

Association of Training Characteristics with Critical Power in Competitive Recreational Cyclists and Triathletes

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ABSTRACT

Endurance athletes often employ a training zone approach to classify their training intensity, where Zones 1, 2, and 3 (Z1-Z3) correspond to low, moderate, and high intensities. Research has shown that many elite athletes across a multitude of endurance sports employ polarized training distributions (TIDs), i.e., they spend a large percentage of their training in Z1 with much of the remainder in Z3 and little training in Z2. This appears to be beneficial for performance in these populations. The typical TIDs among recreationally competitive endurance athletes and their impact on performance are less well understood. **PURPOSE:** The purpose of this study was to examine the TIDs of recreationally competitive cyclists and triathletes and the impact of training characteristics on cycling performance. **METHODS:** Participants ($n = 19$, age = 31.7 ± 10.7 years; height = 176.6 ± 8.8 cm; weight = 70.8 ± 8.6 kg, relative CP = 4.3 ± 0.7 W/kg) submitted raw activity files, which they had previously uploaded to Strava, a popular workout tracking site. We used a workout analysis program (Golden Cheetah, V3.5) and R statistical language to analyze training and racing data. We determined each athlete's highest critical power (CP) relative to body weight by first finding the highest maximum mean power (MMP) over 2, 5, and 10 minutes achieved over the course of a single week and then employing the linear power inverse of time CP model. We considered relative CP (W/kg) as our proxy for endurance performance, as it highly correlates with race performances. We then extracted values for estimated maximal aerobic power (MAP), training volume (training hours), training intensity (mean training power as a percent of MAP), training frequency (number of sessions), and training polarization (polarization index (PI) calculated from percent time in power Z1-3) for the 12 weeks leading up to the performance measure. We determined the association of the training characteristics on relative CP while controlling for participant age and fitness (MAP) by employing a linear regression. **RESULTS:** Only 4 of 23 participants employed a polarized training approach as defined by a PI > 2.0. Athletes spent on average $71.0 \pm 9.5\%$ of their training time in Z1, $16.1\% \pm 6.1$ in Z2, and $12.9\% \pm 7.3$ in Z3. They completed 74.9 ± 22.9 sessions and amassed 110.3 ± 46.9 hours of training time over the 12 weeks leading up to the performance measure. In this preliminary analysis of 19 participants, we were unable to detect a statistically significant effect of polarization on relative CP, when controlling for age, fitness, and all other training variables. Yet, polarization was the explanatory variable with the largest impact on relative CP, b (SE) = 0.25 (0.55), $t = 0.457$, $p = 0.656$. **CONCLUSION:** Most of the recreationally competitive cyclists and triathletes in our study did not employ a polarized TID, despite data from elite cohorts and laboratory studies showing its benefits. More research into the effect of TID on performance and health in recreationally competitive athletes is needed to confirm its benefits in this population.