



## STRENGTH OR TECHNIQUE: WHAT SHOULD BE TRAINED TO INCREASE SWIMMING SPEED?

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### INTRODUCTION

Swimming speed is both dependent on strength and technique. Indeed, the balance between these two major factors may explain the success or failure in competitive events. However, competitive events vary enormously in terms of distance, and therefore time and intensity. Thus, an optimal level of strength is essential for successful performance in swimming (1), varying according to the distance to be swam (2). But how can swimming coaches track the balance between these two factors? And how can be identified if the swimmer must focus in one of them, in detriment of the other?

### METHODS

Twelve male and eleven female swimmers, with a minimum of 2-years' experience in resistance training, took part in a correlational explanatory design. Participants performed 3 maximal front crawl bouts tethered to the starting block (one bout with no constraints, one using only arms and one using only legs). A load-cell was used to assess instantaneous force-time curves. Mean values were estimated for each bout and correlated with swimming 100-m freestyle personal best.

### RESULTS

All participants, except two female swimmers, obtained lower mean forces swimming with no constraints than the sum of mean forces with constraints. In male swimmers sum of forces with only arms and only legs presented higher correlation with swimming performance ( $r=-0.703$ ;  $p=0.011$ ) than forces with no constraints ( $r=-0.525$ ;  $p=0.080$ ). In

female swimmers forces measured with no constraints presented a higher correlation with swimming performance ( $r=-0.780$ ;  $p=0.005$ ).

### DISCUSSION

Whereas the ability to use the muscle force output effectively in water is more important than the levels of strength (1), the relationship between exerted forces in water with swimming speed may provide an appropriate tool for specific evaluation. Moreover, the measurement of the forces exerted with arms and legs separately can provide a diagnostic tool for evaluation of strength deficits. Theoretically, it would be expected that the combination of the upper and lower limbs in a synchronized manner could generate a small amount of additional force exerted. Thus, the sum of the forces exerted by the arms and legs would be lower than those performed with the full body, which did not occur. For male swimmers the sum of the forces of the arms and legs showed a higher correlation with performance, suggesting that this group should give greater emphasis to technical training in order to be able to increase their ability to effectively use the muscle force output in the water. In contrast, female swimmers seem to have a greater margin of progression in strength training.

### REFERENCES

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