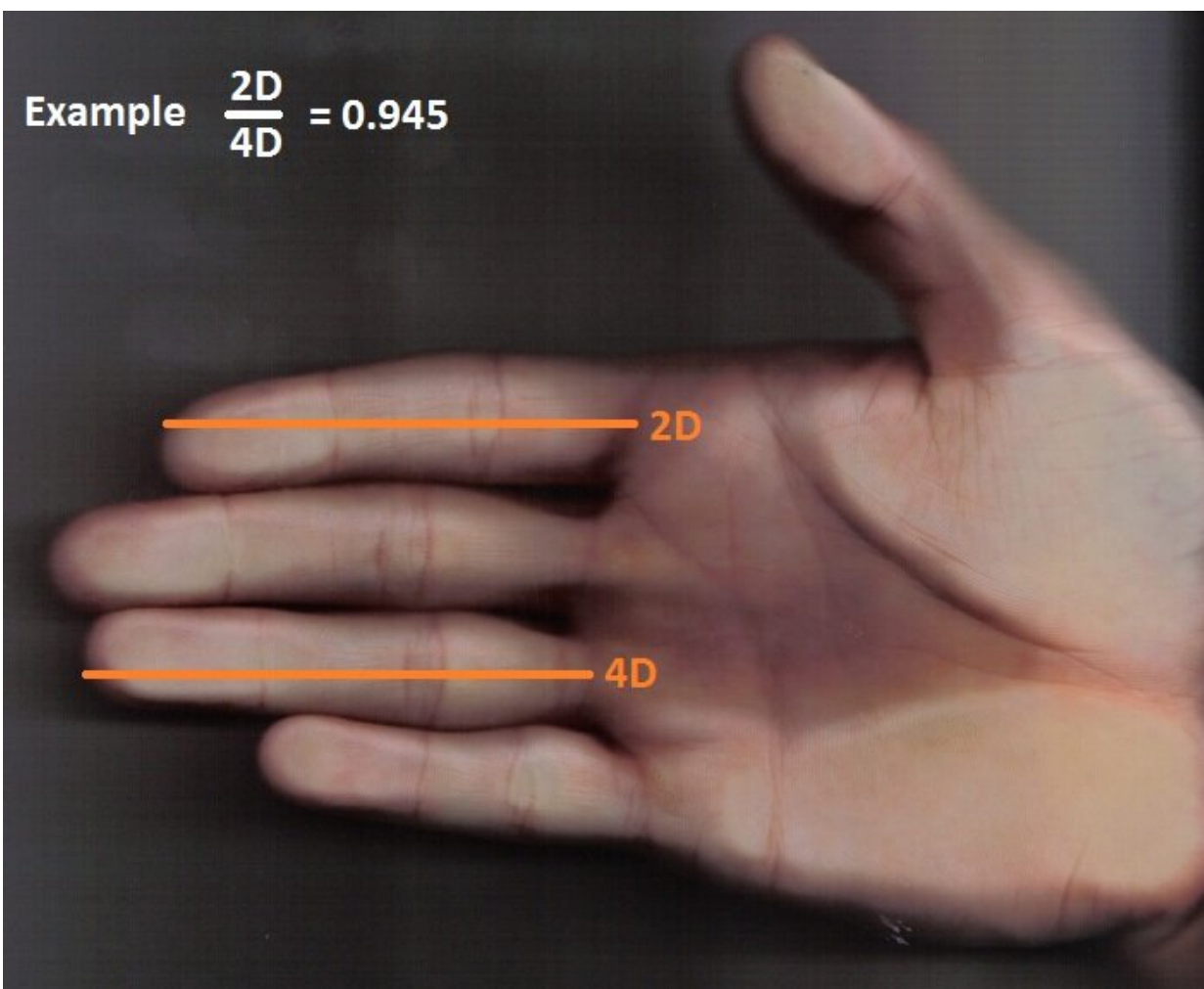


2D:4D ratio is not related to sex-determined finger size differences in men and women: study

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Credit: HSE University

The ratios between the lengths of the second and fourth fingers, known as the 2D:4D ratio, are different in males and females, which is often explained by levels of androgens and oestrogens. However, an alternative theory states that men have bigger body parts, including fingers, which impacts the 2D:4D ratio. A research team including HSE University scholars refuted this hypothesis by collecting data on finger length from 7,500 people. The results of the study were published in *Scientific Reports*.

The assumption with 2D:4D ratio is that the [ring finger](#) in men is longer than the index finger, while in women, these fingers have equal length or the [index finger](#) is longer than the ring one. It is believed that the ratio is due to differences in [sex hormones](#)—androgens and oestrogens—particularly during prenatal development.

However, not all researchers agree with this theory. Some believe that 2D:4D ratio differences are only due to differences in total [finger length](#) and their uneven growth (allometry) in men and women, which is related to specifics in bone or fat tissue development; prenatal hormone levels don't play any role.

To test this hypothesis, the researchers collected data on finger length and 2D:4D ratio from over 7,500 people, including representatives of the three big races, different ages and nationalities; they then compared the 2D:4D ratios and finger lengths in these cohorts.

It had been assumed that if differences in total finger lengths rather than sexes impact the 2D:4D ratios, then these two indicators will be correlated. But the [data analysis](#) showed no evidence of this: sex differences in 2D:4D ratios were present in all nationalities and ages, while finger lengths in men and women varied. In addition, boys and girls under 13 had about the same finger lengths, while the 2D:4D ratios were already present.

The lack of correlation between total finger length and 2D:4D ratio does not confirm the alternative explanation of the ratio differences in males and females based on allometry hypothesis. It is likely that sex and sex hormone levels directly impact the 2D:4D ratio.

"2D:4D ratio is a sexually dimorphic characteristic, while its degree in total and in sex differences varies from population to population. These variations can be explained by both [genetic factors](#) and specific environmental factors, such as nutrition and stress levels," explained Marina Butovskaya, Chief Research Fellow at the HSE International Centre of Anthropology. "The 2D:4D ratio can't be considered a universal masculinization marker, but it makes sense to use it among other indicators to evaluate the risks of estrogen abundance in embryos and the possible consequences for human health."

More information: Marina Butovskaya et al, Sex, population origin, age and average digit length as predictors of digit ratio in three large world populations, *Scientific Reports* (2021). [DOI: 10.1038/s41598-021-87394-6](#)

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