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Maximal torque- and power-pedaling rate relationships for elite sprint cyclists in laboratory and field tests.

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Performance models provide an opportunity to examine cycling in a broad parameter space. Variables used to drive such models have traditionally been measured in the laboratory. The assumption, however, that maximal laboratory power is similar to field power has received limited attention. The purpose of the study was to compare the maximal torque- and power-pedaling rate relationships during "all-out" sprints performed on laboratory ergometers and on moving bicycles with elite cyclists. Over a 3-day period, seven male (mean +/- SD; 180.0 +/- 3.0 cm; 86.2 +/- 6.1 kg) elite track cyclists completed two maximal 6 s cycle ergometer trials and two 65 m sprints on a moving bicycle; calibrated SRM powermeters were used and data were analyzed per revolution to establish torque- and power-pedaling rate relationships, maximum power, maximum torque and maximum pedaling rate. The inertial load of our laboratory test was (37.16 +/- 0.37 kg m(2)), approximately half as large as the field trials (69.7 +/- 3.8 kg m(2)). There were no statistically significant differences between laboratory and field maximum power (1791 +/- 169; 1792 +/- 156 W; P = 0.863), optimal pedaling rate (128 +/- 7; 129 +/- 9 rpm; P = 0.863), torque-pedaling rate linear regression slope (-1.040 +/- 0.09; -1.035 +/- 0.10; P = 0.891) and maximum torque (266 +/- 20; 266 +/- 13 Nm; P = 0.840), respectively. Similar torque- and power-pedaling rate relationships were demonstrated in laboratory and field settings. The findings suggest that maximal laboratory data may provide an accurate means of modeling cycling performance.