The Effects of Aerobic, Resistance, and HIIT Exercise on Testosterone and Cortisol

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Overview

- Background information
  - Hormones
    - Cortisol
    - Testosterone
  - Types of exercise
- Why does this all matter?
- Hypotheses
- Study Design & Procedure
- Data Analysis
- Expected Outcomes & Alternatives
Cortisol

- Hypothalamic-Pituitary-Adrenal (HPA) axis

- Stress hormone
  - ‘Fight or Flight’

- Exercise as a stressor
Cortisol x Exercise

- **Aerobic exercise**
  - Intermittent cycling, salivary-cortisol increase (J.P. Hough et al., 2011)

- **Resistance exercise**
  - 1 rep max for 3 exercises, large variability in salivary-cortisol
    (Ghigiarelli et al., 2013)

- **HIIT**
  - Initial data shows salivary-cortisol increase
Testosterone

- Hypothalamic-Pituitary-Gonadal (HPG) axis

- Testosterone increases:
  - Mating efforts
  - After a competitive win
  - During aggressiveness

- Dual-hormone hypothesis
  - HPA mediates HPG levels

- Side Note: Hormone level delay in saliva
Testosterone x Exercise

- **Aerobic exercise**
  - Increase in salivary-testosterone after cycling intervals (J.P. Hough et al., 2011)

- **Resistance exercise**
  - After 1 rep max, salivary-testosterone increase (Ghigiarelli et al., 2013)

- **HIIT**
  - No testosterone evidence
Why does this all matter?

- Anxiety
  - Exercise as a treatment
  - Hormone effects
- Age related disorders
Hypotheses:

- **H1:** $\downarrow$pre-ex C & $\uparrow$ pre-ex T $\rightarrow$ larger T increase after resistance than aerobic

- **H2:** Under the same conditions ($\downarrow$ pre-ex C & $\uparrow$ pre-ex T) $\rightarrow$ largest T increase after HIIT, as compared to aerobic and resistance

- **H3:** $\uparrow$pre-ex C & both $\uparrow$/ $\downarrow$ T $\rightarrow$ No effect for all three exercise styles
Study Design

- **Independent Variables**
  - Types of exercise
    - Aerobic
    - Resistance
    - High Intensity Interval Training (HIIT)

- **Dependent Variables**
  - Post-exercise hormone levels
    - Salivary-testosterone
    - Salivary-cortisol
Methods Overview

- **Participants**
  - 100 undergraduate males
  - SONA recruitment

- **Hormone measurement**
  - 1.8 mL of saliva
  - Hormone fluctuations (Touitou & Haus, 2000)
Procedure

- Obtain consent
- Pre-exercise saliva sample & resting heart rate taken
- 3 minute directed stretch
- Perform the exercise
  - Aerobic / Resistance / HIIT
- 3-5 minute cool-down
- Post-exercise saliva samples taken
Exercise Modalities

- **Aerobic**
  - Stationary Bike
  - 5 minute slow warm-up
  - 25 minutes at 65-75% VO$_2$max

- **Resistance**
  - 4 Weightlifting exercises (Ghigiarelli, Sell, Raddock, & Taveras, 2013)
    - Bench press, Back squat, Seated row, and Leg press
  - 8-10 reps each at 70% 1 rep max, 3 sets each

- **HIIT**
  - In-progress
Data Analysis

- Descriptive statistics for all dependent variables
- Analysis of variance (ANOVAs)
  - Hormones x Exercise conditions
Expected Outcomes

- T increase from HIIT = largest
- T increases between pre → post for all exercises
- If C is high, then no effect on T
- After HIIT, Cortisol increase

Alternatives,
- Exercise has no effect on testosterone and cortisol
- ↑ pre-ex C → ↑ post-ex T