

# Finger lengths, 2D:4D ratios, and their relation to gender-related personality traits and the Big Five

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## Abstract

Finger lengths and the ratio of index finger to ring finger length (2D:4D) may be markers of gonadal hormone exposure. The current study investigated possible associations between absolute finger lengths, 2D:4D ratios, and gender-related personality traits in over 2000 participants. Regression analyses showed no associations between men's 2D:4D ratios and gender-related personality traits and weak associations between women's 2D:4D ratios and gender-related occupational preferences. Men's absolute finger lengths were weakly associated with self-ascribed masculinity, and women's absolute finger lengths were weakly associated with masculine occupational preferences. Big Five personality traits were assessed in a subsample of over 1000 participants. Analyses showed a weak positive association between 2D:4D and extraversion and a weak negative association between 2D:4D and openness to experience. Absolute finger lengths showed a weak negative association with agreeableness and a tendency to be associated with women's but not men's openness. Overall, associations between finger-length measures and personality were weak and inconsistent.

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The current study focuses on possible associations between finger-length measures (absolute finger lengths and 2D:4D finger-length ratios) and adult personality traits. Finger lengths and 2D:4D ratios are easily measured physical characteristics that are sexually dimorphic and may be linked to androgen and estrogen levels. Like most other physical sex differences, differences in men's and women's 2D:4D ratios and absolute finger lengths are presumed to result, either directly or indirectly, from the developmental effects of sex hormones (Breedlove, 1994; Cooke et al., 1998; Manning, 2002; Williams et al., 2000). Manning (2002) has compiled a body of research showing that 2D:4D ratios are correlated with a variety of physiological, behavioral, and psychological traits that are plausibly influenced by prenatal sex hormones.

In contrast to 2D:4D ratios, absolute finger lengths are likely to be influenced by postnatal as well as prenatal hormone levels. Absolute finger lengths correlate moderately (about  $r = .50$ ) with height and thus serve as

moderately reliable proxies for height (Lippa, 2003). Sex differences in height (and presumably also in absolute finger length) are slight before puberty, but differences favoring boys become increasingly apparent after puberty. The most proximal hormonal causes of pubertal growth are changes in adolescents' levels of growth hormone and insulin-like growth factor I (Grumbach and Styne, 2002). However, these changes are likely triggered by pubertal changes in sex steroids. Although both androgens and estrogens can affect skeletal growth, androgens appear to have their effect primarily after being converted to estrogens by the enzyme aromatase (Reiter and Rosenfeld, 2002). Thus, the effects of sex steroids on growth may be influenced by aromatase levels in various tissues as well as by steroid levels.

## 1. Finger length measures and personality

If 2D:4D ratios serve as an indirect measure of early exposure to sex hormones, then 2D:4D may be associated with personality traits that are also linked to early exposure

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to sex hormones. An early study found a weak negative association between 2D:4D and assertiveness in a sample of 985 women (Wilson, 1983). Several recent studies have investigated links between 2D:4D ratios and other personality traits. In a study of 165 Scottish undergraduates, for example, Austin et al. (2002) reported that women's 2D:4D ratios were negatively associated with measures of sensation seeking, and in a second study of 100 British undergraduates, these researchers reported a tendency for 2D:4D ratios to be associated with neuroticism as assessed by the Eysenck Personality Inventory. Csathó et al. (2003) measured 2D:4D ratios in 46 Hungarian undergraduate women who had completed the Bem Sex-Role Inventory, a measure of instrumental (stereotypically masculine) and expressive (stereotypically feminine) personality traits, and they found a tendency for women's 2D:4D to be associated with a more masculinized composite of BSRI instrumentality and expressiveness scores.

Finally, in a study of 120 British and Austrian undergraduates, Fink et al. (2004) investigated associations between 2D:4D ratios and students' scores on the NEO-FFI, a commonly used measure of the Big Five personality traits. These researchers found that for women, 2D:4D was positively correlated with neuroticism and negatively correlated with agreeableness. The correlation for neuroticism was expected, in the sense that neuroticism is often higher in women than men, and higher (more female-typical) 2D:4D ratios were found to be associated with higher neuroticism. However, the correlation for agreeableness was unexpected, in the sense that agreeableness tends to be higher in women than in men, and higher (more female-typical) 2D:4D ratios were negatively correlated with agreeableness.

No recent studies have reported evidence on associations between absolute finger length and personality. However, a small number of studies have investigated links between height and personality. Drawing upon Sheldon's early work on physique and temperament (e.g., Sheldon et al., 1940; Sheldon and Stevens, 1942), Hood (1963) contrasted the MMPI scores of short (5 ft 5 in. or less) and tall (6 ft 3 in. or greater) University of Minnesota men. He found that short men slightly exceeded tall men on their MMPI femininity and depression scores. In a more recent study, Melamed and Bozionelos (1992) found that height was associated with 16 PF (Cattell et al., 1970) tough-mindedness, venturesomeness, independence, and forthrightness. However, these researchers analyzed combined data from men and women, and thus it is likely that height differences in personality were confounded with sex differences in personality. In short, while relatively little is known about links between 2D:4D and personality, even less is known about links between absolute finger length (and overall stature) and personality.

Previous research on 2D:4D ratios and personality has been motivated by the heuristic assumption that links between 2D:4D and personality are most likely to be demonstrated for personality traits known to show sex

differences. The assumption has been that if 2D:4D ratios are linked to prenatal sex hormones and if prenatal sex hormones are most likely to be associated with sex-linked personality traits, then by implication, 2D:4D ratios are also most likely to be associated with sex-linked personality traits. Consistent with this focus on sex-linked personality traits, the current study assessed participants on four common measures of masculinity and femininity (Lippa, 2001, 2005): self-ascribed masculinity–femininity, male-typical versus female-typical occupational preferences, instrumentality, and expressiveness. A subset of participants was also assessed on the Big Five personality traits of extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Many personality psychologists believe that these five traits comprise the main, broad dimensions of human personality (John and Srivastava, 1999; Wiggins, 1996).

One limitation of previous studies on 2D:4D ratios and personality is that they have assessed relatively small samples. Given that correlations between 2D:4D and personality (and between overall stature and personality) have been small in previous research, it seems desirable to examine 2D:4D–personality associations in larger samples to obtain more reliable results. The current report analyzed data from a study of 2D:4D and sexual orientation in which over 2000 participants were assessed both on 2D:4D and on gender-related personality traits (Lippa, 2003). College student participants (about half of the sample) also completed a Big Five inventory. Thus, it was possible to investigate possible associations between finger-length measures (2D:4D ratios and absolute finger lengths) and personality in large samples of men and women. For gender-related personality traits, it was also possible to examine whether associations between finger-length measures and personality were moderated by the sexual orientation of participants.

## 2. Method

### 2.1. Participants

The sample consisted of 849 men and 1235 women, and included large numbers of both heterosexual and homosexual participants. Most heterosexual participants were college students and staff at California State University, Fullerton. Most gay and lesbian participants were volunteers solicited at gay pride festivals in Long Beach and Orange County, California (see Lippa, 2003, for additional details, including information about the ethnic breakdown of various participant groups).

Participants completed an anonymous questionnaire that included a demographic cover sheet, a section that asked about sexual orientation, and a number of personality scales. Sexual orientation was assessed by asking participants to respond “true” or “false” to whether they currently used

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