

Changes in Upper Limb Coordination and Kinematics following a Five Week Instructional Unit in Cup Stacking

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Cup stacking is a sport played in over 6600 physical education and after school programs in the United States. The leading manufacturer, Speed Stacks, Inc., claims that cup stacking promotes hand-eye coordination, ambidexterity, quickness, concentration, and bilateral proficiency. Since the sport is still fairly new, there have only been a few scientific studies that have investigated the influence of cup stacking (Conn, 2003; Hart, Smith, & DeChant, 2003; Udermann, Murray, Mayer, & Sagendorf, 2003) on psychomotor parameters.

The purpose of this study was to measure upper limb coordination changes using a five week cup stacking intervention. The specific aims of this study were to measure upper limb coordination changes with a star tracer task and to three-dimensionally analyze the sport of cup stacking. We used the Peak Performance Motion Analysis System (Motus Ver. 7.3.2, Centennial, CO.) to measure cup clearance height and time to up stack.

A one-way MANCOVA was used to analyze the results. The independent variable for this study was cup stacking instruction. The dependent variables for this study were the post-test star tracer times, post-test star tracer errors, post-test up stack times, and post-test cup clearance heights. All pre-test scores were used as a covariate to investigate differences between groups in the post-tests. Significance differences were evaluated with alpha set at 0.05.

One of the variables investigated showed statistical significance. The groups were significantly different ($\Lambda(6,12) = .749, F = 5.98, p < .005$) in the star tracer post-test times when the star tracer pre-test times were used as a covariate. No significant differences were found between groups in the post-tests of the star tracer errors, time to up stack, or cup clearance height.

We found that cup stacking has a positive effect on the development of bilateral coordination in sixth grade physical education students. Although only one significant difference was found, trends were found in the kinematic data to suggest that better performance may have occurred with more practice time. The results of this study suggest that cup stacking may lead to better development of bilateral coordination.