

## RELATIONSHIP OF FORCE METRICS WITH SWIMMING PERFORMANCE IN AGE-GROUP SWIMMERS

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### Introduction

In competitive swimming, performance relies in the good combination of force and technique. The relative contribution of each of these components is still a controversial issue. Therefore, the aim of this study was to verify if force metrics obtained through tethered swimming can be explanatory of free swimming performance.

### Methods

22 age-group swimmers (male  $n=14$ , age:  $14.6\pm 1.2$  years of age, body mass:  $53.1\pm 9.0$  kg, height:  $1.66\pm 0.1$  m; female  $n=8$ , age:  $13.9\pm 2.1$  years of age, body mass:  $46.3\pm 9.2$  kg, height:  $1.57\pm 0.1$  m) took part in the study. Each participant performed a 30 s maximal front crawl tethered swimming test (described in detail by Morouço et al., 2011). After normality assumption checked, force metrics (average force – Favg; maximum force – Fmax; and impulse of force – Fimp) were correlated with 50m in-water maximal bout performance (t50).

### Results

Both in male and female swimmers Favg presented strong negative correlations with t50 ( $r=-0.81$  and  $r=-0.95$ ;  $p<0.01$ , respectively). For the male group, both Fmax and Fimp obtained moderate negative associations with t50 ( $r=-0.63$  and  $r=-0.57$ ;  $p<0.05$ , respectively). In female swimmers, both Fmax and Fimp attained strong negative relationships with t50 ( $r=-0.91$  and  $r=-0.85$ ;  $p<0.01$ , respectively).

### Discussion

The higher force metric associated with t50 was Favg for both groups, in accordance with Taylor et al. (2001). These authors stated that only average force was a reliable parameter to estimate swimming performance in age-group swimmers. However, if propulsion occurs along the whole propulsive phase of the stroke cycle (Marinho et al., 2011), integral of force with respect to time should be considered. The lower relationship of Fimp with t50 may suggest that this cohort of swimmers have lack of technique leading to a poor ability to extend the propulsive capacity during stroke. The impulse of force assessment, and respective association with swimming performance, is a feasible methodology to analyze the balance between force and technique in age-group swimmers.

### References

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