

2D:4D Finger Ratio as an Indication of Prenatal Testosterone Exposure

By Arthur T. Johnson

The ratio of the length of the second (index) finger to the length of the fourth (ring) finger on the right hand is termed the *2D:4D ratio* (Figure 1). This ratio has been shown to be different for male and female humans [17] and animals [18]. It is sexually dimorphic, with male 2D:4D ratios (≈ 0.95) lower than those for women (≈ 1.0). The 2D:4D ratio appears to be influenced by prenatal exposure to androgenic hormones in the womb.

A lower, more masculine finger ratio appears to be correlated to attitudes of gratitude [12]; greater aggression or hostility [2], [11]; increased spatial ability and sensation-seeking in men [7], [16]; lower pain perception [16]; reduced male depression [1]; greater agreeableness and less quarrelsomeness of men with women [13]; sexual attractiveness in men [4]; sperm count and testosterone levels in men [9]; increased

incidences of preschool disruptive behavior in young girls but not boys [15]; faster skiing times in men and women [8]; delayed menarche in girls [10]; and a variety of other physical and psychological traits.

Higher, more feminine finger ratios appear to be correlated to depression severity in women but not men [19], personality traits in females [6], and estrogen and prolactin levels in women [9].

Finger ratios have been found to be related to career and occupational interests [5], [21], [14] and handwriting style for women but not men [3].

Animal models have indicated that androgenic steroid (especially, testosterone) exposures before birth might influence sexual orientation, and this could also be true for adult humans. The 2D:4D finger ratio was used as an indicator of prenatal androgen presence, and evidence was found that homosexuality in both sexes is more likely with higher prenatal androgen exposure [20]. Mothers previously preg-

nant with sons appear to have higher levels of testosterone in their bodies, thus altering the fetal development of subsequent children and increasing the likelihood of homosexuality in adulthood.

Biomarkers, indirect indications of biological phenomena such as disease, infections, or environmental exposures, come in many forms. Liquid assays identifying telltale substances circulating in the blood are some of the more promising biomarkers, with the potential to replace tissue biopsies. Based on the survey presented here, the 2D:4D ratio can be considered to be a physical biomarker for prenatal androgen exposure.

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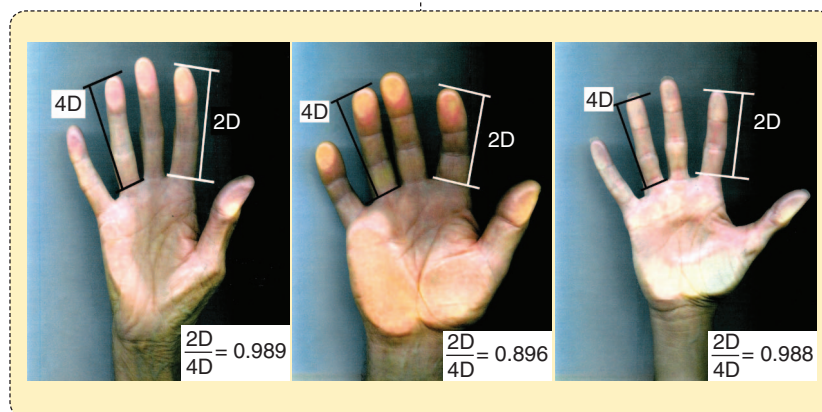


FIGURE 1 The impression of one male (center) and two female hands (left and right) illustrating the 2D:4D ratio in each. The male ratio is much lower than the two female ratios, indicating a higher level of prenatal testosterone in the male.

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