

Abstract

The Influence of Different Training Load Quantification methods on the Fitness-Fatigue Model

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1. Abstract

Today there are numerous ways of quantifying training load (TL), making it difficult for practitioners to choose the most appropriate method. It is suggested that the best TL method, is the method that is able to relate TL to performance. Relating training to performance is done by using the fitness fatigue model. The purpose of this study was thus to test different TL methods within the fitness-fatigue model and to investigate the influence of the quantification methods on the outcomes of the model. A modelling longitudinal research design was used to compare performance, fitness and fatigue over an 11-week period. An 8 week training period was implemented where subjects completed 3 interval training sessions per week. Before every third training session of the week, the subjects also performed a 3 km time trial (TT) in order to monitor the weekly changes in performance. After the training period, there was a 3 week follow-up period where subjects stopped training and only performed the TT on Fridays so that the effect of dissipating fatigue and/or fitness could be monitored. Ten healthy physically active men (22.0 ± 1.6 yr., 177.5 ± 4.5 cm, 73.0 ± 9.3 kg, $VO_{2peak} = 55.2 \pm 7.2$ ml.min⁻¹.kg⁻¹)

participated voluntarily for this study. Banister TRIMP (bTRIMP), Lucia TRIMP (luTRIMP),

Edwards TRIMP (eTRIMP), Rating of perceived exertion (TLRPE) and the Training Stress Score (TSS) were calculated for all training sessions. Although the power output over different training sessions was identical, the resulting internal TL decreased over time. This drop is more pronounced in the first training phase (week 1 to week 4) than in the second training phase (Week 4 to week 8) ($-15.4\% \pm 12.8$ vs. $-0.039\% \pm 12.1$ respectively, $p < 0.001$, CI: $[-22.7 - -7.4]$). In the first period, this drop was more pronounced in bTRIMP than in the other methods ($p < 0.05$), except for TLRPE ($p = 0.124$). The fitness fatigue model was able to relate TL to performance with only a small error (1.5 – 2.1 %). The mean values of the output parameters across all methods for \square_1 , \square_2 , k_1 and k_2 were 13.2 days \pm 2.9, 9.3 days \pm 2.1, 0.59 au. \pm 0.16 and 0.67 au. \pm 0.20 respectively. Small, but significant, differences were found between methods. We conclude that, although the differences in model output are limited, TL methods cannot be used interchangeably since they evolve in a different way. Also, a combination of external and internal TL methods seems warranted.

