence, another critical window of development in which our brain needs to adapt to new challenges, stimuli and ideas. And **in a follow up study**, she discovered that men who felt a greater bond with their unborn baby or planned to take more parental leave had larger changes in their brain. In 2026, Rilling reported **similar evidence of brain changes in new fathers**, confirming the neurological transition.

As for many of the changes in our paternal brains and bodies, there's a use it or lose it aspect: the more involved you get, the more you change. "It's just like something is triggered," says Sarah Hrdy, the primatologist who wrote Father Time.

She believes that all human brains have the latent capacity to parent, what she calls an "**alloparental substrate**", which can be activated under the right circumstances.

Serenity Strull/ BBC

calls "one of the most exciting papers in science I'd ever read".

In it, a team of Israeli academics led by Ruth Feldman recruited heterosexual couples in which a woman provided primary care and the dad "helped", as well as gay couples raising kids without a woman involved, and scanned their brains while they watched videos of their babies.

For the straight couples, the brains of women doing primary care lit in areas related to deeper instinctual responses, such as the amygdala, while the men supporting them had more activity in social areas – that might imply they were first assessing a situation before acting.

But gay men who were giving primary care showed very similar activity in the amygdala and other "maternal" regions of the brain, while keeping the social element too.

Fatherhood was literally rewiring their brains.

Social shifts

All the experts I talked with, and the vast majority of the literature in this field, agreed that these developments in paternal biology should refocus public policy about families.

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"It's an urgent societal priority that we shore up dads' opportunity to build those connections," says Saxbe. She says that improved parental leave policies, for instance, can facilitate the bond between dads and children.

Another key change is getting men involved from the outset, Gettler told me, including by attending ultrasounds, going to appointments and actively interacting with their partner during their pregnancy.

"We know that this biology is potentially coming online during that pregnancy period as families are preparing to welcome their babies," he told me.

Active, involved fathers have benefits for the family. Mothers with more active partners have reported better mental health in many countries including **Pakistan**, **Kenya** and **the US**.

And crucially, the children benefit too. In a huge study that followed 292 families over seven years and was published in early 2026, researchers from the US concluded that **children of more attentive fathers had better heart health**. The twist: mothers' behaviour didn't have the same effect.

"I think there's a place for thinking about how the biology of fatherhood provides a foundation for structuring strong and healthy families from the outset," said Gettler.

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