

Conference Abstract

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No sex differences in durability and repeatability during an intermittent fatiguing cycling protocol

Elisa Pastorio ^{1*}, Juan-José Pérez-Díaz ², José-Antonio Salas-Montoro ², Cristóbal Sánchez-Muñoz ², Emma Hodson-Tole ³, Paul Ansdell ¹, Louise Burnie ¹ and Mikel Zabala ²

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¹ School of Sport, Exercise and Rehabilitation, Northumbria University, Newcastle upon Tyne, UK.

² Department of Physical Education and Sport, Faculty of Sport Sciences, University of Granada, Granada, Spain.

³ Department of Life Sciences, Manchester Metropolitan University, Manchester, UK.

Correspondence

Elisa Pastorio

School of Sport, Exercise and Rehabilitation, Northumbria University, Newcastle upon Tyne, UK

elisa.pastorio@northumbria.ac.uk

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1 Introduction

In modern cycling, a rider's capacity to repeatedly produce maximal sprints throughout a prolonged race and express high-power outputs in fatigued condition represents a key determinant of elite performance [1]. Recently, female cyclists were reported to experience lesser reductions in submaximal thresholds than males after heavy intensity constant cycling [2], together with a greater ability to maintain absolute peak power output, work and speed across repeated cycling sprints [3]. However, data regarding sex differences in

the ability to maintain performance during more real-world intermittent cycling tasks is scarce. Therefore, this study aims to investigate the effects of fatigue developed during 90 minutes of prolonged intermittent cycling on sprint performance [i.e., peak power output (PPO)] and performance during a 5-min time-trial (5 min-TT) and their underpinning physiological mechanisms in both sexes.

2 Material and Methods

40 cyclists (20 males, age 33 ± 11 years, $\text{VO}_{2\text{peak}}$ 54 ± 8 $\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$ and 20 females, age 35 ± 11 years, $\text{VO}_{2\text{peak}}$ 46 ± 7 $\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}$)



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visited the laboratory on three occasions. In visit one, participants underwent a body composition assessment and performed a graded incremental exercise test to exhaustion as well as familiarization with the 5-min time trial and the 6 s maximal sprint. The second and third visits took place in random, counterbalanced order and involved either (i): FRESH: a 6 s maximal sprint, a 5-min time trial immediately followed by another 6 s maximal sprint, or (ii) FATIGUED: a 6 s maximal sprint, 90 min at 90% of first lactate threshold (LT1) interspersed with 4 series of 8 sets of 20 s at 120% of maximal aerobic power (MAP) + 40 s at 30% MAP. 2 min after each series a 6 s maximal sprint was performed (4 in total). Immediately after the 90 min fatiguing intermittent cycling protocol, the 5-min time trial and the 6 s maximal sprint were performed.

During all visits, pulmonary ventilation (VE), oxygen uptake (VO₂), carbon dioxide production (VCO₂), heart rate (HR), and rating of perceived exertion (RPE) were recorded, and blood lactate (bLa) was collected.

3 Results

MAP (males 331±35 vs females 210±32 W), PO at LT1 (males 201±22 vs females 129±16 W), and at second lactate threshold (males 270±36 vs females 172±27 W) achieved during the graded-incremental test were higher in males vs females (all $p < 0.001$). The mean power output achieved during the 5 min-TT decreased ($p < 0.001$), similarly in both sexes (males -8.7±6.9% vs females -8.8±6.5%, $p = 0.978$) following the prolonged intermittent cycling protocol. Similarly, the PPO achieved during the 6 s maximal sprint was reduced after the fatiguing protocol ($p < 0.001$), without sex differences (males -11.5±8.8% vs females -13.3±10.1%, $p = 0.556$). Moreover, during the 5 min-TT performed in fatigued condition, HR_{max} ($p = 0.001$), bLamax ($p < 0.001$) and VO_{2peak} ($p = 0.027$) decreased similarly in

males and females ($p \geq 0.280$) compared to the same trial performed in fresh condition. Moreover, during the 90-min intermittent protocol, HR, Bla, RPE and fat oxidation increased overtime ($p < 0.001$), while RER and carbohydrate oxidation decreased ($p < 0.001$), without sex differences ($p \geq 0.097$).

4 Discussion

After the prolonged intermittent cycling protocol, mean power output during 5 min-TT and 6 s PPO were significantly impaired. Surprisingly, no sex differences were detected neither in the decrement of performance after the 90-min fatiguing intermittent protocol, nor in the physiological changes that occurred during. These findings highlight that sex differences in fatigue resistance are “task specific”. Indeed, when investigating sex differences in fatigue resistance, severe- or maximal-intensity metrics of performance (5 min-TT and PPO) following a high intensity intermittent task, findings contrast the sex differences in durability observed in submaximal markers of performance (thresholds) following a steady state heavy-intensity protocol [2].

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