The Effect of High-Intensity Interval Training (HIIT) on Physical Activity Adherence on Low Active Adults

Nicolas Mendivil, McNair Scholar; Beth Lewis, Ph.D., School of Kinesiology

Introduction

• Only 10% of American are active at the recommended levels which are (Elsawy & Higgins, 2010):
  o 150 minutes of moderate-intensity aerobic activity
  o 75 minutes of vigorous-intensity aerobic activity

• The consequences of physical inactivity are well known; few studies have focused on exercise to improve health, the physiological and psychological variables.

Methodology

• Twenty articles were identified using the following key terms: “High-Intensity Interval Training, Sprint Interval Training, HIIT and adherence, HIIT and physical health,”

• Exclusion Criteria: No detailed protocol of intervention, studies that targeted special populations, and/or not written in English

Relevant Findings

Table 1. HIIT Intervention Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>HIIT Intervention</th>
<th>Variables Measured</th>
<th>Results</th>
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<tbody>
<tr>
<td>Gibala et al. (2006)</td>
<td>16 active men randomized into ET</td>
<td>6 training sessions in 2 weeks</td>
<td>Muscle oxidative capacity</td>
<td>Similar physiological responses for both groups with no statistical differences between groups.</td>
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<td></td>
<td>(n=8) or SIT (n=8)</td>
<td>consisting of: 4-6 30sec maximum intensity at 250% cycling with 4 min recovery (SIT) or 90-120 min continuous cycling at 65% (ET)</td>
<td>by examining COX and COX subunits II and IV protein content. Time trial to 50 and 750 KJ</td>
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<td>Bartlett et al. (2011)</td>
<td>6 recreationally active men in a randomized crossover design of 2 groups: HIIT running or MIT running</td>
<td>HIIT group: 6x3 min at 90% VO2max interspersed with 6x3 min active recovery at 50% VO2max with 7 min warm-up and cool down at 70% VO2max. MIT: 30 min moderate intensity continuous running at 70% VO2max</td>
<td>RPE, Rating of perceived enjoyment through the Physical Activity Enjoyment Scale (PACES), average HR, energy expenditure and VO2max</td>
<td>RPE and perceived enjoyment was higher for HIIT. No difference in average HR, VO2max, or energy expenditure</td>
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<td>Dunham and Harms (2012)</td>
<td>15 individuals randomized into endurance training (n=7) or HIT (n=8)</td>
<td>4 weeks, 3 days a week: 5 1 min bouts at 90% VO2 max on cycle ergometer with 3 min recovery periods</td>
<td>VO2max, 5-mile time trial, maximum inspiratory pressure (Pimax), maximum expiratory pressure (Pemax)</td>
<td>Similar increase for VO2max and time trial. Significant difference between groups for Pmax,</td>
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<td>Saamijski et al. (2015)</td>
<td>26 sedentary middle-age men randomized into HIT (n=13) or MIT (n=13)</td>
<td>2 weeks, 6 sessions: HIIT group: 4-6 x 30 sec maximum effort 180% peak workload with 4 min recovery MIT group: 40-60 min continuous cycling at 60% peak workload</td>
<td>RPE, Stress, affective state recorded before, during and after each session. Peak oxygen consumption measured before and after intervention.</td>
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<td>Astorino et al. (2017)</td>
<td>71 individuals with a minimum of 150 min/week of exercise randomized into HIT (n=39) or control (n=32). After 10 sessions of low vol HIT, the HIT group was randomized into another 3 groups with different HIT protocols (SIT, high vol HIT, periodized interval training).</td>
<td>1st 10 sessions low vol HIT: 8-10 60 at 90-110 peak power 75 sec rest. 2nd 10 sessions SIT 8-12 all out sprints for 30 sec with 120 sec of recovery. High vol HIT of 12.5-17.5 min consisting of 2.5 min at 70-80 peak power with 60 sec recovery. PER with 3 sessions of high vol HIT, 3 HIT and 4 low vol HIT</td>
<td>VO2max, Cardiac Output</td>
<td>VO2max and Cardiac output increased significantly for all 3 interventions</td>
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<td>Follador et al. (2018)</td>
<td>14 moderately active men randomized into either cycling (n=7) or running protocols (n=7)</td>
<td>3 cycling protocols: ST 4x30sec all-out sprints; Tabata 7x20sec at 170%VO2max HIT 10x60sec at 90%HRmax.</td>
<td>VO2max, HR, RPE and Affective Valence (session-affect using the 11-point Feeling scale)</td>
<td>Tabata and the v VO2max had highest VO2max and RPE and least pleasant session-affect for their respective groups.</td>
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</table>

Summary of Findings

• Six articles met exclusion criteria. (See Table 1.)

• Variety of methods and timeframes for the interventions.

• No consistency in type of exercise, number of exercises vs. rest minutes or intensity.

• HIIT’s effect on affective responses to exercise varied across studies.

• HIIT’s effect on physiological variables consistently showed similar effects when compared to TET; however, HIIT was more time efficient than TET.

Limitations

• Sample sizes were small.

• Mostly male participants.

• Lack of generalizability.

• No standardized protocol for HIIT interventions.

• All studies were conducted in lab settings.

• Disagreement regarding psychological effects due to lack of a standardized protocol of interventions.

• Limited literature on affective responses to HIIT.

• Lack of studies utilizing theories to better understand the psychological effects of HIIT.

Future Research

• Further research is needed to standardize the HIIT protocol to facilitate comparisons between studies.

• Larger sample sizes and studies including both men and women are needed.

• Home-based interventions should be examined.

• Utilize theories such as Self Determination Theory (SDT; Deci & Ryan, 1985) to test adherence and motivation to HIIT interventions.

• Examine the effects of HIIT on affective responses to exercise and motivation to clarify contradicting literature.

References


