

## **Time-Dependent Effects of Acute Cycling Exercise on Long-Term Emotional Memory and Salivary $\alpha$ -Amylase**

Lauren R. Weiss<sup>1</sup>, Andrew C. Venezia<sup>2</sup>, J. Carson Smith<sup>1</sup>, FACSM. <sup>1</sup>University of Maryland, College Park, MD, <sup>2</sup>University of Scranton, Scranton, PA

Psychological research has strongly documented the memory-enhancing effects of emotional arousal. Current opinion implicates the central release of stress hormones, specifically norepinephrine, as the neurobiological basis for this enhancement. Experimental induction of arousal has been shown to enhance long-term memory in a time-dependent manner. While extensive research has provided evidence for the memory benefits of exercise training, the effects of acute exercise on long-term memory are not as well understood. Furthermore, acute exercise of a sufficient intensity and duration stimulates central norepinephrine release. This presents an opportunity to investigate the role of acute exercise-induced arousal in the modulation of long-term memory. **PURPOSE:** The purpose of this study was to determine the time-dependent relationship between acute exercise-induced arousal and long-term emotional memory. **METHODS:** Forty healthy young adults (22±4 yrs) were randomly assigned to an exercise-before, exercise-after, or rest group. Participants in the exercise groups completed a high-intensity session of cycling exercise before or after viewing pleasant, neutral, and unpleasant images. Exercise intensity was prescribed using Borg's Ratings of Perceived Exertion (RPE) scale, and participants were instructed to exercise at an intensity of 15 ("Very Hard"). Salivary  $\alpha$ -amylase (sAA), a noninvasive biomarker of central norepinephrine, was measured as an indicator of arousal. A recognition memory test was administered after a 48-hour delay. Memory data were submitted to a 3×3×2 (Group × Valence × List) mixed ANOVA. The sAA data (n = 33) were submitted to a 3×4 (Group × Time) mixed ANOVA. **RESULTS:** No effect of Group or Valence on recognition memory was revealed, however; high-intensity cycling increased sAA in both exercise groups, indicated by a significant Group × Time interaction,  $F(6,90) = 6.995, p = .001, \eta^2 = 0.318$ , and confirmed with paired *t*-tests ( $p < 0.05$ ). **CONCLUSION:** This is the first study to our knowledge that demonstrates an increase in sAA resulting from an RPE-prescribed bout of exercise. Further investigation is needed to draw conclusions about the memory-enhancing potential of acute aerobic exercise.

Supported by the University of Maryland Kinesiology Graduate Research Initiative Fund.