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Research article

**Backstroke Technical Characterization of 11-13 Year-Old Swimmers**Ana Filipa Silva<sup>1</sup>, Pedro Figueiredo<sup>1,2</sup>, Ludovic Seifert<sup>3</sup>, Susana Soares<sup>1</sup>, João Paulo Vilas-Boas<sup>1,4</sup>, Ricardo J. Fernandes<sup>1,4</sup>, [Author Information](#)[Publish Date](#)[How to Cite](#)[Email link to this article](#)**ABSTRACT**

The aim of this study was to characterize the backstroke swimming technique of 11-13 year-old swimmers when performing at very high intensity. A sample of 114 swimmers was divided into four groups regarding maturational and gender effect, who performed 25- m backstroke swimming at 50-m pace. Using two underwater cameras the general biomechanical parameters (speed, stroke rate, stroke length and stroke index), the arm stroke phases and two indexes of arm coordination (Index of Coordination 1, which characterizes the continuity between propulsive phases of each arm and Index of Coordination 2 that evaluates the simultaneity between the beginning of the pull of one arm and of the recovery of the other arm) were measured. Post- pubertal swimmers achieved higher values of speed ( $1.06 \pm 0.14$  and  $1.18 \pm 0.14$  m·s<sup>-1</sup> for pubertal and  $1.13 \pm 0.14$  and  $1.24 \pm 0.12$  m·s<sup>-1</sup> for post-pubertal girl and boy swimmers, respectively), stroke length ( $1.64 \pm 0.26$  and  $1.68 \pm 0.25$  m·cycle<sup>-1</sup> for pubertal and  $1.79 \pm 0.22$  and  $1.75 \pm 0.27$  m·cycle<sup>-1</sup> for post-pubertal girls and boys, respectively) and stroke index. Regarding genders, male were faster than female swimmers. Boys also showed a higher stroke rate and stroke index than girls, who achieved higher results in the ratio between stroke length and arm span. As it was expected, no hand lag time was noticed in young swimmers. Although no differences were noticed between genders, the Index of Coordination 1 was in catch-up mode ( $-9.89 \pm 3.16$  and  $-10.16 \pm 3.60$  % for girls and  $-9.77 \pm 2.93$  and  $-10.39 \pm 2.44$  % for boys pubertal and post-pubertal, respectively) and the Index of Coordination 2 was in superposition mode ( $1.86 \pm 4.39$  and  $2.25 \pm 2.25$  % from girls and  $1.72 \pm 2.62$  and  $1.95 \pm 2.95$  % for boys, pubertal and post-pubertal, respectively).

**Key words:** Swimming, backstroke, age group, kinematics, coordination

### Key Points

- Young swimmers adopt the catch-up arm coordination when swimming backstroke.
- These swimmers present lower stroking parameters than those published for older and higher level swimmers.
- No hand lag time at the thigh was noticed, meaning that young swimmers perform the final phase of their arm cycle without inducing discontinuity between the propulsive actions of the two arms.

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