

# The Effect of Swim Training on the Resting and Maximum Metabolic Rates of Varsity and Novice Athletes

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## Introduction

The following physiological factors have been shown to be indicators of health:

- **MMR**—maximum metabolic rate--the number of Calories burned per minute at intense exercise
- **RMR**—resting metabolic rate--the number of Calories burned per minute at rest

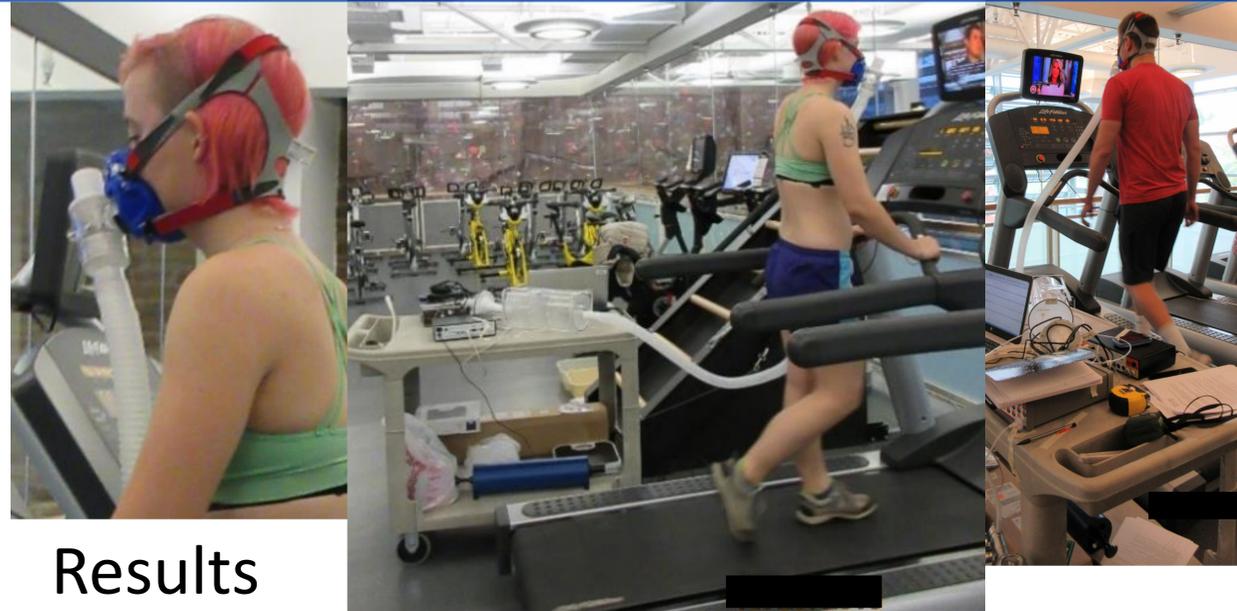
Exercise has been shown to significantly affect these measurements, leading to health benefits including reduced risk of coronary heart disease, weight loss, and increased cardio efficiency.

**Aim:** To determine whether exercise, specifically swimming, affects MMR and RMR in varsity and novice athletes, and if so, whether it increases or decreases MMR and RMR.

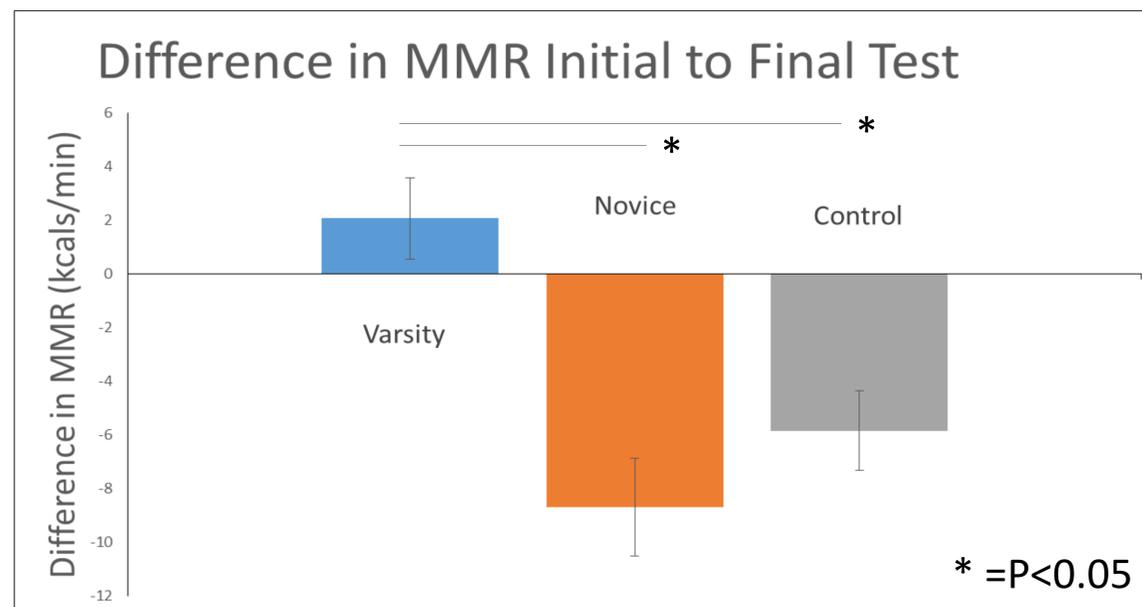
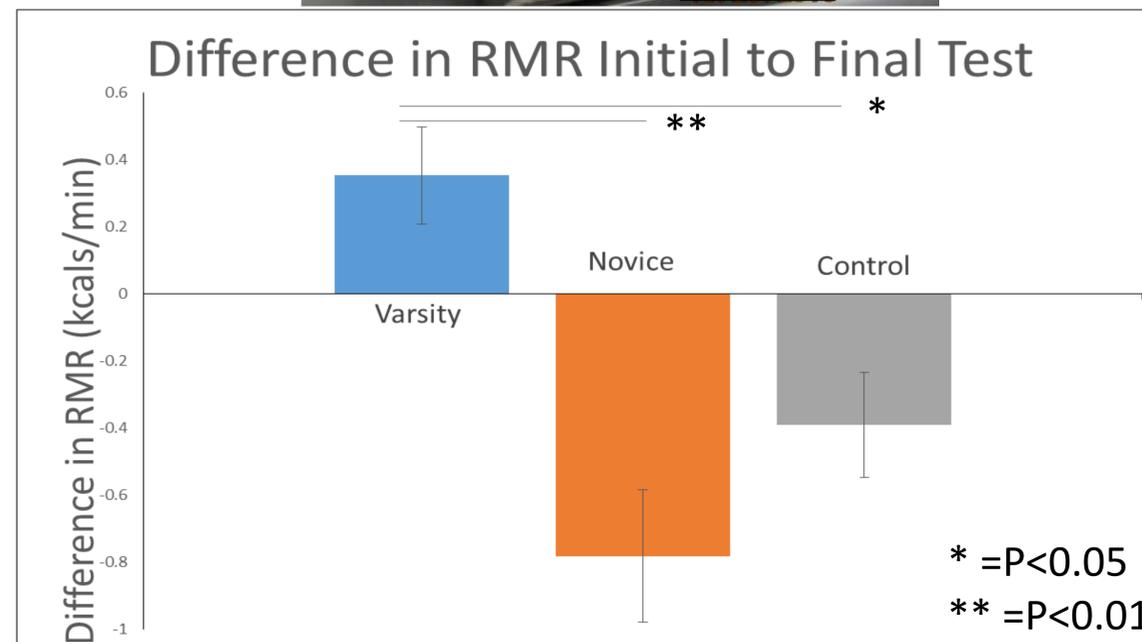
- We hypothesized that six weeks of swim training would increase RMR and decrease MMR levels in both varsity and novice athletes.
- We predicted changes would be greater in novice athletes due to their assumed lower fitness levels at time zero.

## Methods

- We followed 6 weeks of swim and weight training, and measured initial and final RMR and MMR levels via the Bruce Treadmill Protocol (modified by Cynthia Downs).
- **Workouts:**
  - Varsity: coach-assigned
  - Novice: 3x20min swim and 1 weight per week
  - Control: didn't workout
- We took into account body mass index (BMI), outside training, and initial fitness levels in our final analyses



## Results



## Conclusions:

- **RMR**
  - Training **decreased RMR levels in the novice group and increased them in the varsity group**. Additionally, higher RMRs were correlated with higher BMIs ( $\beta=0.101\pm0.044$ ).
- **MMR**
  - Novice training decreased participants' MMRs by increasing their efficiency.
  - Varsity training increased participants' MMRs by increasing their ability to perform at peak intensity
  - Individuals that completed a higher portion of the training had lower final MMRs i.e. higher efficiency ( $\beta=-21.568\pm9.668$ )

## Take-home:

- Swim Training at low intensity increases efficiency, reducing RMR and MMR
- Swim training at high intensity increases athletes' abilities to perform at higher intensities, slightly increasing RMR and MMR
- **Overall, swimming improves your health by increasing your cardio efficiency and your ability to workout at higher intensities**

References—available upon request