ABSTRACT

Background: Hop tests are commonly used within a testing battery to assess readiness for return to sport after anterior cruciate ligament (ACL) injury, yet athletes still experience a high rate of re-injury. Simultaneous performance of a secondary task requiring cognitive processing or decision-making may test the athlete under more realistic contexts.

Purpose: To examine a clinically feasible, dual-task assessment paradigm applied during functional hop tests in healthy individuals.

Study Design: Repeated measures

Methods: Participants performed the crossover triple hop for distance (XHOP) and medial triple hop for distance test (MHOP) under three separate conditions: standard procedures and two dual-task protocols including the backward digit span memory task and a visuospatial recognition task. The visuospatial task involved briefly displaying an image consisting of 18 randomly placed red and blue circles on a screen, where the participant was asked to identify the number of red circles in each image. The backward digit span task was applied by introducing a sequence of random numbers to the participants, who were required to repeat the sequence in reverse order. Each motor and cognitive task was performed independently and simultaneously, in accordance with the dual-task paradigm.

Results: Thirty-four healthy participants (age: 24.0 ± 3.9 years) completed testing procedures. No differences in hop distance were observed with the simultaneous application of a cognitive task, with the exception of the backward digit span memory task resulting in decreased hop distance (p = 0.04, d = 0.14). There were no differences in cognitive accuracy according to hop test type, although the effect size was greater for the XHOP (p = 0.08, d = 0.49) compared to the MHOP (p = 1.0, d = 0.07). The dual-task protocol revealed good-excellent within- (ICC3,1 = 0.85 – 0.99) and between-session (ICC3,k = 0.94 – 0.99) intrarater reliability for hop distance across all dual-task conditions. The addition of a cognitive task to the XHOP and MHOP resulted in a lower standard error of measurement and decreased minimal detectable change, as compared to standard testing procedures.

Conclusion: The simultaneous application of a cognitive task did not alter hop distance, with the exception of the backward digit span memory task resulting in decreased hop distance with a trivial effect size. There were no differences in cognitive accuracy according to task type (sitting, XHOP, MHOP). All combinations of dual-task assessment demonstrated good-excellent within- and between-session intrarater reliability among healthy individuals, but measurement precision was deficient.

Level of Evidence: 2b

Key words: anterior cruciate ligament, cognition, dual-task, functional performance, knee