

The Effect of Testosterone on Human Bargaining Behaviour



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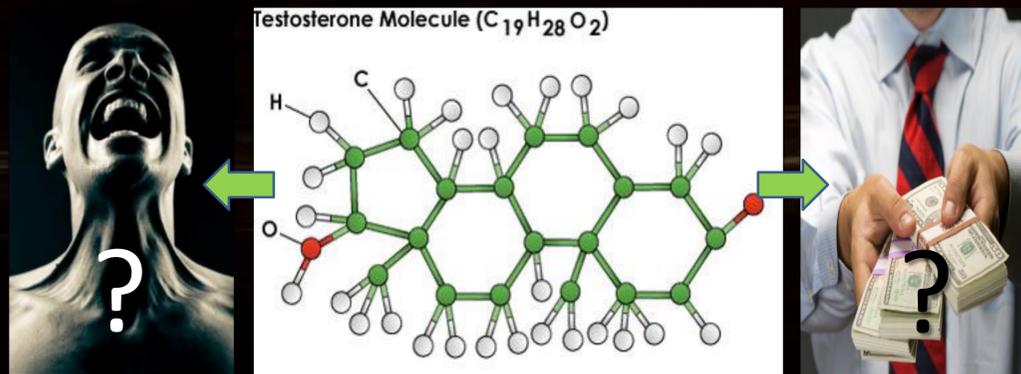
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Abstract

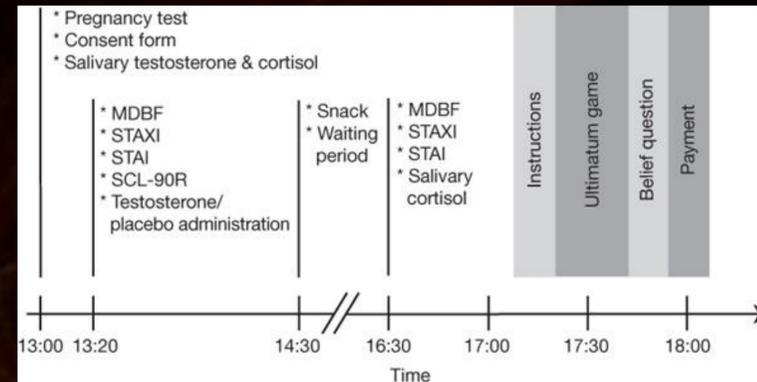
There are currently two reigning theories on the effects of testosterone on human behaviour – ‘social status theory’; which hypothesises testosterone increases ‘social status seeking’ and ‘folk wisdom theory’; which proposes testosterone induces antisocial and aggressive behaviours. To discriminate between each theory, 121 female subjects, mean age of 25.16 ± 6.40 years, partook in the ‘bargaining ultimatum game’ in which a proposer, party A, could delegate up to 10 real money units (MUs) to a responder, party B. Party B could not make a counter offer to Party A, but if party B vetoed A’s offer, neither party received MUs. The results of the experiment show that a higher frequency of ‘fair offers’ (1:1 MUs) were made via subjects who had received a sublingual administration of 0.5mg testosterone. Subjects who believed they had received testosterone, regardless of whether they had, showed a higher frequency of unfair offers. The results are in congruence with social status theory, though highlight that belief in folk wisdom theory may predetermine the subject’s behaviour.



Left – Folk Wisdom theory, Right- Social Status Theory, and the associated behavioural effects of each theory.

Background

The evidence for both social status and folk wisdom theory correctly describing the effects of testosterone is sparse and mainly correlative. Studies on the endogenous testosterone levels in U.S. male and female prisoners show a positive correlation between salivary testosterone levels and the exhibition of aggressive, egoistic and antisocial behaviour. Such connotations have even been extrapolated into the courtroom, being used as a legal defence for ‘near-homicide’ due to ‘steroid induced rage’. The social status theory however proposes that testosterone induces behavioural changes when a person’s social status is challenged. By testing the prosocial dimension of social seeking behaviour, each theory can be discriminated. This is an important study as it questions the credibility of testosterone taking the responsibility for violent behaviour.

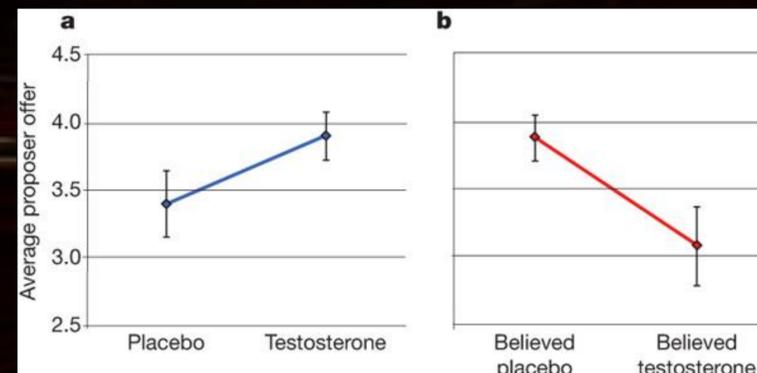


Sequence of events in the double-blind study with testosterone and placebo administration.

Methodology

Before testosterone or placebo administration, baseline testosterone levels were measured from each subject. Subjects were then asked to complete several questionnaires, testing psychological well-being (SCL-90R), mood and arousal (MBDF), anxiety (STAI) and anger (STAXI), before and 4 hours after the sublingual administration of testosterone (see diagram above).

At 17:30, subjects were randomly and anonymously assigned to either party A, the proposer ($n = 62$) or party B, the responder, ($n = 59$). The proposer’s role was to divide 10 real money units (MUs) between parties A and B. The possible divisions of MUs, A:B, consisted of 1:1, 7:3, 8:2, 10:0 with 1:1 representing the most fair, and 10:0 the least. If B accepted A’s offer then the proposed allocation was implemented. Party B could not make a counteroffer to A, but if B vetoed A’s proposal, then neither party would receive MUs. At the end of the experiment each subject was asked which substance they thought and they had received, and party A was then given feedback about B’s response.

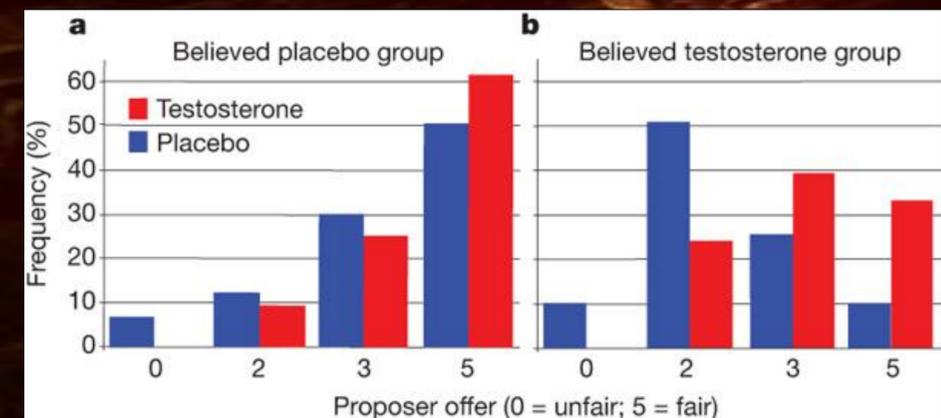


The proposers’ mean offers in the ultimatum game across treatments and beliefs.

Results

The results of the experiment show that subjects who had received exogenous testosterone made significantly higher offers, with 3.90 MUs on average, while placebo subjects offered 3.40 MU. Notably, strong support for a ‘belief effect’ was found whereby subjects who believed they received testosterone made much lower offers; i.e. 2.38 MUs – received placebo but believed testosterone, and 3.47 MUs – received testosterone and believed testosterone.

The results from the personality questionnaires and salivary testosterone level tests showed there was no significant difference between placebo or testosterone groups prior to testosterone administration. It can therefore be implied that testosterone did not influence subjects’ mood and arousal, nor did it affect these variables during the experiment.



Distribution of proposers’ offers conditional on their beliefs.

Conclusion

The results are compatible with social status theory and cast doubt on folk wisdom theory. Alternative explanations for the higher proposal offers observed could be that testosterone has a positive influence on altruistic motivation. If this were the case we would also observe lower rejection rates from testosterone administered responders. It was found however that there was a null effect on the rate of rejection rates implemented by testosterone administered members of party B.

The findings highlight that both biological and psychological factors influence human behaviour and that in future experiments it is important to control for subject’s beliefs so that the pure substance effect is not over or under-estimated.

Reference: C. Eisenegger et al, Prejudice and truth about the effect of testosterone on human bargaining behaviour, Nature 463, 356 (2010).

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