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The Interplay of Biomechanics and Body Composition in Kayak Sprint Performance: An explorative study

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## INTRODUCTION:

Sprint kayaking is a dynamic sport that requires a combination of strength, power, and endurance. Sprint performance in kayaking is influenced by various physiological and biomechanical factors [1], including body composition, muscle strength, stroke rate, stroke force and paddling technique [2]. There is, however, still a lack of knowledge on how the interplay of different factors impact performance [3]. This study aims to fill this gap by conducting a comprehensive evaluation of kayak sprint performance by examining multiple biomechanical and physiological variables simultaneously

## METHODS:

13 highly trained male kayakers (Age  $22.92 \pm 6.25$  years, body weight  $84.80 \text{ kg} \pm 7.29$ , height  $1.80 \pm 0.44$  m) were recruited. The following variables were recorded during a 100 m all out on-water test: paddle force (E-kayak, AP-Lab), footrest force, kayak velocity. Furthermore, 1 repetition maximum in bench press, bench pull, pull up and a specific kayak strength test measured on a custom-made single arm machine (SAM) were tested. Body compositions were measured using a DEXA scanner (GE Lunar iDXA).

## RESULTS:

The results from on water showed: 100m sprint time:  $20.32 \pm 0.74$ s. Paddle mean stroke force:  $280.34 \pm 67.95$  N, paddle peak force:  $563.28 \pm 69.82$  N, footrest mean stroke force:  $288.45 \pm 105.99$  kg, footrest peak force:  $588.45 \pm 210.38$  kg. The results from the strength tests were: Bench press:  $113.46 \pm 12.39$  kg, bench pull:  $104.65 \pm 8.25$  kg, pull ups  $39.80 \text{ kg} \pm 10.12$  kg, SAM:  $63.07 \pm 13.09$  kg.. The results from DEXA scan showed: body fat percentage:  $18.59 \pm 3.97$  %, lean body mass:  $66.15 \pm 5.78$  kg

## CONCLUSION:

This study aimed to comprehensively evaluate kayak sprint performance by examining multiple biomechanical and body composition variables simultaneously. The kayakers in the study demonstrated similarities in levels of paddle and footrest force compared to the literature [4], along with high levels of lean body mass and moderately body fat percentages, not as low the ones found in the literature [1]. The results of the study showed that kayak sprint performance is influenced by a combination of different factors, including muscle strength, stroke force, and body composition. These findings suggest that to improve kayak sprint performance, athletes should focus on developing their strength and optimizing their body composition to a certain degree. The interplay between the biomechanical variables should be investigated further.

[1]Nilsson JE, Rosdahl H. Contribution of leg muscle forces to paddle force and kayak speed during maximal effort flat-water paddling 2016;22–7.

[2]Michael JS, Rooney KB, Smith R. The metabolic demands of kayaking: a review 2008;7:1–7.

[3]Michael JS, Smith R, Rooney KB. Determinants of kayak paddling performance 2009;8:167–79.

[4]McDonnell LK, Hume PA, Nolte V. A deterministic model based on evidence for the associations between kinematic variables and sprint kayak performance 2013;12:205–20.

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