



# The Relationship Between Competition and Adaptive Testosterone Production

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## Background

- Greater testosterone production is associated with better competitive endurance and overall performance (Casto et al., 2020).
- Despite the benefits, high testosterone levels are physiologically costly; higher testosterone is associated with suppressed immune function and detrimental long-term health impacts (Roberts et al., 2004).
- Testosterone production may increase more when the benefits of such production are greater (e.g., Miller et al., 2012).
- No work has experimentally examined whether men and women's testosterone response is sensitive to the benefits of producing testosterone.

## Research Question

Do people produce more testosterone in a competition when winning is determined by performance or when the reward is larger?

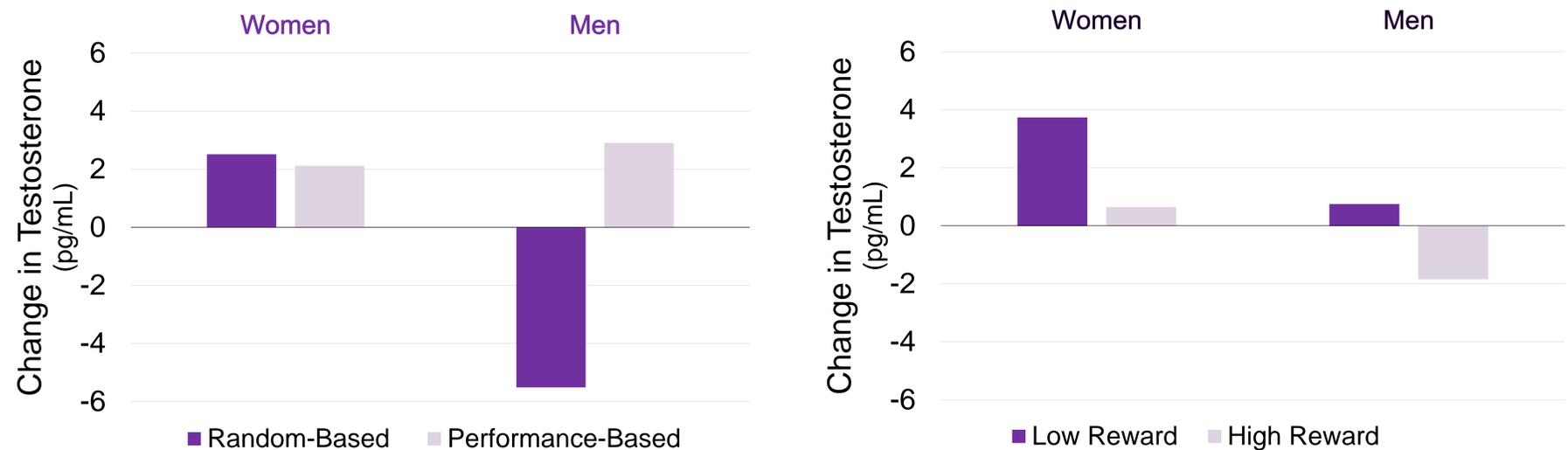
## Method

- 216 participants ( $M_{age} = 19.78$ ,  $SD = 2.02$ ) were asked to compete in a novel origami task.
- Participants were randomly assigned to a low-value (\$5) or high-value reward (\$20) condition and a performance-based or random winner condition.
- Participants provided saliva samples before and after completing the novel task.
- Free testosterone levels were assayed in the lab to assess changes in testosterone production.

## Hypothesis

- We predicted that participants who compete in a high-reward, performance-based task will experience an increase in testosterone production.

## Results



## Results are preliminary. Data collection is still ongoing.

- Women similarly **increased** testosterone production, regardless of how winning was determined.
- Men **increased** testosterone production when winning was determined by performance and **decreased** testosterone production when winning is determined randomly.
- Women exhibited a greater **increase** in testosterone production when the reward was low (vs. high).
- Men exhibited a small **increase** in testosterone production when the reward was low and a **decrease** when the reward was high.

## Funding



## References

- Casto, K. V., Edwards, D. A., Akinola, M., Davis, C., & Mehta, P. H. (2020). Testosterone reactivity to competition and competitive endurance in men and women. *Hormones and Behavior*, 123, 104665.
- Miller, S. L., Maner, J. K., & McNulty, J. K. (2012). Adaptive attunement to the sex of individuals at a competition: The ratio of opposite-to-same-sex individuals correlates with changes in competitors' testosterone levels. *Evolution and Human Behavior*, 33(1), 57-63.
- Roberts, M., Buchanan, K., & Evans, M. (2004). Testing the immunocompetence handicap hypothesis: A review of the evidence. *Animal Behaviour*, 68(2), 227-239.

## Conclusions

- Physiological endocrine responses may be sensitive to psychological experiences which impact the costs and benefits of testosterone production.
- There are sex differences in how the costs and benefits of producing testosterone shape testosterone reactivity.
- Women may be better able to bear the physiological costs of testosterone production than men, even when the benefits of high testosterone are relatively low.
- Men may be particularly sensitive to the costs of testosterone production.