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Decreasing sprint duration from 20 to 10 s during reduced-exertion high-intensity interval training (REHIT) attenuates the increase in maximal aerobic capacity but has no effect on affective and perceptual responses

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ABSTRACT

Purpose: Recent studies have demonstrated that modifying the ‘classic’ 6x30-s ‘all-out’ sprint interval training (SIT) protocol by incorporating either shorter sprints (6x10-s or 15-s sprints) or fewer sprints (e.g. 2x20-s sprints; reduced-exertion high-intensity interval training (REHIT)) does not attenuate the training-induced improvements in maximal aerobic capacity ($\dot{V}O_2$max). The aim of the present study was to determine whether reducing the sprint duration in the REHIT protocol from 20 s to 10 s per sprint influences acute affective responses and the change in $\dot{V}O_2$max following training.

Methods: Thirty-six sedentary or recreationally active participants (17 women; mean±SD age: 22±3 y, BMI: 24.5±4.6 kg·m^{-2}, $\dot{V}O_2$max: 37±8 mL·kg^{-1}·min^{-1}) were randomised to a group performing a ‘standard’ REHIT protocol involving 2x20-s sprints or a group who performed 2x10-s sprints. $\dot{V}O_2$max was determined before and after 6 weeks of 3 weekly training sessions. Acute affective responses and perceived exertion were assessed during training.

Results: Greater increases in $\dot{V}O_2$max were observed for the group performing 20-s sprints (2.77±0.75 to 3.04±0.75 L·min^{-1}; +10%) compared to the group performing 10-s sprints (2.58±0.57 vs. 2.67±3.04 L·min^{-1}; +4%; group×time interaction effect: $p<0.05$; d=1.06). Positive affect and the mood state vigour increased post-exercise, while tension, depression and total mood disturbance decreased, and negative affect remained unchanged. Affective responses and perceived exertion were not altered by training and were not different between groups.

Conclusion: Reducing sprint duration in the REHIT protocol from 20 s to 10 s attenuates improvements in $\dot{V}O_2$max, and does not result in more positive affective responses or lower perceived exertion.

Key words:

$\dot{V}O_2$max; sprint interval training; SIT; Wingate sprint; affect

Abbreviations:

ANOVA: analysis of variance; BMI: body mass index; BRUMS: Brunel mood scale; HIIT: high-intensity interval training; IPAQ: International Physical Activity Questionnaire; MICT: moderate-intensity continuous training; PANAS: positive and negative affect schedule; PAR-Q: physical activity readiness questionnaire; RCT: randomised controlled trial; REHIT: reduced-exertion high-intensity interval training; RPE: rating of perceived exertion; SIT: sprint interval training; TMD: total mood disturbance; $\dot{V}O_2max$: maximal aerobic capacity

INTRODUCTION

Low maximal aerobic capacity ($\dot{V}O_2$max) is one of the strongest predictors of future chronic disease and premature mortality (Keteyian et al. 2008; Myers et al. 2002), and longitudinal studies have demonstrated that increasing $\dot{V}O_2$max substantially lowers morbidity and mortality during follow up (Blair et al. 1995; Lee et al. 2011). Thus physical activity and/or exercise interventions that improve $\dot{V}O_2$max should be emphasised in public health guidelines (Bouchard et al. 2015; Ross et al. 2016). $\dot{V}O_2$max can be improved through moderate-intensity continuous training (MICT) (Garber et al. 2011), but as perceived lack of time prevents many people from doing such exercise (Kimm et al. 2006; Korkiakangas et al. 2009; Trost et al. 2002), alternative exercise routines such as (sub)maximal high-intensity interval training (HIIT) and supramaximal sprint interval training (SIT) have been proposed as time-efficient alternative/adjunct exercise strategies (Gillen and Gibala 2014). However, the need for recovery periods in between repeated sprints diminishes the time-efficiency of most HIIT and SIT protocols compared to less strenuous MICT (Gillen and Gibala 2014).

The mechanisms which underpin the increases in $\dot{V}O_2$max with HIIT and SIT remain unclear (Vollaard and Metcalfe 2017), but have been proposed to rely on activation of skeletal muscle signalling pathways involving 5' adenosine monophosphate-activated protein kinase (AMPK), peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC-1α) (Gibala 2009), and potentially other signalling molecules such as p38 mitogen-activated protein kinase (p38 MAPK) (Little et al. 2011), sirtuin 1 (SIRT1) (Guerra et al. 2010) and sirtuin 3 (SIRT3) (Edgett et al. 2016). It has been proposed that the activation of relevant signalling pathways with supramaximal exercise may be reliant on achieving peak power output (Hazell et al. 2010), but we have proposed an alternative theory suggesting that activation of signalling pathways could plausibly be related to rapid glycogenolysis associated with supramaximal exercise (Metcalfe et al. 2015). As glycogen depletion during supramaximal exercise is limited to the first ~15 s of the first bouts of repeated 'all-out' sprints (Parolin et al. 1999), we have previously proposed that more time-efficient SIT protocols with fewer and/or shorter sprints may remain effective at improving $\dot{V}O_2$max (Metcalfe et al. 2012;

Vollaard and Metcalfe 2017). In recent years we have provided support for this hypothesis by demonstrating that a reduced-exertion high-intensity interval training (REHIT) protocol involving two 20-s all-out cycle sprints within a 10-min exercise session improves $\dot{V}O_2$max in sedentary individuals (Metcalfe et al. 2012; Metcalfe et al. 2016) and patients with type 2 diabetes (Ruffino et al. 2017). Furthermore, REHIT may improve measures of insulin sensitivity (Gillen et al. 2016; Gillen et al. 2014; Metcalfe et al. 2012) and blood pressure (Ruffino et al. 2017). With a total time-commitment of 3 x 10 min per week, the REHIT protocol appears to offer a genuinely time-efficient alternative to MICT (Vollaard and Metcalfe 2017; Vollaard et al. 2017).

The sprints in the REHIT protocol are shorter (20 s) comparted to those used in most other SIT protocols (30 s). This shortened sprint duration, and the concomitant lower increase in muscle metabolites (e.g. lactate, hydrogen ions) and reduction in central motor command can be expected to reduce perceived exertion (Pageaux 2016; Vollaard and Metcalfe 2017). The strong contribution of phosphocreatine hydrolysis to energy demands during the first ~10 s of a 30-s Wingate sprint means that perceived exertion during this phase is relatively low, whereas the gradual switch to glycolysis as the predominant energy source (Parolin et al. 1999) is associated with severe and progressive fatigue during the latter stages of the sprint. It follows that if sprint duration in the REHIT protocol can be reduced further without affecting the associated improvements in $\dot{V}O_2$max, the protocol would be perceived as less unpleasant and more tolerable. Recent findings by Townsend et al. (2017) suggest that reducing sprint duration may attenuate negative affective responses to SIT. This in turn could potentially lead to better uptake of, and adherence to, SIT as a viable alternative exercise intervention for reducing risk of noncommunicable disease (Rhodes and Kates 2015).

To date there has been little focus on the effects of sprint duration in SIT protocols on associated adaptations to $\dot{V}O_2$max. Hazell and co-workers (2010) suggested that generation of peak power may be more important as a mechanism for improving $\dot{V}O_2$max than the maintenance of a high power output for a longer duration. Indeed, they observed no difference in the increase in $\dot{V}O_2$max between SIT protocols incorporating either 4-6 x 30-s or 10-s sprints (Hazell et al. 2010). This was supported by Zelt et al. (2014) who found similar increases in $\dot{V}O_2$max with 4-6 x 30-s or 15-s sprints. Therefore, the present study aimed to determine whether reducing the sprint duration in the REHIT protocol from 20 s to 10 s per sprint affects the associated change in $\dot{V}O_2$max as well as ratings of perceived exertion and changes in affect and mood state.

METHODS

Compliance with Ethical Standards

The study was approved by the local University Ethics committees (references: SSREC 888/ FC52 2016-17/ 16-8.1/18), and conformed to the standards set forth in the latest revision of the Declaration of Helsinki. The study protocol was fully explained to all participants in written and verbal form before they were asked to provide written consent.

Participants

Thirty-six apparently healthy, sedentary or recreationally active participants (**Table 1**) were recruited at sites in the UK (Stirling, Derry/Londonderry) and Turkey (İzmir), and randomised into a group performing the REHIT protocol as previously described by Metcalfe et al. (2012) (REHIT20; n=18, 11 men) and a group performing the same protocol but with the sprint duration reduced by 50% for each session (REHIT10; n=18, 8 men). Randomisation was performed using the sealed envelope method. Exclusion criteria were classification as highly physically active according to the International Physical Activity Questionnaire (IPAQ (Craig et al. 2003)), contraindications to exercise as determined using a standard physical activity readiness questionnaire (PAR-Q (Thomas et al. 1992)), clinically significant hypertension (>140/90 mm Hg), or resting heart rate ≥100 beats·min^{-1}. All participants were asked not to make conscious changes to their diet and physical activity patterns for the duration of the study.

Experimental Procedures

Following measurement of body mass and height, $\dot{V}O_2$max was determined using an incremental cycling test to exhaustion (Excalibur Sport, Lode, Groningen, the Netherlands), with breath-by-breath measurement of oxygen uptake using a calibrated online gas analyser (Oxycon Pro, Jaeger, Wurzburg, Germany; Quark C-PET, Cosmed, Rome, Italy; CV: 4%). Participants were asked not to perform strenuous exercise or consume caffeine or alcohol the day before and prior to the test, and to drink half a litre of water the morning of the testing day. After a 2-min warm-up at 50 W the intensity was increased by 1 W every 3 s until volitional exhaustion (failure to maintain rpm >50) despite verbal encouragement. $\dot{V}O_2$max was determined as the highest value for a 15-breath rolling average, and accepted if two or more of the following criteria were met: 1) volitional exhaustion, 2) a plateau in $\dot{V}O_2$ despite increasing intensity, 3) RER>1.15, and 4) maximal heart rate within 10 beats of the age-predicted maximum (i.e. 220 - age). This was the case for all participants. Because of technical difficulties we were unable to complete the post-training $\dot{V}O_2$max test for one female participant in the REHIT20 group, so $\dot{V}O_2$max data are presented for 11 men and 6 women for this group.

Following the $\dot{V}O_2$max test, participants performed a 6-week training programme involving 3 training sessions per week. Training sessions consisted of 10 min of unloaded pedalling (Ergomedic 874e, Monark, Vansbro, Sweden), with two all-out cycle sprints against a resistance of 7.5% of the participant's body weight. The first sprint started at 2 min and the second sprint finished at 6 min. Sprint duration in the REHIT20 group increased from 10 s in the first 3 sessions, to 15 s in sessions 4-6, and 20 s in all remaining sessions. Sprint duration in the REHIT10 group was exactly half that of the REHIT20 group in all sessions: duration increased from 5 s in the first 3 sessions, to 7.5 s in sessions 4-6, and 10 s in all remaining sessions. Participants were asked to increase their cadence to maximal ~3 s prior to the start of the sprint and to maintain the highest possible cadence throughout the sprint. Verbal encouragement was provided. A session rating of perceived exertion (RPE) score using the 6-20 Borg scale (representing the entire training session (Borg 1982)) was taken directly post-exercise at the last session of each training week. In addition, during the first, fourth, seventh and eighteenth training session, the changes in psychological affect as a result of exercise were assessed using the positive and negative affect scale (PANAS (Watson et al. 1988)) and the Brunel Mood Scale (BRUMS (Terry et al. 1999)). These scales were completed before and within 5 min after the exercise session. Following the final training session, participants completed a questionnaire on the acceptability of the intervention, as previously used by Boereboom et al. (2016). A second

$\dot{V}O_2$max test was performed on the third day after the final training session, at a similar time as the baseline test and following identical procedures.

Statistical analysis

Data are presented as mean±SD. Based on a coefficient of variation for the $\dot{V}O_2$max test protocol of 4% (Songsorn et al. 2016), it was calculated that 14 participants were needed in each group to be able to detect a difference in the change in $\dot{V}O_2$max of 5% between the two groups, with a power of 90% and $\alpha=0.05$. Independent sample t-tests were used to determine differences between the two groups at baseline. Two-way mixed model ANOVA (intervention [REHIT10 / REHIT20] × trial [pre-training / post-training]) was used to determine differences in the change in $\dot{V}O_2$max and body mass from baseline to post-intervention between the two groups. Three-way repeated measures ANOVA (intervention [REHIT10 / REHIT20] × training session [session 1 / 4 / 7 / 18] × time [pre-exercise / post-exercise]) was used to assess the effect of acute exercise on affect and mood state, and two-way repeated measures ANOVA (intervention [REHIT10 / REHIT20] × training session [session 3 / 6 / 9 / 12 / 15 / 18]) was used to assess the effect of acute exercise on perceived exertion. A Mann-Whitney U test was used to test for differences between the groups for intervention acceptability. Cohen's *d* effect sizes are reported. Significance was accepted at $p<0.05$.

RESULTS

There were no significant differences between participants in the control group and the training group for mean baseline characteristics (**Table 1**) or other variables. Of the 36 participants, 23 completed all 18 training sessions, 7 completed 17 sessions, and 6 completed 16 sessions, resulting in an overall mean adherence of 97% (98% for REHIT10 and 96% for REHIT20). We observed a small but significant increase in body mass from pre- to post-intervention (main effect of time: $p<0.05$), but no difference between the change in the REHIT20 group (70.3±11.5 vs. 71.2±11.0 kg) compared to the REHIT10 group (75.8±18.7 vs. 76.2±18.8 kg). There was a greater increase in $\dot{V}O_2max$ in the REHIT20 group (2.77±0.75 vs. 3.04±0.75 $L{\cdot}min^{-1}$; +10%) compared to the REHIT10 group (2.58±0.57 vs. 2.67±3.04 $L{\cdot}min^{-1}$; +4%; group × time interaction effect: $P<0.05$; d=1.06; main effect of time: $p<0.001$; **Figure 1**).

Acute REHIT sessions were associated with a small but significant increase in positive affect directly post-exercise (main effect of time: $p<0.05$; d=0.23), whereas negative affect was unchanged (**Table 2**). There were no significant time × session interaction effects for affect, and no significant differences were observed between the changes in the REHIT10 and REHIT20 groups. Significant exercise-induced improvements with small effect sizes (d=0.11-0.21) were observed for the mood states tension, depression, vigour (main effect of time: $p<0.01$ for each) and total mood disturbance (main effect of time: $p<0.05$), but there were no significant changes for anger, fatigue, or confusion (**Figure 2**). Again, no differences were observed between training sessions, nor between the REHIT10 and REHIT20 groups. Ratings of perceived exertion scores averaged between ~13-15 ('somewhat hard' to 'hard'), with no significant differences between the groups or between training sessions (**Figure 3**). Following the final training session, both REHIT programmes were deemed acceptable by the majority of participants (**Figure 4**), with no significant differences between the protocols. Specifically, on average participants in both groups agreed with the statements that they believed that their fitness had improved, that they would do HIT again, that they would recommend HIT to others, and that they enjoyed HIT. They were neutral about the statement that HIT was more demanding than expected, and on average disagreed with the statements that the physical strain or travelling involved with HIT interfered with their life, and that HIT was a time burden.

DISCUSSION

The present study aimed to determine whether a REHIT protocol with 10-s sprints could be equally effective at improving $\dot{V}O_2$max compared to a protocol involving 20-s sprints. Unlike previous studies that found no difference in the increase in $\dot{V}O_2$max between 2-4 weeks of 4-6 x 30-s sprints vs. 10 (Hazell et al. 2010) or 15-s sprints (Zelt et al. 2014), we observed significantly greater improvements in $\dot{V}O_2$max with 2 x 20-s vs. 2 x 10-s sprints. As acute affective responses and perceived exertion were not affected by sprint duration, we conclude that in protocols with very few sprints the sprint duration should be longer than 10 s.

The increase in $\dot{V}O_2$max we observed in response to our original 2x20-s REHIT protocol is similar to what we have reported in our previous studies (Metcalfe et al. 2012; Metcalfe et al. 2016). This increase is important as low $\dot{V}O_2$max is strongly linked to poor health and increased risk of premature morbidity (Keteyian et al. 2008; Myers et al. 2002). As the prevalence of physical inactivity remains high worldwide (Hallal et al. 2012), there is an urgent need to establish alternative exercise interventions that are 1) effective at improving $\dot{V}O_2$max, and 2) acceptable to populations that are currently unwilling or unable to adhere to recommended levels of MICT. In an attempt to address the commonly reported barrier to exercise of perceived lack of time (Kimm et al. 2006; Korkiakangas et al. 2009; Trost et al. 2002) we previously developed the genuinely time-efficient REHIT intervention (Metcalfe et al. 2012). REHIT has a total time-commitment of 3 x 10 min per week and is associated with acceptable session ratings of perceived exertion ('somewhat hard') (Metcalfe et al. 2012). Nonetheless, there remains a need to establish whether the REHIT protocol can be made shorter and/or easier in order to enhance the likelihood of sedentary populations taking up and adhering to this exercise routine. We have recently provided preliminary data suggesting that a minimum of two sprint repetitions within a training session is required in order to improve $\dot{V}O_2$max (Songsorn et al. 2016; Songsorn et al. 2017; Vollaard et al. 2017). Reducing the sprint duration in the REHIT protocol would do little to reduce the total training time (the bulk of each training session is spent on the low-intensity warm-up and recovery periods), but if the resulting protocol remains effective at improving $\dot{V}O_2$max it could be beneficial by reducing potential negative affective responses or perceived exertion (Townsend et al. 2017). However, in the present study we demonstrate that reducing the sprint duration from 20 s to 10 s attenuates the efficacy of the REHIT protocol at improving $\dot{V}O_2$max, and we therefore propose that the original protocol involving 20-s sprints remains the protocol of choice.

The exact physiological stimuli and molecular signalling pathways responsible for the rapid improvements in $\dot{V}O_2$max associated with HIIT and SIT protocols remain unclear (Vollaard and Metcalfe 2017). As long as this is the case, establishing the shortest and/or easiest exercise interventions associated with health benefits such as improved $\dot{V}O_2$max remains a matter of trial and error, involving studies examining a variety of protocol modifications. Previous work by the groups of Hazell (Hazell et al. 2010) and Gurd (Zelt et al. 2014) suggested that the sprint duration in SIT protocols can be substantially reduced from that used in the 'classic' 4-6 x 30-s SIT protocol popularised by Gibala's group (Burgomaster et al. 2005). On the basis of these results it was suggested that generation of peak power is a key stimulus for improving $\dot{V}O_2$max. Our present data suggest that this is not the case, at least not when the number of sprint repetitions is kept low (2 repetitions). The evidence to date points to a need to repeat all-out sprints of a sufficient duration (e.g. 2 x 20 s) or number (e.g. 4-6 x 10 s) to achieve clinically meaningful increases in $\dot{V}O_2$max. The reasons why certain combinations of sprint repetitions and sprint duration lead to differences in the effectiveness of the protocols in improving $\dot{V}O_2$max will remain unclear until we have a more detailed understanding of the mechanisms responsible for the increase in $\dot{V}O_2$max associated with very low volume SIT protocols (Vollaard and Metcalfe 2017).

This is the first study to provide data on the acute effects of REHIT on affective responses and mood state. We demonstrate that reducing the sprint duration in the REHIT protocol from 20 s to 10 s does not reduce session ratings of perceived exertion, nor does it lead to more positive affective responses or changes in mood state post-exercise. This is important, because a criticism of SIT protocols has been that all-out sprints are too strenuous for untrained individuals: it has been suggested that performing all-out sprints requires too much motivation (which many sedentary populations lack), and is likely to evoke negative affect which may lead to subsequent avoidance of further exercise (Hardcastle et al. 2014). However, the evidence on which this criticism is based is contentious (Jung et al. 2015), and our data suggest that REHIT is not associated with the negative affective responses described by Hardcastle et al. (2014).

Exercise interventions can only improve health if performed regularly, and therefore exercise protocols leading to a smaller increase in $\dot{V}O_2$max could still be deemed acceptable if they were substantially less strenuous and associated with less negative affect. However, we demonstrate that acute exercise in a REHIT session is not associated with an increase in negative affect or a disruption of mood state directly after exercise, and that neither reducing the sprint duration from 20 s to 10 s nor regularly performing REHIT sessions (i.e. training) modifies the acute responses. Our finding that REHIT does not result in negative affect directly post-exercise is in contrast to longer SIT protocols with more sprints (Townsend et al. 2017). Conversely it is in line with Townsend's finding that shorter and, if sprint duration is kept constant, fewer sprints have less of an impact on affective responses. Nonetheless, our data should be interpreted with caution given that affective responses and changes in mood state were only assessed on completion of the exercise session, i.e. ~5 min following the second sprint. Previous studies which have applied continuous exercise have shown that affective responses to exercise above the ventilatory threshold follow an inverse U-shaped curve: affect decreases (and may become negative) during exercise, but then rebounds quickly upon exercise cessation and mood state may then be enhanced in the immediate post-exercise period (Ekkekakis et al. 2008). Future studies should determine whether negative affect is present at any point during the 10-min exercise session. Still, that REHIT may be associated with positive affective responses immediately post-exercise is in direct contrast to classic SIT (4-6 x 30-s sprints) (Saanijoki et al. 2015) and at the very least suggests that any potential negative responses will be short-lived.

In conclusion, our present study shows that reducing the sprint duration in the REHIT protocol from 2 x 20 s to 2 x 10 s attenuates improvements in $\dot{V}O_2$max, but does not impact perceived exertion, acute affective responses or mood state. Our findings further support the use of the original REHIT protocol consisting of 2 x 20-s sprints, and strengthens our contention that REHIT represents an efficacious, time-efficient, and acceptable alternative to classic SIT and MICT for improving health and reducing risk of future morbidity and premature mortality.

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Conflict of interest

The authors declare that they have no conflict of interest.

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Table 1 participant characteristics

	REHIT10 (n=18)	REHIT20 (n=18)
Sex (male / female)	8 / 10	11 / 7
Age (y)	22±4	22±2
BMI (kg·m^{-2})	25.3±5.9	23.8±24.1
Baseline $\dot{V}O_2$max (mL·kg^{-1}·min^{-1})	34±9	39±7
Physical activity level (MET-min·week^{-1})	911±739	981±769

Values shown are means±SD. Physical activity level was determined using the IPAQ.

Table 2 Effects of REHIT10 and REHIT20 on positive and negative affect

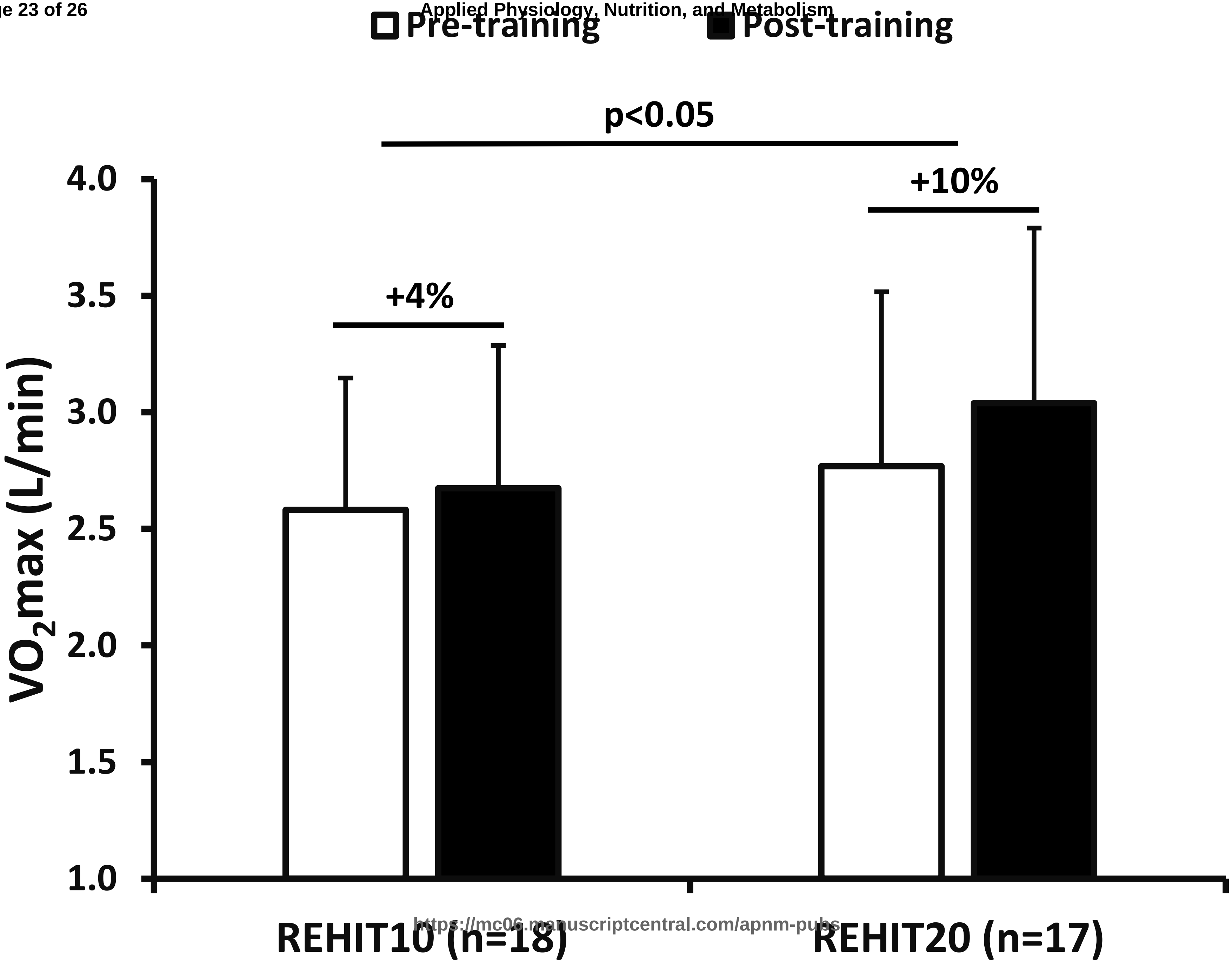
	Positive affect				Negative affect			
	REHIT10		REHIT20		REHIT10		REHIT20	
	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise	Pre-exercise	Post-exercise
Session 1	24±7	26±7	22±7	22±6	15±4	16±6	14±3	13±4
Session 4	22±6	26±7	19±7	19±7	15±4	15±5	13±5	13±5
Session 7	23±6	25±6	19±8	20±10	15±5	15±5	13±3	13±4
Session 18	25±6	26±8	20±9	21±9	15±5	16±5	14±5	14±5

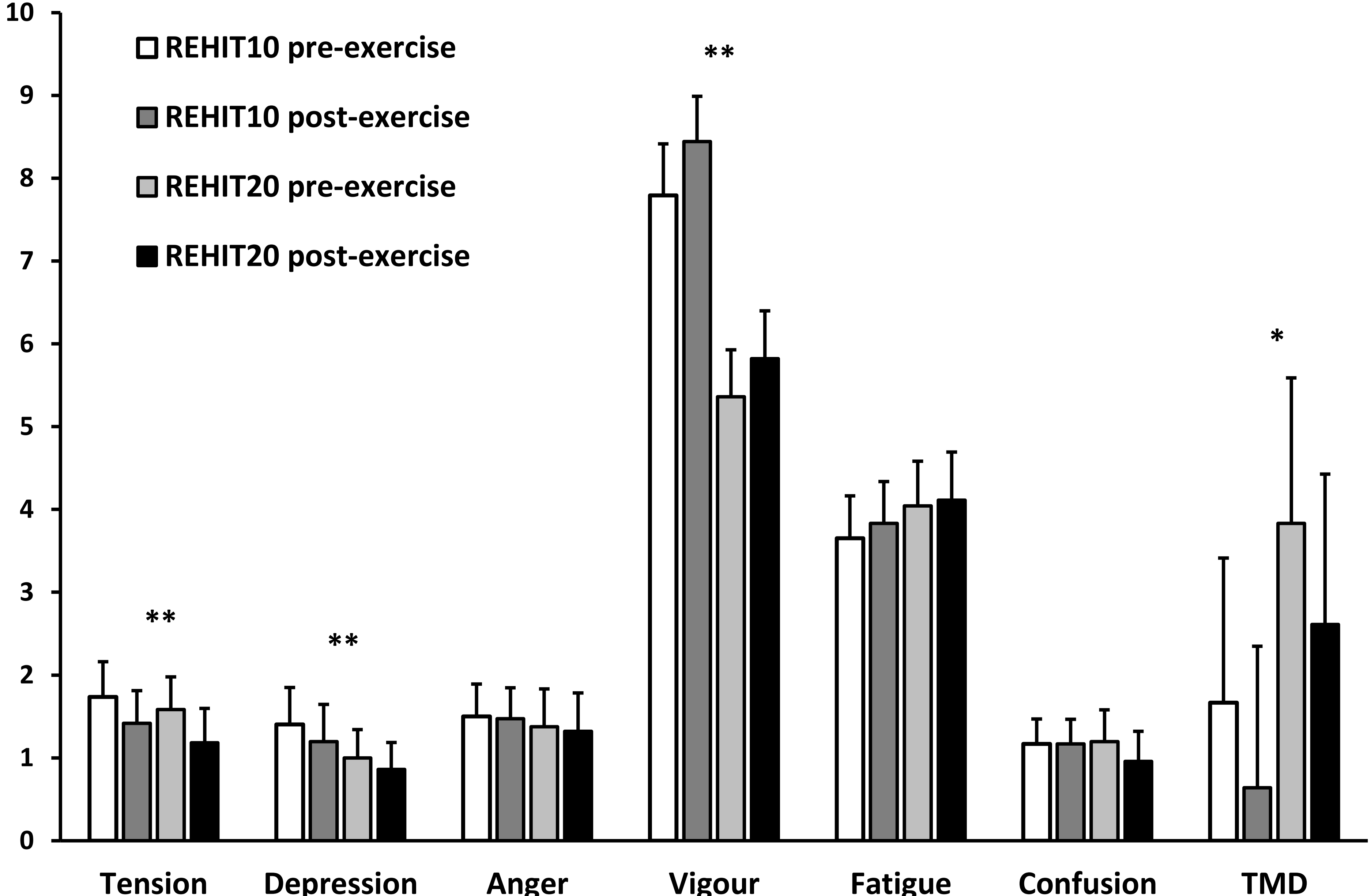
Figure 1 Changes in $\dot{V}O_2max$ in response to 6 weeks of REHIT10 and REHIT20. The mean 10% increase in $\dot{V}O_2max$ following REHIT20 was significantly higher than the 4% increase following REHIT10 ($p<0.05$).

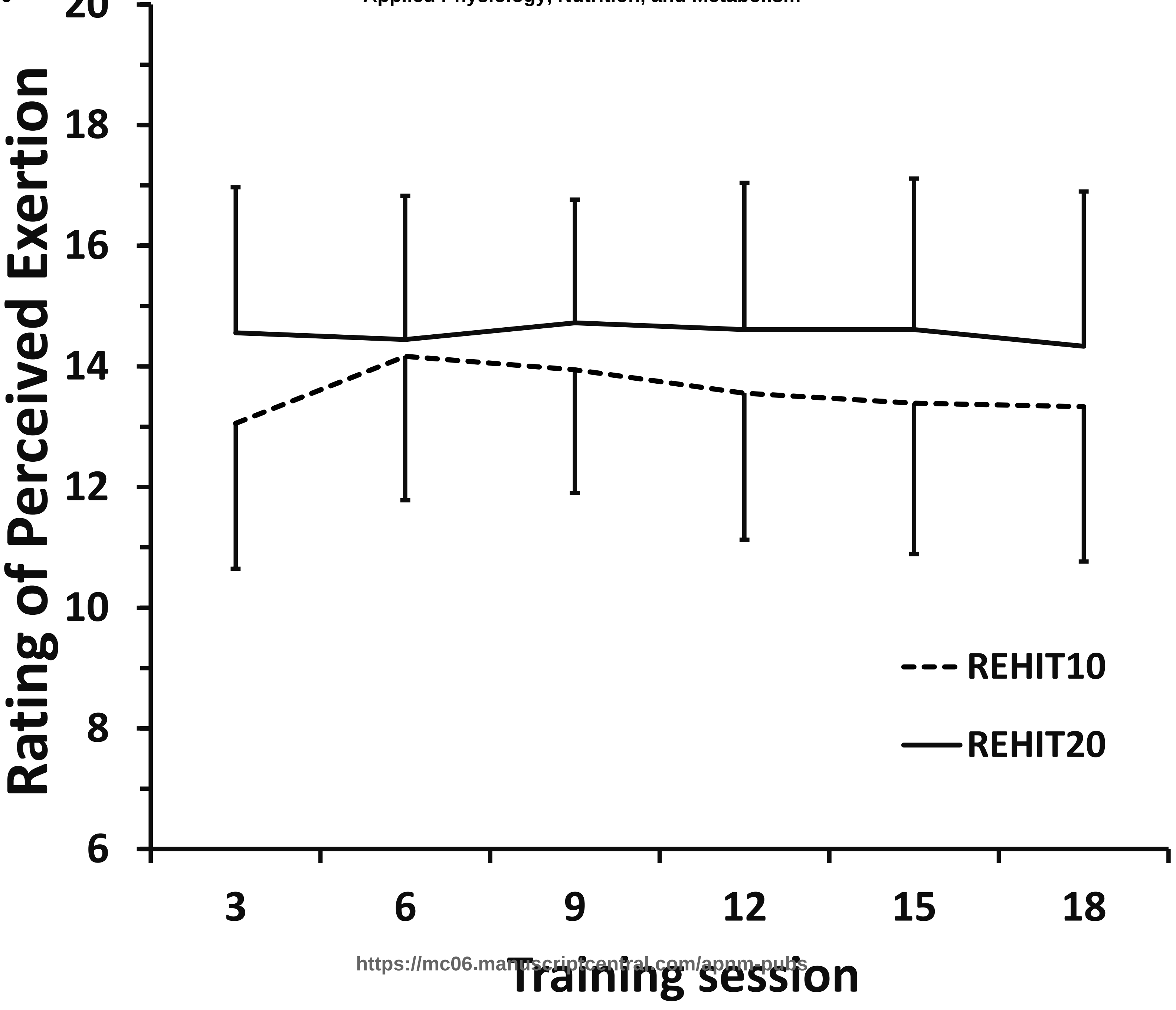
Figure 2 Effects of REHIT10 and REHIT20 on mood state as determined using the Brunel Mood Scale (BRUMS). As no main or interaction effects of training session were observed, values for training sessions 1, 4, 7, and 18 were averaged. Values shown are means±SD. TMD: total mood disturbance. Main effects of time: * $p<0.05$, ** $p<0.01$.

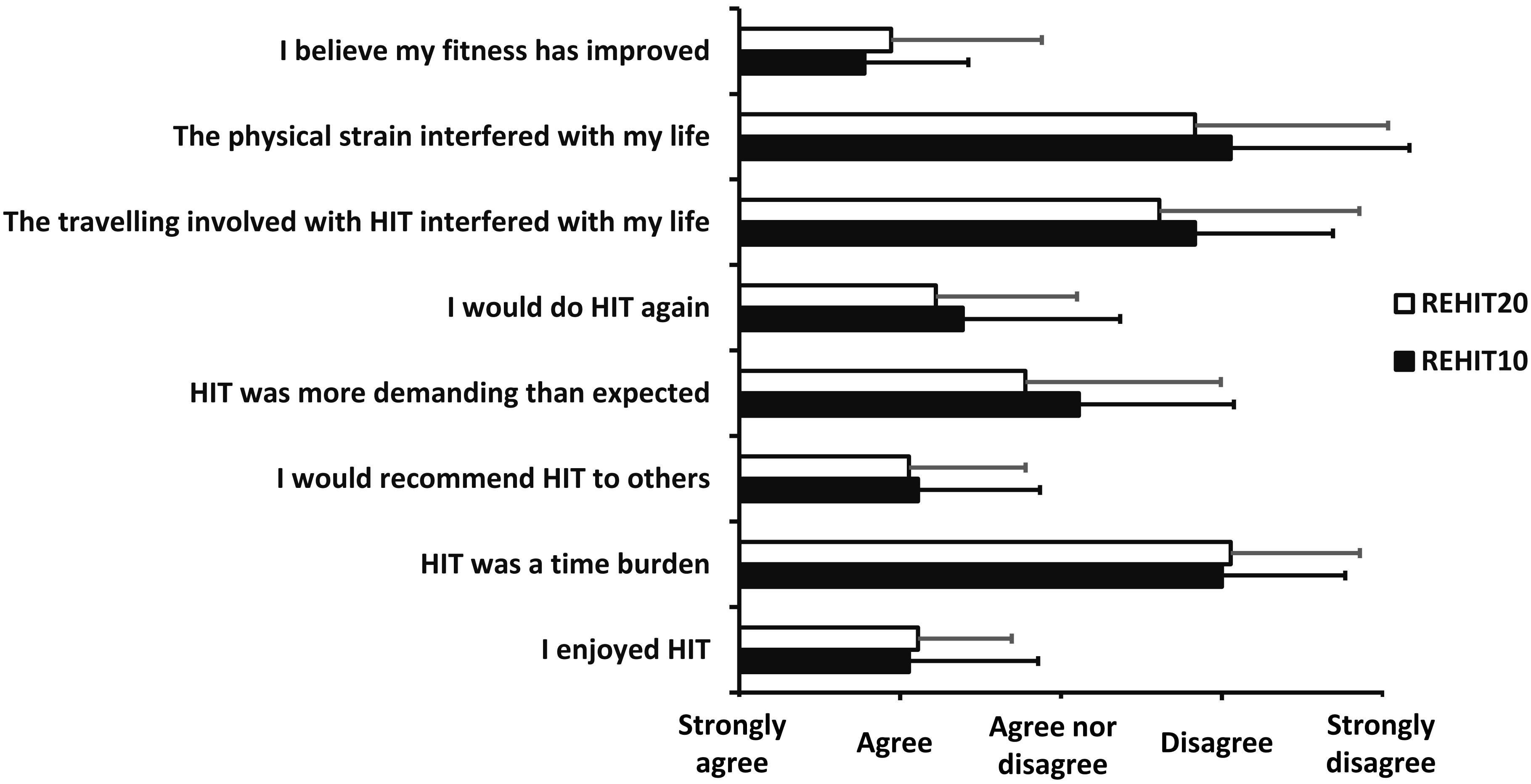
Figure 3 Rating of perceived exertion (RPE) as taken at the end of the last training session of each week. Participants were asked to rate the 10-min training sessions as a whole. No significant differences were observed between REHIT10 and REHIT20, nor between the training sessions.

Figure 4 Acceptability of REHIT. Acceptability was assesses using a modified questionnaire as used by Boereboom et al. (2016). Answers were given on a five-point Likert scale ranging from 1 - strongly agree to 5 - strongly disagree. No significant differences in the mean responses were observed between REHIT10 and REHIT20.


Pre-training
Post-training
p<0.05
+10%
+4%
4.0
3.5
3.0
2.5
2.0
1.5
1.0
VO2max (L/min)
REHIT10 (n=18)
REHIT20 (n=17)


10
9
8
7
6
5
4
3
2
1
0
REHIT10 pre-exercise
REHIT10 post-exercise
REHIT20 pre-exercise
REHIT20 post-exercise
**
**
**
*
Tension
Depression
Anger
Vigour
Fatigue
Confusion
TMD


20
18
16
14
12
10
8
6
Rating of Perceived Exertion
3
6
9
12
15
18
Training session
REHIT10
REHIT20


I believe my fitness has improved
The physical strain interfered with my life
The travelling involved with HIT interfered with my life
I would do HIT again
HIT was more demanding than expected
I would recommend HIT to others
HIT was a time burden
I enjoyed HIT
REHIT20
REHIT10
Strongly agree
Agree
Agree nor disagree
Disagree
Strongly disagree