Predicting eggbeater kick performances from hip joint function testing in artistic swimming

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Abstract

Eggbeater kick is an important skill in artistic swimming to lift the body above water level. Previous attempts to model eggbeater kick performance include complex biomechanical parameters that cannot be easily used to guide strength and conditioning training. In this study, we modelled the relationship between hip function and eggbeater kick performance in 92 elite artistic swimmers with a machine learning algorithm. We assessed hip function with six isometric tests that can be easily performed on a weekly basis, without the need for a physiotherapist or a scientist. Our model may accurately predict future performances as the predictive error is similar to the resolution of the scale used by judges during competitions. We then provide a set of interpretation and simulations methods that showcase some of the important predictors of the eggbeater kick performance and highlight personalized strategy to reach a target performance. By using a model that is both accurate and interpretable, practitioners could access objective decision-making support, allowing them to effectively select athletes and design personalized conditioning programs. We believe machine learning and data-driven decision-making provide sports scientists and coaches with new opportunities to enhance research and performance.

References