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HURDLE JUMP IN REVERSE DIVES PERFORMED BY ELITE AND SUB-ELITE DIVERS

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In reverse dives from the springboard the hurdle is the jump off one foot to a landing on both feet at the end of the board that precedes the take-off. The hurdle step is a crucial action as it allows divers to use the horizontal momentum generated in the approach phase to compress the board and generate sufficient height to complete the dive. The purpose of this study was to determine the effect of level of expertise (LoE) on the kinematic of the hurdle step in three reverse dives with increased degree of difficulty (DoD) (300B, DoD 1.9; 303C DoD 2.6; 305C, DoD 3.4). 30 dives were performed by elite ($n = 4$; 18.25 ± 4.20 years; 63.44 ± 17.40 kg) and sub-elite ($n = 3$ 18.25 ± 4.20 years; 63.44 ± 17.40 kg) athletes on the 3m springboard. With institutional ethical approval, the sagittal plane of the hurdle was recorded at 80Hz. Camera parameters for 2D analysis were obtained using planar calibration method. Custom software Dive Tracker 4 was used to digitise the diver's body and to locate the centre of mass. A 2x3 FANOVA ($P < .05$) was used to examine hurdle length (HL), hurdle height (HH), maximum deflection of the board (MDB) and distance from the tip of the board (DTB). There was a main effect of LoE for HH (elite = 1.95 ± 0.19 m; sub-elite = 1.63 ± 0.21 m, $\eta_p^2=0.011$), HL (elite = 0.16 ± 0.09 m; sub-elite = 0.10 ± 0.07 m, $\eta_p^2=0.17$) and MBD (elite = 0.85 ± 0.19 m; sub-elite = 0.65 ± 0.14 m, $\eta_p^2=0.41$). DoD showed an effect on HH (300B = 1.71 ± 0.07 m; 303C = 1.71 ± 0.05 m; 305C = 1.98 ± 0.06 m, $\eta_p^2=0.37$), MDB (300B = 0.73 ± 0.06 m; 303C = 0.71 ± 0.04 m; 305C = 0.88 ± 0.05 m $\eta_p^2=0.24$) and DTB (300B = 0.72 ± 0.09 m; 303C = 0.23 ± 0.06 m; 305C = 0.5 ± 0.07 m $\eta_p^2=0.47$). The DTB yielded a significant interaction indicating that in more difficult dives sub-elite landed further away from the tip of the board. The present study showed that elite performance is denoted by a more efficient hurdle jump.

The DTB was identified as a crucial performance variable that characterises more difficult dives based on the levels of expertise. Further study should investigate the strategies used by elite divers in the approach phase preceding the hurdle.