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Testosterone and power

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Across many studies in humans, two functional relationships between testosterone and power consistently emerge: First, high levels of testosterone prime individuals to pursue dominance (*priming relationship*). Second, victories and defeats in dominance contests and other outcomes of dominance interactions drive differential changes in testosterone levels that in turn prime and shape future behavior (*reciprocal relationship*). Priming and reciprocal relationships between power and testosterone have been principally documented in men, and our understanding of the relationships between testosterone and power in women is less complete.

Baseline levels of testosterone prime individuals to pursue dominance. The best evidence for this phenomenon is derived from studies that measure the actual behavior of individuals high or low in testosterone. This line of research shows that those with high testosterone engage in behavioral pursuit of dominance and status. For instance, lawyers with high testosterone are more likely to be trial lawyers who visibly argue in front of judge and jury than non-trial lawyers. Also, prisoners with high testosterone are more likely to have a history of violent crime and to have other prisoners rate their behavior as tougher. Boys with high testosterone are judged as more dominant and as possessing leadership qualities. These and many other findings document that generally, high levels of testosterone prime individuals to pursue dominance and status in socially acceptable ways, but that in some cases they can also lead to aggression, antisocial behavior, and sometimes violent crime.

It is notable that the priming relationship between testosterone and dominance only emerges reliably when behavioral measures of dominance are employed. However, when questionnaire measures of dispositional power, dominance, or aggression are used,

researchers rarely find any relationship between individuals' questionnaire scores and their testosterone levels. Several reviews of the testosterone literature have therefore concluded that self-report measures of power and dominance are of little value when studying the relationship between testosterone and power.

If dominance dispositions are assessed indirectly, small but consistent correlations between individual differences in dominance motivation and testosterone have been found. One method that has been used with success for this purpose is the measurement of individuals' implicit power motive (n Power), which is defined as a recurrent need to have impact on others. N Power is assessed by content-coding imaginative stories that research participants write in response to picture cues. Although n Power does not correlate with questionnaire measures of dominance, it is positively correlated with testosterone, suggesting that high baseline levels of testosterone motivate one to pursue dominance and manifest themselves in aspects of an individual's personality. Interestingly, n Power also positively predicts many of the same dominance behaviors that high levels of testosterone are associated with (e.g., entering influential occupations, spousal abuse, drug abuse, risk taking, and sexual promiscuity). Such findings suggest that the implicit power motive represents the psychological manifestation of individual differences in testosterone levels.

Consistent with the notion of a reciprocal relationship between testosterone and dominance, testosterone also changes as a function of winning or losing dominance contests. For example, it has been found that winners of chess tournaments have elevated testosterone levels, and that individuals whose favorite sports teams lose have depressed levels of testosterone. However, contest outcome is not the only variable that predicts

changes in testosterone. Indirect measures of power motivation (but again not questionnaire measures of power motivation) often moderate the effect that dominance contest outcomes have on testosterone changes. For instance, there is evidence that victory-induced testosterone increases and defeat-induced testosterone decreases are consistently observed in high-power men, but not in low-power men. There is also some evidence that baseline levels of testosterone as a marker of individuals' need for power predict how those individuals respond hormonally and behaviorally to contest outcomes.

Contest-induced testosterone changes can have two effects. First, increases in testosterone can prime one to engage in another dominance contest, and decreases can make one less motivated to engage in another dominance contest and thus less likely to expend more energy on the costly pursuit of power. In support of this idea, contest-induced testosterone increases predict individuals' inclination to engage in another contest, whereas testosterone decreases predict behavioral withdrawal from dominance situations. Second, testosterone increases have been linked to reward and reinforcement. Testosterone surges after winning can act as reinforcers for effective dominance behavior. Evidence in support of this idea comes not only from animal studies, in which the effects of testosterone on brain reward centers can be measured directly. Research on human subjects also shows that victory-induced testosterone increases predict better learning of behavior that was instrumental during the contest, whereas defeat-induced testosterone decreases predict impaired learning of such behavior.

It is important to note that in humans, testosterone changes are not necessarily, or even frequently, induced by the outcome of physical fights, but are more typically elicited by outcomes of subtle, "psychological" dominance competitions. Chess players

and sports fans have testosterone changes, but never actually engage in physical aggression or violence. Yet, from a biological perspective, the testosterone changes that result from psychological contests are the same as those resulting from engagements in physical aggression.

While the relationships between testosterone and power are relatively well-explored in men, research on these relationships in women is lagging behind and has produced fewer clear-cut findings. A small set of studies using behavioral measures of dominance consistently links high testosterone to dominance (e.g., high-status occupations, aggression, antisocial behavior) in women, suggesting that the priming relationship between testosterone and dominance holds for both sexes. There is less evidence for a reciprocal relationship between testosterone and dominance in women. Studies in which effects of dominance contests on women's testosterone levels have been assessed either found no contest outcome effect or, in the case of one study examining the effect on n Power on testosterone responses, testosterone increases in both winners and losers high in n Power. Thus, in women, there is some evidence that testosterone primes dominance, but there is little replicable evidence so far for a reciprocal relationship between testosterone and dominance. Two points are important to consider when studying testosterone and power in women. First, most of the studies have relied on questionnaire measures of dominance as opposed to indirect measures like n Power or observational measures of actual behavior. In men, studies using questionnaires have been equally fraught with problems. Second, estradiol, the other sex steroid, could have a much greater influence over dominance in women. Several studies have documented

estradiol's critical role in female mammalian dominance, but few studies have examined the relationship between dominance and estradiol in women.

Further Reading

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