Strength profiles and hypermobility in children with varying levels of movement proficiency

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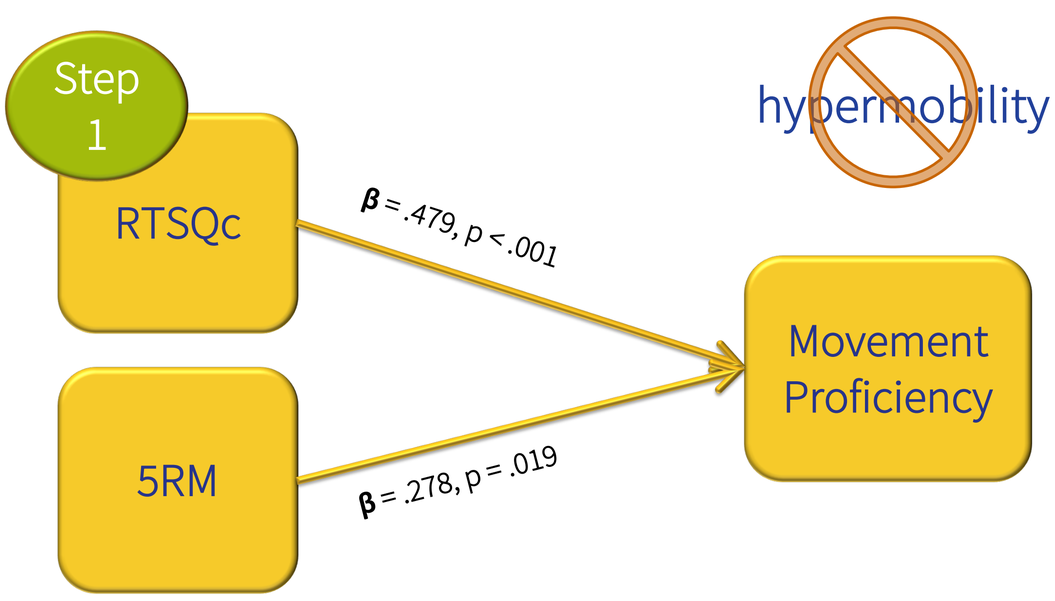
Previous research suggests children with low movement proficiency produce less muscular force than their typically developing (TD) peers.[1] Joint hypermobility, due to its association with muscle weakness, may also be related to low movement proficiency. This study aimed to compare hypermobility and strength profiles in children with varying levels of movement proficiency.

METHODS

Sixty four children (mean age 7.91±1.5yrs) participated; 41 children were classified as TD, 10 classified 'at risk' of movement difficulties (≤16th percentile); and 13 with confirmed movement difficulties (CMD; ≤5th percentile) via the Movement Assessment Battery for Children-2 Test.

Children completed the Resistance Training Skills Battery for Children (RTSQc) and 5-repetition maximum (5RM) leg press. Isometric and isokinetic peak torque of the knee flexors and extensors were assessed using a Biodex dynamometer. Hypermobility was measured using the revised Beighton score and Lower Limb Assessment Score.

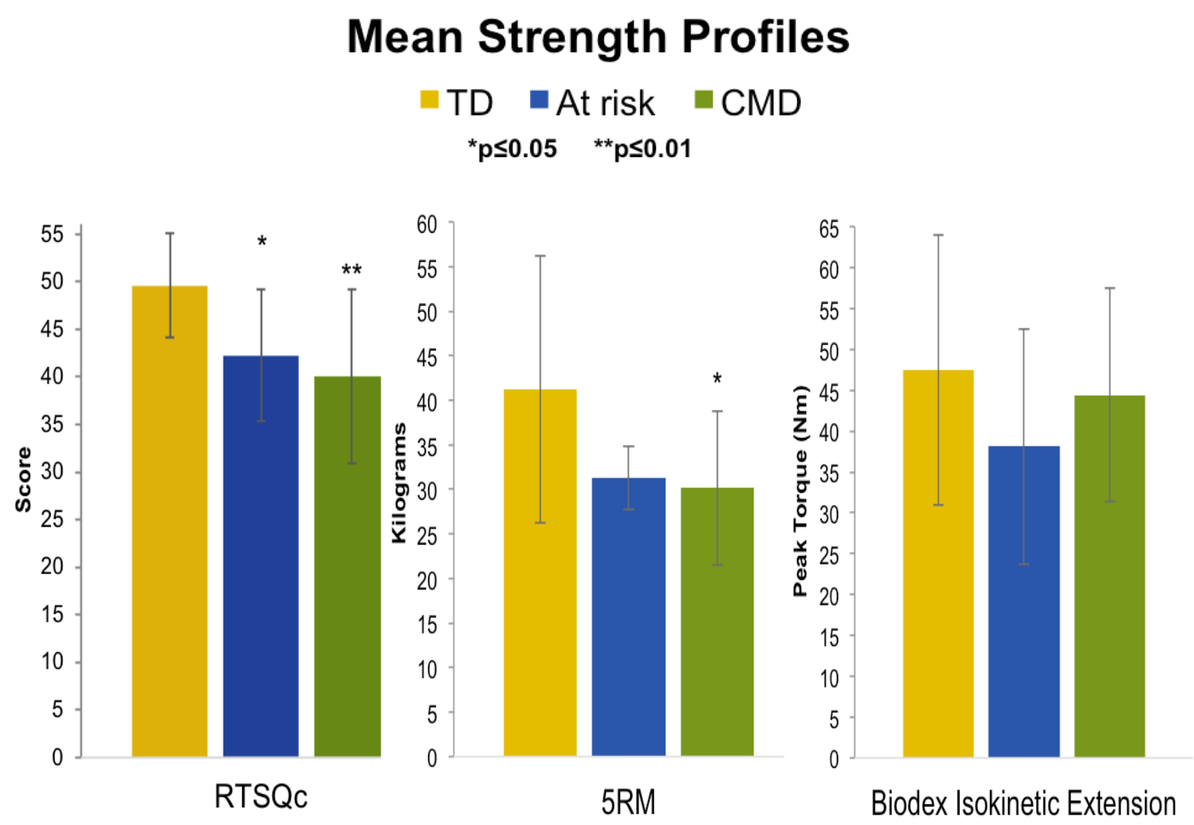


RESULTS

Between groups ANOVA revealed RTSQc scores to be significantly different ($F(2,61)=13.179$, $p<.001$), with TD children scoring significantly higher than those 'at risk' ($p= .021$) and with CMD ($p <.001$). 5RM scores were also significantly different between groups ($F(2,61)=5.618$, $p=.006$), but only between TD children and CMD group. No differences were found between groups for isometric or isokinetic measures of strength.

Sequential regression analysis revealed strength variables (5RM & total RTSQc) explained 41% of variance in MP ($F(6,63) = 8.311$, $p <.01$), with the total RTSQc ($\beta = .479$, $p < .001$) and 5RM ($\beta = .278$, $p = .019$) emerging as positive significant predictors.

Hypermobility was seen in 17% of the children, but failed to explain significant variance in movement proficiency beyond that explained by strength (R^2 change = .002, F change (1,56) = .158, p = .692).



DISCUSSION

- Children with CMD score the lowest on the RTSQc and the 5RM – indicating significant differences to their typically developing peers.
- There are no differences between children's force production when it is measured in isolation (i.e. Biodex), suggesting that along with motor control, the muscular strength required for more complex tasks may be the limiting factor in children with CMD's performance.
- Functional strength should be an important consideration in movement interventions given its influence on the variability of movement proficiency and task performance.

KEY REFERENCES:

1.Rivilis, I., Hay, J. A., Cairney, J., Klentrou, P., Liu, J., & Faught, B. (2011). Physical activity and fitness in children with developmental coordination disorder: a systematic review. Research in Developmental Disabilities, 32(3), 894–910.

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