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Conference Abstract

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Dropped Out - Physiological and perceptual responses at the point of task disengagement in intermittent endurance events

Joao Henrique Falk Neto [1,*], Aidan K. Comeau [1] and Michael D. Kennedy [1]

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[1] Athlete Health Lab, Faculty of Kinesiology, Sport, & Recreation, University of Alberta, Edmonton - Alberta - Canada

Correspondence

Joao Henrique Falk Neto

Athlete Health Lab, Faculty of Kinesiology, Sport, & Recreation, University of Alberta, Edmonton - Alberta - Canada

falkneto@ualberta.ca

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1 Abstract

Intermittent endurance events require athletes to perform multiple surges in intensity over the course of a race. These surges usually occur at supramaximal intensities (i.e., above the athletes' maximal aerobic power - MAP), exacerbating the race's physiological and perceptual demands. The ability to complete these surges and stay within the leading pack is essential for success in these events, as the race outcome is often decided in the finishing sprint. Many athletes, however, are unable to sustain the demands of these surges, and need to manage their efforts to ensure they can complete the race. Thus, this study had 2 aims: (1) to describe the physiological and perceptual responses at the point of task disengagement during an intermittent endurance event, and to determine whether athletes who skipped a sprint experienced greater physiological and perceptual demands at disengagement than those who did not, and (2) to determine if there were any differences in the determinants of endurance performance between the group that completed all sprints and the group that did not.

The study recruited 14 endurance-trained males (age: 35.5 ± 9.6y; bodyweight: 82.5 ± 10.3 kg, VO_2max: 58.9 ± 12.4 $ml.kg.min^{-1}$). The participants performed a protocol consisting of fifteen 10-second sprints separated by 50 seconds of low intensity cycling (60% maximal aerobic power – MAP). The sprints were performed at an intensity associated with 25%

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of the athletes' anaerobic power reserve (APR). Seven participants completed all sprints during the protocol (COMP), while seven skipped at least one sprint (SKIP). On average, participants first skipped a sprint at sprint 9 (60% of the protocol). Therefore, the responses of the COMP group at sprint 9 were used for between group comparisons. An independent samples t-test was used to determine if there were any differences in physiological (oxygen consumption - VO_2, heart rate – HR, respiratory rate – RR, blood lactate, muscle activity – expressed as a percentage of the participants' maximal voluntary contraction – MVC) and perceptual (rate of perceived exertion – RPE, and leg discomfort - LD) responses between groups at the point the participants decided to skip a sprint. The same test was used to assess if there were any differences in physiological and performance characteristics between the two groups (VO_2max, MAP, maximal peak power, and APR).

At the point of task disengagement, the participants in the SKIP group had a high oxygen consumption (84.1 ± 6.9% of VO_2max), respiratory rate (49.0 ± 5.9 breaths per minute), muscle activity (60.1 ± 17.5% MVC), and blood lactate level (10.4 ± 2.0 mmol.L^{-1}), along with near maximal heart rate (92.8 ± 2.7% HRmax), and high perceptual demands (RPE = 15.7 out of 20, LD = 6.8 out of 10). However, there were no differences in these responses between the COMP and SKIP groups. Despite the lack of statistically significant differences, a moderate to large effect size was reported for respiratory rate (d = 0.73, 95% CI = -0.36 to 1.80), blood lactate (d = 0.75, 95% CI = -0.35 to 1.82), and LD (d = 0.93, 95% CI = -0.19 to 2.03). Participants in the COMP group had significantly higher VO_2max (p = .034, mean difference = 13.6 ml.kg.min^{-1}, 95% CI = 1.17 to 26.10 ml.kg.min^{-1}) and MAP values (p = .018, mean difference = 61.4W, 95% CI = 12.5 to 110.2W) than those in the SKIP group.

The results indicate that very high levels of physiological and perceptual demands are attained at the point of task disengagement during intermittent events. However, having a higher VO_2max and MAP might allow athletes to withstand these demands during a race. As such, coaches and sport scientists involved in these events should focus on developing their athletes' aerobic power to increase their chances of success. Lastly, the moderate to large effect sizes reported for physiological (respiratory rate and blood lactate) and perceptual measures (leg discomfort), highlights that further studies are required to determine the importance of these variables to assess exercise tolerance in intermittent endurance events.