It is widely acknowledged that adult road cyclists belong high maximal aerobic capacity (\(\text{V'O}_2\max\)), good capability to sustain a high percentage of \(\text{V'O}_2\max\) over time and elevated explosive power characteristics. Few data are available to understand if younger cyclists already possess these physiological qualities or if they are enhanced by training and performance over years. Therefore the purpose of this study is to compare physiological qualities of adolescent (A), junior (J) and senior (S) cyclists. 

70 male cyclists (A: N11, age 15.5\(\pm\)0.5 yr, FM 12.16\(\pm\)2.91\%, FFM 53.41\(\pm\)7.38 kg; J: N41, age 17.7\(\pm\)0.5 yr, FM 11.19\(\pm\)2.61\%, FFM 57.90\(\pm\)5.70 kg; S: N18, age 21.1\(\pm\)1.2 yr, FM 9.87\(\pm\)1.84\%, FFM 66.14\(\pm\)7.79) volunteered to participate in the study and underwent the following tests: 1) three 6 s maximal sprints, at 70, 90 and 120 rpm on an aerodynamic braked cycle-ergometer (Frigeri, Italy), were used to draw the maximum power/velocity curve and to calculate peak power (Wpeak); 2) an incremental test to exhaustion on an electro-magnetic braked cycle-ergometer (Excalibur Sport, Lode, Holland) allowed the maximal mechanical power (Wmax) and the maximal aerobic power (\(\text{V'O}_2\max\)) measurement on breath by breath basis (Quark b2, Cosmed, Italy); 3) an incremental intermittent test with blood lactate measured in capillary blood sample (Biosen 5030, EKF, Germany) at the end of each of 5 minutes step was used to draw the lactate/power curve and to calculate the mechanical power that elicits the blood lactate concentration at 4 mM (W4).

A cyclists possess lower Wpeak values when expressed in absolute values but significantly higher values when adjusted for body weight if compared with J and S cyclists (Wpeak: A 955.41\(\pm\)119.49, J 967.41\(\pm\)108.53, S 1049.27\(\pm\)152.83, ns; Wpeak/kg: A 15.71\(\pm\)0.81, J 14.77\(\pm\)1.01, S 14.24\(\pm\)1.17, p<0.05). The behaviour of aerobic qualities shows a different pattern: A cyclists possess a significantly lower Wmax and \(\text{V'O}_2\max\) and a significantly lower mechanical power at W4 both expressed in absolute and relative values if compared with J and S cyclists (Wmax, A 320.91\(\pm\)63.79, J 397.5\(\pm\)83.75, S 465\(\pm\)79.5 watt, p<0.05; \(\text{V'O}_2\max\), A 65.78\(\pm\)4.94, J 70.26\(\pm\)5.67, S 72.74\(\pm\)4.94 ml/kg/min, p<0.05; W4: A 213\(\pm\)28.67, J 246.61\(\pm\)31.58, S 295.78\(\pm\)33.89 watt, p<0.05; A 3.52\(\pm\)0.33, J 3.79\(\pm\)0.41, S 4.05\(\pm\)0.36 watt/kg, p<0.05).

This discrepancy can be partly explained considering that A cyclists take part to shorter but more intermittent races with a higher amount of sprints if compared with J and S. Moreover A perform a lower volume of training than J and S during a competitive season. Therefore our study demonstrates that the amount of training and performance over years significantly enhance (aerobic qualities) and modify (power qualities) cyclists’ physiological qualities.