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## **Importance of different upper body strength qualities in the prediction of 30s on-water kayak sprint performance**

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Since 2012, the 200m kayak sprint has been a part of the Olympic program. As this is the shortest kayak distance on the Olympic program (1), changes in the athletes training programs may be necessary to achieve optimal performance. It has previously been shown, that maximal upper-body strength can to some extent, determine a 200m kayak performance in elite kayakers (2). However, there is limited evidence regarding the transfer of different upper body strength qualities to on-water kayak performance and to which extent these tests can predict sprinting performance. Therefore, the aim of this study was to examine the relationship between maximal isometric, explosive, dynamic, and endurance strength in the bench-press and -pull exercises and a 30 sec flat-water sprint performance. 37 national elite sprint kayakers participated in the study. 22 men (age  $17.5 \pm 1.8$  years, body mass  $75.6 \pm 10.7$  kg, height  $181.5 \pm 8.1$  cm) and 15 women (age  $17.2 \pm 1.4$  years, body mass  $63.7 \pm 7.1$  kg, height  $170.7 \pm 5.4$  cm) A GPS-based accelerometer was used to determine the distance traveled during the on-water sprint tests. An AMTI force plate was used to measure force in the vertical direction in the isometric bench press and pull test. Partial least squares regression analysis (PLS) was performed as an exploratory regression model to elucidate which of the independent variables were more important in predicting on-water sprint performance. In the PLS analysis latent factor 1 was used as it explained most of the variance alone. The proportion of variance explained in the model was 64.1% for the independent variables (X variance) and 61.7% for the dependent variable (Y variance). The proportion of variance explained for the whole model was 60.4% (adjusted  $R^2$ ) The regression coefficients of the two most important independent variables were: 0.474 (bench press, 1RM) and 0.216 (bench pull, 1RM). In conclusion, 1RM bench press and 1RM bench pull were found to be the best predictors for a 30s on-water kayak sprint performance. However, it is difficult to declare which of the two is most important for a 30 sec sprint performance. Further investigation is needed to determine if there is causality between the strength parameters and kayak sprint performance.

1. McDonnell LK, Hume PA, Nolte V. A deterministic model based on evidence for the associations between kinematic variables and sprint kayak performance. *Sports Biomech.* 2013;12(3):205–20.
2. Pickett CW, Nosaka K, Zois J, Hopkins WG, J A, Blazevich. Maximal Upper Body Strength and Oxygen Uptake are Associated with Performance in High-Level 200-M Sprint Kayakers. *J Strength Cond Res.* 2017;32(11):3186–92.