

UNIVERSITI TEKNOLOGI MARA

**MOTOR SKILLS PROFICIENCY IN
CHILDREN WITH DOWN
SYNDROME**

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ABSTRACT

Motor development of children of Down syndrome is delayed as considering the affected motor control dynamics of movement skills. The motor performance characterized the motor skills proficiency elements which are fundamental in their motor progression. This research is designed in determining the motor skills proficiency in the motor development of children with Down syndrome. It serves to evaluate firstly, the motor skills proficiency subsets & its correlation in the motor skills performance. Secondly, it is to determine the biomechanical changes of lower limb joint range of motion on the developmental jumping movement. Identified thirty-three participants ($n = 33$, 23 boys and 10 girls with Down syndrome) aged 4–12 had undergone selected motor skill proficiency subtests of the Bruininks-Oseretsky Test of Motor Proficiency Second Edition, Short Form. In this Study 1, the bivariate Pearson correlation, r , was used to determine the motor skills proficiency subsets relationship. It is found that there was a poor prevalence of motor skills performance with 61.8% below average and it had no significance on gender comparison. The running speed and agility was positive moderately correlated with the upper-limb coordination ($r = 0.36$, $n = 34$, $p = 0.04$). Otherwise, there was no significant relationship between the motor composite's body control (bilateral coordination subtest and balance subtest) and motor composite's strength (running speed and agility subtest, and strength subtest). The running speed and agility, and upper-limb coordination correlation signified the functional motor skills of movement of upper-limb. It determined the fundamental the functional motor skills of stability, locomotors skill and object control skill. Subsequently, only the male participants ($n = 23$) had been selected and participated in Study 2. In this study, the participants had further undergone the standing broad jump test. The participant movement tasks were evaluated through jumping horizontal distance (in centimetres), Motor Skill Inventory, and kinematic study with the KINOVEA 2D analysis of jumping performance's video recording. The participants were then categorised into three classes of developmental jumping movement which are the rudimentary ($n = 5$), functional ($n = 9$), and mature ($n = 9$). The video footage evaluated the lower limb joint (hip, knee, and ankle) range of motion on take-off, jump peak height, and landing. It was demonstrated that 91.3% of the participants scored 'Poor' in the classification of jumping performance. ANOVA revealed that the developmental jumping movement of jumping groups (rudimentary, $n = 5$; functional, $n = 9$; mature, $n = 9$) had a significant effect on the horizontal jumping distance. With MANOVA, further biomechanical analysis revealed that the developmental jumping movement had a significant effect on the hip joint during take-off phase in rudimentary and mature groups only. The hip angle on take-off promotes the jumping performance with better biomechanical coordination or movement range of motion. With larger forward momentum and upward movement during take-off, then higher velocity of body gravity centre is resulted and therefore, the body mass forward rotation-leg extension is more efficient. Findings suggested that the fundamental element biomechanical changes of lower limb hip joint range of motion of jumping performance will further improve jumping performance of children with Down syndrome. Those motor skills proficiency are fundamental in developing a goal-directed motor conditioning program for children with Down syndrome.

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