Digit Ratios Predict Risk Aversion For Both Sexes

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Many important consumption decisions involve risk. We explore the biological basis of risk taking using an emerging measure of prenatal androgrens, the ratio between the length of the second and fourth digits (2D:4D). A smaller 2D:4D ratio has been linked to higher exposure to prenatal testosterone relative to estradiol. The 2D:4D ratio is a sexually dimorphic marker, with men having lower ratios than women on average. In a task with real financial stakes, both men and women with smaller 2D:4D ratios chose significantly riskier options. For those at the extreme ends of the digit-ratio distribution the gender difference in risk-taking disappears.

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EXTENDED ABSTRACT

Many of our most important consumption decisions, such as buying a home or car, investing for the future and choosing healthcare options involves risk taking. Despite the importance of risk attitudes and the large literature on the subject, relatively little is known about the determinants of risk taking or the sources of heterogeneity in risk attitudes. One of the most consistent findings in the risk taking literature is that women are more risk averse than men. For example, in a meta-analysis of 150 studies of gender differences in risk taking, men were found to be significantly less risk averse than women on 14 out of 16 risk taking categories (Byrnes, Miller & Schafer, 1999). Most of the explanations for this persistent gender difference involve psychological or sociological theories, such as self-regulation models, social-role theories, or power and status differences. In contrast, little research has explored the biological basis for gender difference in risk taking.

To explore a possible of a biological basis for risk taking; we examine whether differential exposure to prenatal androgens affects risk taking in a financially motivated decision task. A persistent biological marker of exposure to prenatal androgens exists in the ratio of the length of the index to the length of the ring finger, commonly called the 2D:4D ratio. Within and across gender a lower ratio results in part from greater exposure to testosterone and lesser exposure to estradiol (Lutchmaya et al., 2004), with men on average having a lower ratio than women. The 2D:4D ratio offers an excellent marker of biological effects since it develops in utero (Malas et al., 2006), persist through puberty (Trivers et al., 2006) and into adulthood (Phelps, 1952). The 2D:4D ratio has been correlated with a wide array of biological and psychological characteristics that show strong sex differentiation suggesting that it is an effective predictor of gender differences (e.g., Manning & Taylor, 2001; Kempel et al., 2005; Austin et al., 2002).

To examine the relationship between 2D:4D and risk taking, we ran a study that included 2D:4D measurement and three financially motivated decisions involving varying levels of risk. Sixty-five female and eighty-six male Caucasian participants made three financial decisions. Building on established procedures for measuring risk preferences (Eckel & Grossman, 2008), each decision required selecting one of six options. The expected payoff increased from options 1 to 5 and was the same for options 5 and 6. Financial riskiness (e.g., variance) increased from options 1 to 6; thus choosing higher options indicates acceptance of greater risk. For each participant, one decision was randomly chosen to be played out and paid. Afterwards, participants’ hands were scanned. Second and fourth fingers were measured for both hands by three independent coders (intrarater reliability 0.86). Since results are similar across measures, the analysis uses the average ratio averaging across coders and hands.

Consistent with the extant literature, we find that women were significantly more risk averse than men across all three decisions (the average female choice was 0.769 options lower than the male average; p<0.01; OLS regression controlling for subject and decision effects) and men have the expected lower 2D:4D ratio (male 2D:4D ratios (.959) were lower than female ratios (.969); p<0.02, t-stat=2.23).

However, the main and novel results are that the 2D:4D ratio can partially explain risk taking behavior both within and between genders. The 2D:4D ratio can explain risk taking differences within gender; for both sexes, people with lower 2D:4D ratios (i.e., higher relative levels of in utero testosterone exposure) take greater risk (p=0.011; OLS regression controlling for subject, decision and gender). A one standard-deviation decrease in the ratio increased the choice riskiness by 0.23 options (equivalently, 0.145 standard-deviations). This 2D:4D effect was the same for men and women (coefficient=0.00, p>0.99 for 2D:4D-by-gender interaction). The 2D:4D ratio also explains some of the difference between genders in risk taking; the average gender gap fell 11% from 0.769 options lower for women without controlling for 2D:4D to 0.685 options lower controlling for 2D:4D (p=0.045, χ²=4.02). A quartile examination of the data reveals that this decrease in gender difference is driven by those at the high and low extremes of the 2D:4D distribution. We also find that the other physical factors we measured (height, BMI and finger length) do not affect choices across the risky decisions, reinforcing that the predictive power of 2D:4D is not spurious, and adding further support for the role of 2D:4D as an indicator of a biological basis for risk taking behavior.

REFERENCES


