Durational Effects of HIIT Training on Physiological Variables

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ABSTRACT

PURPOSE: To compare the effects of high intensity interval training (HIIT) and steady-state aerobic exercise on VO2max and body composition, and to quantify the lasting effects of these physiological variables following a two week detraining period.

METHODS: 27 college-aged recreationally active participants (17 males, 10 females) from a university were randomly assigned to one of the following conditions: experimental group (HIIT), control group (steady-state aerobic exercise), or a no training control group. Each group underwent 30 minutes of training (warm up, training, cool down) twice a week for three weeks. The HIIT group completed 10 bouts of 1-minute maximal effort, 1-minute recovery at 90-95% HRmax, and 60-65% HRmax, respectively. The CON group maintained a pace at 60% HRmax for 20 minutes. Descriptive statistics of the baseline characteristics were gathered for the dependent variables (DV): age, height, weight, VO2max, body fat, and visceral fat.

RESULTS: There was a significant correlation between levels of visceral fat and time amongst both the CON and EXP group (r=0.39, p<0.05). There was no significant improvement in VO2max between groups or over time (F(2,50) = 0.52, p = .629).

CONCLUSION: A three-week, six session HIIT and Aerobic Training program elicited significant reductions in visceral fat mass over time as well as similar improvements in VO2max. HIIT is a viable, time efficient method to improve measures of fitness among healthy college-aged individuals.

INTRODUCTION

- HIIT is characterized by alternating periods of intense exercise followed by short periods of recovery. Compared to traditional aerobic exercise, HIIT offers a time-efficient way for individuals to dedicate to exercise during the week.
- Coronary artery disease (CAD) patients reported HIIT training to be more enjoyable as measured by Profile of Mood States Questionnaire (Oliveria, Slama, Deslandes, Furado, Santos, 2013). Using an alpha of 0.05, the two-way repeated measures ANOVA indicated Time (PreT, PT, PDT) and Group (EXP and CON) were not significant predictors of VO2max (p<0.05).
- A three-week, six session HIIT and Aerobic Training program elicited significant reductions in visceral fat mass over time as well as similar improvements in VO2max. HIIT is a viable, time efficient method to improve measures of fitness among healthy college-aged individuals.

METHODS

- Participants: 27 college-aged recreationally active participants (17 males, 10 females) that meet the ACSM Guidelines for physical activity. Inclusion criteria included being without any injuries that would be aggravated by high impact exercise (orthopedic, cardiovascular, or musculoskeletal).
- Participants were randomly assigned to one of the two groups: steady-state aerobic exercise (CON), or HIIT (EXP).
- The HIIT group completed 10 bouts of 1-minute maximal effort, 1-minute recovery at 90-95% HRmax, and 60-65% HRmax, respectively. The CON group maintained a pace at 60% HRmax for 20 minutes.
- Descriptive statistics of the baseline characteristics were gathered for the dependent variables (DV): age, height, weight, VO2max, body fat, and visceral fat.

RESULTS

- **Participants**
  - 27 college-aged recreationally active participants (17 males, 10 females) that meet the ACSM Guidelines for physical activity.
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CONCLUSIONS

- Using an alpha of 0.05, the two-way repeated measures ANOVA indicated Group (EXP and CON) was not a significant predictor of Visceral Fat, F(2,50) = 0.003, p = .956 respectively. In addition, no significant interaction effect was examined, F(2,50) = 0.956, p = .390. However, there was a significant interaction between Time (PreT, PT, PDT) and Visceral Fat, F(2,50) = 3.92, p = .026.

Table 1. Descriptive Statistics

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<th>F</th>
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- **Measures**
  - **Anthropometric Measures:** including height and weight.
  - **InBody 770 body composition assessment** specifically for percent body fat and visceral fat measures (cm)
  - **VO2max (maximal oxygen consumption)** using a Parvo Medics TrueOne 2400 metabolic cart to determine each participants aerobic efficiency, measured in mL•kg-1•min-1.
  - **Polar Heart Rate Monitors** were used during testing and training periods to monitor heart rate and maintain an ideal heart rate ranges for both the CON and EXP groups.
  - **Borg Scale** was used to standardize participants’ rating of perceived exertion during both maximal testing, and training periods for both groups.

- **Study Design**

- **A two-way ANOVA repeated measures test was conducted to compare measures between HIIT and steady-state training groups over time.**
- **A 3-week training period was designed to elicit physiological responses in both HIIT and steady-state aerobic exercise groups.** The CON group maintained a steady pace, while the HIIT group alternated between high intensity intervals and moderate-intensity recovery.

- **Validation of VO2max:** Increases in VO2 less than 2.5 (mL•kg-1•min-1) within age-predicted max or failure to increase with increasing workload, HR above 110 beats • min-1.

- **CONCLUSIONS**

- A three-week, six session HIIT and Aerobic Training program elicited significant reductions in visceral fat mass over time as well as similar improvements in VO2max.
- HIIT is a viable, time efficient method to improve measures of fitness among healthy college-aged individuals.
- Data Analysis is yet to be conducted regarding Ventilatory Threshold 1 and Ventilatory Threshold 2.
- Certain individuals improved in the respective outcome measures more than others, suggesting potential responders and non-responders to the allotted exercise dose.