

Abstract

# The effect of physical and cognitive fatigue on mountain bike balance and agility performance

Kim Buchholtz <sup>1,2\*</sup>, Mike Lambert <sup>1</sup> and Theresa L. Burgess <sup>3,4</sup>

1. Division of Exercise Science and Sports Medicine, University of Cape Town, Sports Science Institute of South Africa, Newlands, Cape Town
2. Department of Physiotherapy, LUNEX University, Luxembourg
3. Division of Physiotherapy, University of Cape Town, Anzio Road, Observatory, Cape Town
4. Centre for Medical Ethics and Law, Faculty of Medicine and Health Sciences, Stellenbosch University, Cape Town, South Africa

\* Correspondence: (KB) [kim.buchholtz@lunex-university.net](mailto:kim.buchholtz@lunex-university.net)

Received: 18 June 2021; Accepted: 08 July 2021; Published: 30 November 2021

Abstract: Fatigue is a complex process affecting reaction time, movement coordination, motor control precision and muscle force generation capacity. Since fatigue develops during long duration or high-intensity mountain biking, it may be argued that bicycle balance and agility may be negatively affected and the risk of falling could increase. In this study we assessed the effects of physical and cognitive fatigue on novel dynamic bicycle balance and agility tests. This study was a quasi-experimental cohort study with a test-retest design. Nineteen participants (m=9, f=10) completed a familiarisation session followed by a cognitive fatigue protocol (Stroop task) and a physical fatigue protocol (repeated sprints) in a randomised order. Participants completed baseline bicycle balance and agility tests, followed by the fatigue protocol, then retested on the baseline tests (with top-up fatigue tasks between each test) to assess for fatigue related changes with a seven-day washout period between sessions. Rate of perceived exertion and performance on each test were recorded. Rate of perceived

exertion was significantly increased for all tests following the physical fatigue protocol (Cliff's  $d$  effect size= 0.27-0.40;  $p=0.001$  to 0.037), but balance and agility performance were not affected. The cognitive fatigue protocol had no effect on RPE or balance and agility performance. The fatigue induced in these protocols was insufficient to change performance in the bicycle-specific balance and agility tests, although RPE increased following the physical fatigue task. In our study, we assessed physical and cognitive fatigue individually and in mountain biking the combination of the two may be more appropriate. This should be investigated in future studies.

