

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



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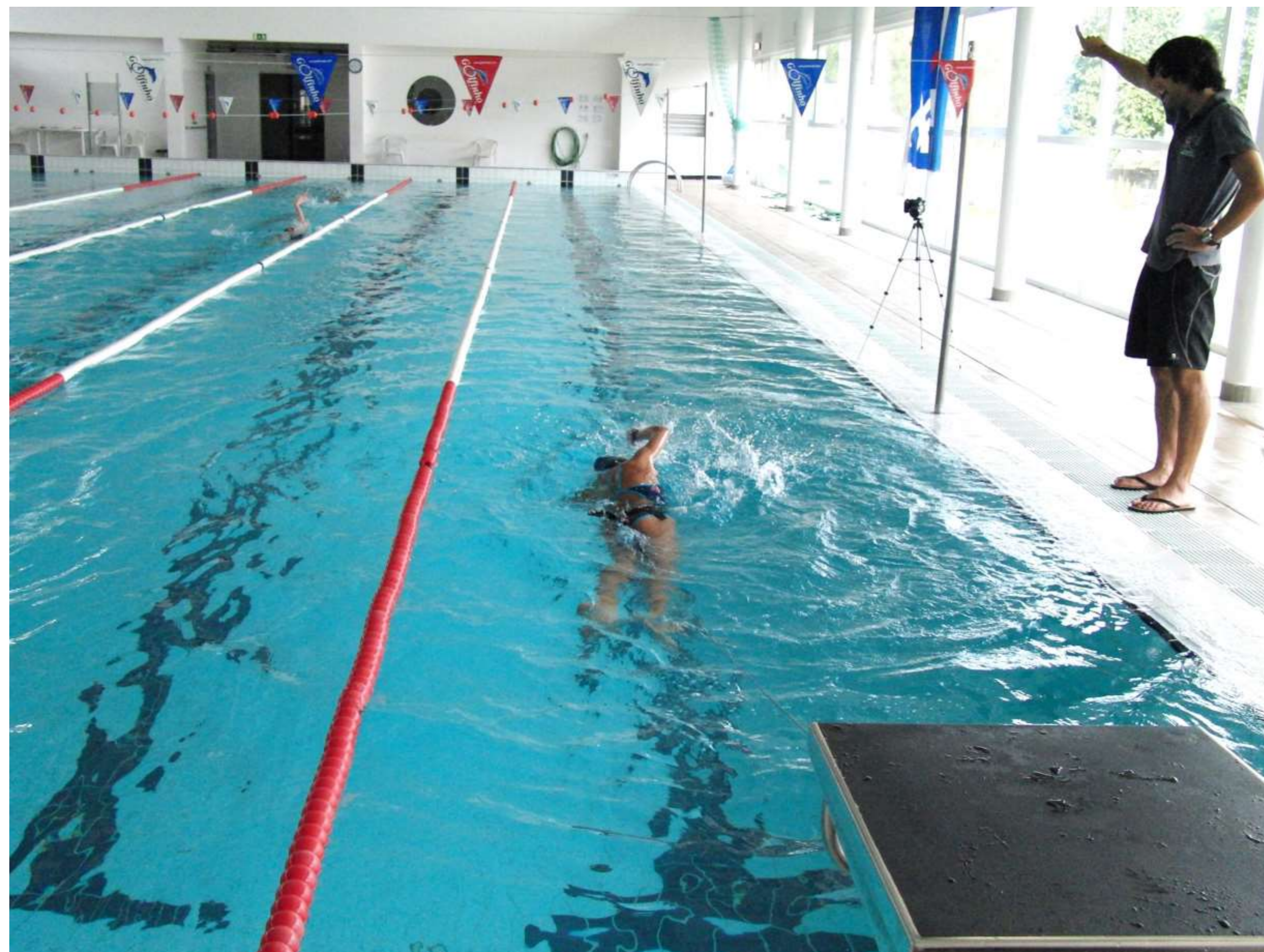
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Introduction

In competitive swimming, performance relies in an optimal combination of force and technique (Keskinen, 1997). The relative contribution of each of these components is still a controversial issue, namely considering age-group swimmers.

Objectives

Therefore, the aim of this study was to verify if force metrics obtained through maximal tethered swimming can be explanatory of free swimming performance in short distances.



Materials & Methods

Twenty-two age-group swimmers volunteered to take part in the study.

Table 1. mean (\pm SD) values for the main physical characteristics of the participants.

	age (years)	body mass (kg)	height (m)
male ($n = 14$)	14.6 \pm 1.2	53.1 \pm 9.0	1.66 \pm 0.1
female ($n = 8$)	13.9 \pm 2.10	46.3 \pm 9.2	1.57 \pm 0.1

After an 800 m warm-up, each subject performed a maximum 50 m front crawl free swimming with a in-water start, assessing swimming time (t50). Afterwards, subjects undertook a 30 s maximal front crawl tethered swimming test (described in detail by Morouço et al., 2011). A 30 minutes of recovery between tests was controlled.

After normality assumption checked, force metrics (average force – Fav_g; maximum force – F_{max}; and impulse of force – F_{imp}) were correlated with 50m in-water maximal bout performance (t50).

Results & Discussion

Both in male and female swimmers, average force presented strong negative correlations with t50 ($r = -0.81$ and $r = -0.95$; $p < 0.01$, respectively).

For the male group, both maximum and impulse of force obtained moderate negative associations with t50 ($r = -0.63$ and $r = -0.57$; $p < 0.05$, respectively).

In female swimmers, both maximum and impulse of force attained strong negative relationships with t50 ($r = -0.91$ and $r = -0.85$; $p < 0.01$, respectively).

The higher force metric associated with performance in the 50 m swimming was average force 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.

Conclusions

1. The lower relationship of impulse of force with swimming performance may suggest that this cohort of swimmers have lack of technique leading to a poor ability to extend the propulsive capacity during stroke.
2. The impulse of force assessment, and respective association with swimming performance, may be a feasible methodology to analyze the balance between force and technique in age-group swimmers.

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Keskinen KL. Evaluation of technique performances in freestyle swimming. Kinesiology 1997; 2: 30-38.