

The risk of a wrong conclusion: On testosterone and gender differences in risk aversion and career choices

In a recent paper, Sapienza et al. (1) assessed correlations of salivary concentration of testosterone and two markers of prenatal exposure to testosterone with performance on a game assessing financial risk aversion and actual career choices. The authors concluded that “Gender differences in financial risk aversion and career choices are affected by testosterone,” “testosterone has both organizational and activational effects on financial risk aversion in men and women and that these effects influence important career choices”, and “Individuals high in testosterone and low in risk aversion were more likely to choose risky careers in finance.” However, the reported study does not present evidence to support any of these conclusions.

First and foremost, the study assessed correlations between testosterone levels and behavior rather than the effects of manipulating testosterone levels on behavior. Only studies of the latter type can lead to conclusions about the effects of testosterone on behavior. Correlations such as those reported in the paper may also reflect the effects of behavior as well as of other nonbiological parameters on testosterone level rather than vice versa. Indeed, there is evidence from different species, including humans, that differences in behavior, status, and social context affect testosterone levels (2, 3).

The statistical tests used to support specific conclusions are not always appropriate. For example, there is no analysis of the relation between career choices, risk aversion, and testosterone levels that can support the claim that “Individuals who were high in testosterone and low in risk aversion were more likely to choose risky finance careers.” Similarly, to claim that “the relation between testosterone and risk aversion was stronger in

women than in men,” one has to show that these two correlations are statistically different. They are not (entire sample: $r_{\text{men}} = -0.04$, $r_{\text{women}} = -0.17$, $P_{\text{diff}} = 0.2$; low testosterone: $r_{\text{men}} = -0.05$, $r_{\text{women}} = -0.15$, $P_{\text{diff}} = 0.49$).

The two markers of prenatal testosterone exposure are controversial (4), and their correlation was 0.0629, which provides strong evidence against the assumption that they are markers of the same third variable (i.e., prenatal testosterone exposure). Therefore, no conclusion can be drawn regarding the relation between prenatal testosterone exposure and risk aversion and career choice.

All the correlations and semipartial correlations found in the study are extremely low and explain less than 5% of the criteria variability. Some of the regression coefficients are statistically significant because the sample size is large ($n = 460$) and significance was set at a very loose criterion of $P < 0.10$.

Taken together, the data presented support the conclusion that there are very weak correlations between salivary testosterone levels and risk aversion and career choices.

Biological correlates of gender differences draw much interest, particularly because it is wrongly assumed that biological differences reflect only innate factors, whereas, in fact, biological measures are influenced by many additional factors, including behavior and experience. It is therefore extremely important that researchers reporting such data be cautious in their analysis of data and in the presentation and interpretation of results.

Daphna Joel¹ and Ricardo Tarrasch

Department of Psychology, Tel Aviv University, Tel Aviv 69978, Israel

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¹To whom correspondence should be addressed. E-mail: djoel@post.tau.ac.il.