The Mental Winner Effect: Effects of Imagined Victory and Defeat on Testosterone

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Title of research:
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Abstract:
The “winner effect” is a phenomenon in which winning a competition increases testosterone relative to losing, and this testosterone surge in winners facilitates future victories. The current study tests whether imagining oneself winning or losing can change testosterone and thus simulate the winner effect. Further, we test whether effects differ when imagining a high-investment competition (i.e., an activity of personal importance such as athletics or music) compared to a low-investment competition (i.e., entering a raffle).

Research question, goals of the study, significance to social/personality psychology:
Research question and goals: The “winner effect” is a well-documented phenomenon in which winners of a competition experience a surge in testosterone, which increases the likelihood of winning again (reviewed in Oliveira, 2009). Although there are some mixed findings, losing a contest typically decreases testosterone, which may promote withdrawal from competition and minimize further costs to status or physical condition (Oliveira, 2009). Importantly, research suggests that the direct experience of competition is not required for hormonal changes to occur: anticipation of competition, as well as vicarious competition (e.g., watching a favorite sports team win), can increase testosterone (Archer, 2006; Bernhardt et al., 1998). The current study will further probe the role of cognitive appraisals in hormone responses to competition by experimentally testing whether thinking about victory increases testosterone compared to thinking about defeat. That is, can imagining oneself winning simulate the winner effect by mimicking the hormone response that occurs in response to an actual victory? I hypothesize that imagining a victory will increase testosterone compared to imagining a defeat, and that this effect will be especially strong when imagining a high-investment competition (i.e., an activity of personal importance such as athletics or music) compared to a low-investment competition (i.e., entering a raffle).

Significance to social/personality psychology: In the context of competitive or challenging situations, a growing body of research points to the importance of cognitive appraisals in modulating physiological responses, coping behaviors, and in turn the eventual outcome (Kemeny, 2003; Salvador, 2005). For example, researchers have investigated how perceived controllability of a stressor shapes individuals’ physiological stress responses (Kemeny, 2003). My research will build on this framework to test whether visualizing oneself winning can elicit a hormonal response shown to be adaptive in competitive situations. If the way an individual thinks about a situation modulates physiological responses, this suggests that individuals could harness cognitions to influence their own physiology and behavior (see also Carney et al., 2010).

Thus, this research has broad practical applications for competitive or challenging real-life situations (e.g., within the workplace) and for health and well-being.

Research design and methodology:
Participants and Design: Participants (N = 130 women; 18 years or older) will be recruited from St. Edward's University and the larger community. I ultimately plan to test this hypothesis in women and men, but this initial proposal focuses on women because women's testosterone may be more responsive than men's to competitive stimuli (van Anders et al., 2015), yet despite this, women are understudied in research on competition.

Participants will be randomly assigned to one of four conditions in a 2 (investment: high or low) x 2 (outcome: win or loss) design. In each condition, participants will listen to audio prompts about a hypothetical situation, imagine themselves in the situation, and respond to a series of open-ended questions about the scenario they imagine. Participants assigned to the high investment conditions will hear a prompt about entering a competition centered around an activity of personal importance to them (e.g., music, academics, athletics), whereas participants assigned to the low investment conditions will hear a prompt about entering a raffle for $50 held by a grocery store. Following an initial set of open-ended questions (e.g., describing the lead-up to the competition), participants will hear a second randomly assigned prompt about winning or losing and answer a second set of open-ended questions regarding their feelings upon learning the outcome. I have successfully used a similar methodology to test effects of sexual thoughts on hormones (Goldey & van Anders, 2011), and my students and I are currently validating effects of the prompts on mood via an online, non-hormonal pilot study.

Procedure: After completing informed consent, participants will complete a baseline saliva sample for testosterone and a baseline mood questionnaire (PANAS). They will then listen to the audio prompts for their randomly assigned condition and complete the open-ended questions about the imagined scenario. Participants will next complete a second mood questionnaire and a 10-minute time-filler activity (to allow time for hormone responses to be present in saliva). At the conclusion of the session, participants will complete a post-manipulation saliva sample and final mood questionnaire. Saliva samples will be enzyme immunoassayed for testosterone using kits from Salimetrics.

Planned analyses:
The primary analysis will involve a 2 x 2 factorial ANOVA with investment (high or low) and outcome (win or loss) as the independent variables and percent change in testosterone from baseline to post-manipulation as the dependent variable. Percent changes are more sensitive than absolute changes in detecting effects of social stimuli on hormones because they account for the wide individual variation in baseline testosterone levels (van Anders et al., 2014).

The sample size of N=130 was chosen based on a power analysis conducted using

G*Power software. Using a medium effect size (effect size f = 0.25) and setting alpha at 0.05 and power at 0.80 yielded a desired sample size of N = 128 for the above planned factorial ANOVA. A medium effect size was chosen as a compromise between past research showing small to medium effect sizes for comparisons of testosterone changes in winners and losers in men (e.g., d = 0.31-0.36; Archer, 2006) and past research suggesting medium to large effect sizes of competitive situations (wielding power) on percent change in testosterone in women specifically (Cohen's dz = 0.65 and 0.51; van Anders et al., 2015).

Secondary analyses will use multivariate factorial ANOVAs to explore effects of investment and outcome on mood (PANAS) subscales.

Itemized budget:

- Testosterone assay kits: $1,855 [130 participants x 2 samples each = 260 samples. This translates to 7 Salimetrics testosterone assay kits (38 samples/kit). 7 kits x $265/kit = $1,855.]

- Participant compensation: $25 [Upon completion of the study, participants will be given the option to enter a raffle for a $25 Visa gift card. Student participants may also earn a small amount of extra credit at the discretion of their instructors. These methods have been effective at recruiting participants from our university in the past.]

- Saliva collection materials (tubes, gloves, etc.): Already obtained

- Assay disposables (pipette tips, pipette basins, etc.): Already obtained

TOTAL NEEDED: $1,880
Revenue Sources: SPSP funding will be used towards testosterone assay kits. The St. Edward's Department of Psychology and Behavioral Neuroscience will cover the remaining $380 to make this study possible.

Over the past 5 years, estimate the average amount of grant dollars per year (both internal and external) that the PI has been awarded for research?:
St. Edward's University is a small teaching-oriented institution; I teach undergraduates exclusively, and one of our department's goals is to increase the quality of research experiences available to Psychology students. Our Psychology and Behavioral Neuroscience department has a small yearly budget for lab supplies. This budget is not specifically allocated to any individual faculty member, such that funding for any individual project is not a guarantee and depends on the balance of other needs within the department. In our 13-member department, increases in the number of faculty and in research productivity have far outpaced the small increases in the Psychology lab budget. Thus, funds are extremely limited, especially when considering the cost of research involving physiological measures. Although my department could fund the remainder of expenses ($380) after the SPSP Small Grant, covering the full budget would be unlikely, such that this study would be under-powered and thus infeasible without help from SPSP.

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Proposed Timeline

Research Stage	Time Period
IRB approval	Received 05/16/2016
Participant recruitment & data collection	September 2016 – March 2017 (approximately 18-19 participants per month needed to reach desired sample size)
Hormone assay	April 2017 – May 2017
Data analysis	May 2017 – June 2017
Submit abstract for SPSP 2018	Summer 2017
Prepare & submit manuscript for publication	June 2017 – September 2017
Present at SPSP 2018 (Atlanta)	March 2018