

Getting too excited can stop men from orgasming, but there's a mathematical solution for that

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Credit: AI-generated image ([disclaimer](#))

The way sex is portrayed in pop culture films and music could easily give you the idea that it, at least physically, should happen easily—particularly for men.

Sex may seem like a straightforward activity but it actually involves a high degree of coordination between the brain and body parts. Recent data suggests that erectile dysfunction affects [around one in five UK men](#), with the figure rising to [50% for the 40-70 age group](#).

With this data in mind, we set out to explore how we could mathematically model the essence of sexual response in men and improve the experience. But in our study published in *Chaos: An Interdisciplinary Journal of Nonlinear Science*, we found that too much psychological arousal before or during sexual stimulation can make it difficult to climax.

Until recently, little was known scientifically about physiology and psychology of what happens when people are having sex, partly because of the taboo around it. A breakthrough came in the 1960s with the work of [US researchers William Masters and Virginia Johnson](#). They invited over 380 women and over 300 men to a lab and observed them having sex, taking notes of the physiological changes that happened.

Having collected data from over 10,000 sex acts, Masters and Johnson published their results in 1966 in their [Human Sexual Response paper](#). It proposed a paradigm of the [human sexual response cycle](#) as a sequence of excitement, plateau, orgasm, resolution. For each of these stages Masters and Johnson described in minute detail physiological changes in genital areas, as well as more general reactions, such as hyperventilation, increased pulse and [blood pressure](#), and involuntary sweating immediately after orgasm.

While sexual responses in women are less understood, the Masters-Johnson sexual response cycle for men has stood the test of time and is still the best representation of the stages men go through when having sex. Data collected by [later studies](#) showed that female sexual responses are more diverse and don't follow the linear progression of excitement-

plateau-orgasm-resolution of the Masters-Johnson model.

Practical insights

One of the criticisms of the Masters-Johnson framework was that it did not account for psychological component of sexual response. In our [mathematical model](#), we wanted to capture interactions between physiological and psychological aspects of sexual response in men. Our model focused on how the levels of physiological and psychological arousal (turn-on) change during sexual stimulation.

We combined data about physiological responses from the Masters-Johnson study with insights from five [functional magnetic resonance imaging \(fMRI\)](#) studies of people having sex from 2003 to 2011. fMRI [measures the small changes in blood flow](#) that occur with brain activity.

Our model made two assumptions. First, that psychological turn on increases when someone is physically excited, from watching porn or from observing a partner and interacting with them. We also assumed that after sex, psychological excitement eventually subsides.

Getting over excited

The results of our model show that if a man becomes psychologically overly excited, either due to their initial level of psychological turn-on before, or during sex, this can be detrimental to their chances of achieving orgasm. One explanation for this is that when someone is overly excited they are too focused on their sexual performance or achieving an orgasm.

This can cause anxiety, which is itself a state of psychological overstimulation. As a result, people can come to a frustrating state of being agonizingly close to the point of climax yet not being able to reach

it. The solution to this is to mentally switch-off and relax to allow your psychological arousal to decrease.

Another finding of our model is that the level of physical arousal decreases with psychological stimulation. Although this may seem counter-intuitive, it fits with the data from [fMRI studies](#) from around 15 years ago, in which 21 men were put inside an fMRI scanner and asked to bring themselves to orgasm either through self-stimulation or with the help of their partners.

The results showed that right before orgasm, many areas of the brain become deactivated. These include the amygdala (responsible for processing emotions and threatening stimuli) frontal cortical regions (controls judgment and [decision making](#)) and [orbitofrontal cortex](#) (integrates sensory input and takes part in decision making for emotional and reward-related behavior).

So orgasm is associated with [letting go](#)—it's a mental release as much as a physical one.

The same result follows from the [Yerkes-Dodson law](#), which over 100 years ago established that for some tasks optimal physical performance is achieved with intermediate levels of psychological arousal. For example, difficult or intellectually demanding tasks may require a lower level of arousal (to facilitate concentration), whereas tasks demanding stamina or persistence need higher levels of arousal (to increase motivation).

[Mathematical models](#) have already helped us understand the dynamics of other physiological processes, such as blood circulation, heart disease, cancer, neural firing in the brain. Applying them to such complex phenomenon such as sexual response can provide insights that can help improve sexual performance and develop new approaches to treatment

of sexual dysfunction.

What next?

Women have a [greater variety of sexual responses](#) that can include single or multiple orgasms.

[Recent data](#) suggests that while heterosexual men achieve [orgasm](#) about 95% of the time, the equivalent figure for heterosexual women is a measly 65%.

Our next step would be to explore how to develop a [mathematical model](#) to represent the dynamics of female sexual response using the latest [Basson's circular model](#), which will hopefully help close the [orgasm gap](#).

More information: K. B. Blyuss et al, Sex, ducks, and rock "n" roll: Mathematical model of sexual response, *Chaos: An Interdisciplinary Journal of Nonlinear Science* (2023). [DOI: 10.1063/5.0143190](https://doi.org/10.1063/5.0143190)

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