

Contraceptive pills might impair fear-regulating regions in women's brains

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More than 150 million women worldwide use oral contraceptives (OCs). Combined OCs (COCs), made up of synthetic hormones, are the most common type. Sex hormones are known to modulate the brain network

involved in fear processes.

Now a team of researchers in Canada has investigated current and lasting effects of COC use, as well as the role of body-produced and synthetic [sex hormones](#) on fear-related brain regions, the neural circuitry via which fear is processed in the brain.

"In our study, we show that healthy women currently using COCs had a thinner ventromedial prefrontal cortex than men," said Alexandra Brouillard, a researcher at Université du Québec à Montréal and first author of the study published in *Frontiers in Endocrinology*.

"This part of the prefrontal cortex is thought to sustain [emotion regulation](#), such as decreasing fear signals in the context of a safe situation. Our result may represent a mechanism by which COCs could impair emotion regulation in women."

Emotion regulation and contraceptives

"When prescribed COCs, girls and women are informed of various physical side effects, for example that the hormones they will be taking will abolish their menstrual cycle and prevent ovulation," Brouillard explained. However, the effects of sex hormones on brain development, which continues into early adulthood, are rarely addressed. Considering how widespread COC use is, it is important to better understand its current and [long-term effects](#) on brain anatomy and emotional regulation, the researchers said.

The team recruited women who were currently using COCs; women who used COCs previously but did not at the time of the study; women who never used any form of hormonal contraception; and men. Comparing these groups allowed the researchers to see if COC use was associated with current or long-term morphologic alterations as well as to detect sex

differences, since it is established that women are more susceptible to experience anxiety and stress-related disorders than men.

"As we report reduced cortical thickness of the [ventromedial prefrontal cortex](#) in COC users compared to men, our result suggests that COCs may confer a risk factor for emotion regulation deficits during their current use," Brouillard said.

The impacts of COC use, however, may be reversible once intake is discontinued, the researchers said. Given that the vmPFC effect found in current users was not observed in past users, the findings did not support lasting anatomical effects of COC use. This, the researchers wrote, will need to be confirmed in further studies.

Much to learn

There is still much to learn when it comes to women's brains and how they are impacted by COC use. For example, Brouillard and team are currently investigating the impact of age of onset and duration of use to delve further into the potential lasting effects of COCs. Given that many [teenage girls](#) start using COCs during adolescence, a sensitive period in brain development, user age might also impact reversibility.

Pointing to limitations in their study, the scientists said that no [causal relationship](#) can be implied between COC use and brain morphology and that generalization of their results to a general population may be limited. The researchers also cautioned that drawing conclusion from anatomical findings to behavioral and [psychological impact](#) is not possible at this point.

"The objective of our work is not to counter the use of COCs, but it is important to be aware that the pill can have an effect on the brain. Our aim is to increase scientific interest in women's health and raise

awareness about early prescription of COCs and [brain development](#), a highly unknown topic," concluded Brouillard.

More information: Morphologic Alterations of the Fear Circuitry: The Role of Sex Hormones and Oral Contraceptives, *Frontiers in Endocrinology* (2023). [DOI: 10.3389/fendo.2023.1228504](https://doi.org/10.3389/fendo.2023.1228504)

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