

# Does Your Finger Length Reveal Psychopathic Tendencies?

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## STORY AT-A-GLANCE

- › The index finger-to-ring finger-ratio (2D:4D-ratio) is linked to exposure to hormones, specifically testosterone and estrogen, in the womb
- › A lower 2D-to-4D ratio – meaning the ring finger is longer than the index finger – signals an increased likelihood of certain psychiatric disorders
- › In one study, people with psychiatric conditions had significantly lower 2D-to-4D ratios compared to those without
- › Those with both amphetamine use disorder and antisocial personality disorder had the lowest 2D-to-4D ratios
- › Having a lower 2D-to-4D ratio was also linked with higher ‘Dark Triad’ (DT) traits, which involve narcissism, Machiavellianism and psychopathy

Take a look at the length of your index finger and your ring finger. Is your ring finger longer? If so, it could be a sign of psychopathic tendencies and antisocial personality traits.<sup>1</sup> This is because the index finger-to-ring finger ratio (2D-to-4D ratio) is linked to exposure to hormones, specifically testosterone and estrogen, in the womb.

These exposures may have a lasting effect on human health and behavior, it turns out. A lower 2D-to-4D ratio – meaning the ring finger is longer than the index finger – is associated with higher testosterone exposure and lower estrogen exposure in the womb during the first trimester. It also signals an increased likelihood of certain psychiatric disorders, according to research published in the *Journal of Psychiatric Research*.<sup>2</sup>

# Digit Ratios May Predict Eating Disorders, Personalities, Obesity and More

Digit ratios, particularly the 2D-to-4D ratio, is widely considered a proxy for prenatal sex hormone exposure. As such, there are noted differences between men and women, with males, who are exposed to more testosterone, typically having lower ratios than females.

Further, in men a lower 2D-to-4D ratio is linked with physical aggression and enhanced sports performance,<sup>3</sup> while lower digit ratios are also associated with being left-handed, an increased risk for anxiety and, in females, assertiveness. But the tendency for digit ratio to predict behavior and health status goes even further, as digit ratios, whether low or high, are associated with:<sup>4</sup>

Numerical competencies	Spatial skills	Handedness
Cognitive abilities	Academic performance	Sperm counts
Personalities	Obesity	Migraine
Eating disorders	Depression	Myopia
Autism		

"The topic is interesting, because the relation of the lengths of index finger (2D) and ring finger (4D) is one of the most robust biological markers formed during the prenatal stage with a remarkable impact later on an adult's behavior," Serge Brand of the University of Basel and Kermanshah University of Medical Sciences told PsyPost, adding:<sup>5</sup>

*"More specifically, a lower 2D:4D-ratio, that is to say, that the index finger is shorter compared to the ring finger, is strongly associated with an increased exposure to testosterone and with a decreased exposure to estrogen during the prenatal stage.*

*Now, several original studies, meta-analyses and systematic reviews showed that a lower 2D:4D-ratio as a proxy of prenatal sex steroid exposure enables an adult organism to outperform in behavior in case of necessity.*

*What was unclear so far was, if such sex steroid exposure during the prenatal stage might be mirrored in an adult's behavior such as amphetamine use disorder and antisocial personality disorder."*

Brand and colleagues conducted a study to find out, assessing whether 2D:4D ratios differed among people with amphetamine use disorder (AUD) and antisocial personality disorder (ASPD), which involves manipulative, impulsive and often criminal behavior.

## **People With Psychiatric Conditions Have Lower 2D-to-4D Ratios**

To calculate digit ratio, the length of the index finger (2D) is divided by the length of the ring finger (4D). A ring finger that's longer than the index finger, which leads to a lower digit ratio, suggests higher exposure to testosterone in the womb.

The study involved 44 people with AUD, ASPD or both AUD and ASPD, along with 36 healthy controls. Those with the psychiatric conditions had significantly lower 2D-to-4D ratios compared to those without. Further, those with both AUD and ASPD had the lowest 2D-to-4D ratios. Having a lower 2D-to-4D ratio was also linked with higher 'Dark Triad' (DT) traits, which involve narcissism, Machiavellianism and psychopathy.

According to the study:<sup>6</sup>

*"The lower the 2D:4D-ratio, the higher the DT scores among the clinical sample. In our opinion, this finding is of greater importance, in that DT traits were associated with various types of negative psychosocial and psychological outcomes, including IU [intolerance of uncertainty], callous affect and interpersonal manipulation.*

*Given this, it appears that DT traits could be biologically rooted in higher testosterone and lower estrogen concentrations during the fetal phase of the first trimester."*

Even the researchers were surprised to see such a strong association between greater psychopathology symptoms and a longer ring finger compared to the index finger. Brand told PsyPost:<sup>7</sup>

*"We were surprised to observe such a linear association between higher symptoms of psychopathology and lower 2D:4D-ratios. That is to say: The more an adult participant had signs of psychopathology, the more it appeared that this adult has been exposed to higher testosterone concentrations and lower estrogen concentrations during the prenatal period of life."*

He also pointed out, however, that finger length alone doesn't dictate the state of your mental health and, in some cases, a lower 2D-to-4D ratio could be beneficial, such as in competitive sports:<sup>8</sup>

"It is important to understand that the finger lengths-ratio as a proxy of a specific exposure to prenatal sex steroids should not be understood as a person's irrevocable fate! Rather, a lower 2D-to-4D ratio and thus a higher exposure to testosterone during the prenatal period of physiological development might enable an adult person to show a specific pattern of behavior.

To make the case in point, compared to 117 age- and sex-matched sedentary females, 104 Swedish female Olympic athletes had statistically significantly lower 2D-to-4D ratios<sup>9</sup> or, simply put: The Swedish female Olympic athletes were exposed to higher testosterone and lower estrogen concentrations during their prenatal stage of development."

## **Psychiatric Patients Tend to Have Longer Ring Fingers Than Index Fingers**

A systematic review of case-control studies similarly found that psychiatric patients had lower 2D-to-4D ratios than people without psychiatric disorders.<sup>10</sup> In the case of autism spectrum disorder, attention deficit hyperactivity disorder (ADHD) and addictions, 2D:4D

ratio was significantly lower than in those without the conditions. The researchers noted:<sup>11</sup>

*"Our finding is important because, on one hand, it may propose 2D:4D as a potential biomarker for psychiatric disorders in general; on the other hand, it highlights the role of prenatal exposure to hormones, specifically testosterone, in the etiopathogenesis of psychiatric disorders."*

Beyond mental health, 2D:4D ratio has also been linked with "a wide number of traits and conditions, ranging in almost every field of medicine," the study explained, including conditions dependent on sex hormones as well as physical characteristics and behaviors. Examples include:<sup>12</sup>

Breast cancer	Prostate cancer	Osteoarthritis
Facial shape	Age of menarche	Penis size
Stuttering	Visuo-spatial ability	Schizotypal personality
Sporting ability	Successful financial risk-taking	Sexual orientation

## Men With Long Ring Fingers May Experience Mild COVID-19

Digit ratio may also be a strong indicator of men's vulnerability to COVID-19, due to its relation to testosterone exposure in utero. Higher testosterone levels are deemed protective due to their effects on the angiotensin-converting enzyme 2 (ACE2).

Researchers at the U.K.'s Swansea University measured the ring fingers of 103,482 men and 83,366 women from 41 countries in relation to their index fingers.<sup>13</sup>

In countries with a smaller digit ratio (0.976 millimeters (mm)), such as Malaysia, Russia and Mexico, COVID-19 fatality rates were lower than in countries with a higher digit ratio (0.99 mm and greater, which indicates a shorter ring finger), such as the U.K., Spain and

Bulgaria.<sup>14</sup> Overall, men in countries with longer ring fingers had a COVID-19 death rate of 2.7 per 100,000, compared to 4.9 per 100,000 in countries with a shorter overall ring finger length.<sup>15</sup>

"Our findings support a link between high 2-to-4D (low prenatal testosterone) and high severity of COVID-19 in men," the researchers explained, adding, "Thus, high prenatal testosterone (low 2D-to-4D) in men may be protective of the serious effects of COVID-19 ... A strong positive association between male 2D-to-4D and mortality may provide a biomarker for male COVID-19 susceptibility ..."<sup>16</sup>

One theory for why men with shorter ring fingers have a higher risk of severe outcomes from COVID-19 has to do with ACE2, an enzyme that's beneficial in that it promotes tissue regeneration. The problem is that coronavirus binds to ACE2 and uses it to enter cells,<sup>17</sup> where it then multiplies. But when levels rise high enough, ACE2 may actually be protective.

Professor John Manning, lead researcher of the study, noted, "The theory is that someone with high prenatal testosterone – and a long ring finger – has greater levels of ACE2. These concentrations are large enough to oppose the virus ... Our findings may be men with long ring fingers will experience mild symptoms and could return to work."<sup>18</sup>

Writing in *Early Human Development*,<sup>19</sup> the researchers further explained the paradox:

*"SARS-CoV2 enters cells via the receptor molecule ACE2. Paradoxically, the up-regulation of ACE2 relates to protective effects from COVID-19 infection, possibly because it opposes the loss of ACE2 from cell surfaces. We speculate that in men the up-regulation of ACE2 relates to high testosterone and low 2D:4D."*

## **How to Support Positive Mental Health**

While you can't choose or change your 2D-to-4D ratio – and it remains constant throughout life<sup>20</sup> – it's not the only measure of your mental health. Further, there's plenty you can do to support optimal psychological well-being. Getting optimal exposure to

sunlight daily and regular physical activity, particularly three to five days a week for 45 minutes,<sup>21</sup> can improve mental health.

You can also use the Emotional Freedom Techniques (EFT) or the Neuro-Emotional Technique's First Aid Stress Tool, or NET FAST,<sup>22</sup> to help relieve stress. Here is a summary of the FAST procedure:

1. While thinking about an issue that is bothering you, place your right wrist, palm up, into your left hand. Place three fingers of your left hand onto the area of your right wrist where you can feel your pulse.
2. Place your open right hand on your forehead. Gently breathe in and out several times while concentrating on feeling the issue that bothers you.
3. Switch hands and repeat steps 1 and 2.

Getting a sound night's sleep is also important, as too little sleep may increase anxiety by up to 30%,<sup>23</sup> while deep sleep was shown to have anxiety-relieving effects. If you're struggling with anxiety, making sleep a priority may calm your brain and your mind, helping to resolve anxiety symptoms.

Further, the more sleep deprived you are, the less social you become, and others pick up on this largely subconscious cue to be left alone, essentially turning people into "social lepers" and fueling an epidemic of loneliness.<sup>24</sup> A short temper and unwanted behaviors such as rudeness can also be the result of a poor night's rest.<sup>25</sup>

Eating healthy is another key. Researchers from Macquarie University, Australia, studied 76 students between the ages of 17 and 35 who followed a poor diet and had moderate to high levels of depression symptoms.<sup>26,27</sup>

One group of participants was asked to improve their diet by cutting back on **refined carbohydrates**, sugar, processed meats and soft drinks, while eating more vegetables, fruits, dairy products, healthy fats and anti-inflammatory spices such as turmeric and cinnamon.<sup>28</sup> After only three weeks of healthier eating, those in the healthy diet group

had significant improvements in mood and their depression scores went into the normal range.

In addition to 2D-to-4D ratio, researchers are also exploring whether other prenatal factors influence personality and behavior later in life.<sup>29</sup> No matter the cause, if you're experiencing a serious mental health problem, always seek the guidance of an integrative health practitioner who can help you get started on your healing journey. If you're in the midst of a mental health crisis, get emergency medical care.

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