



Exploring strength and hypermobility in children: Interaction with movement proficiency

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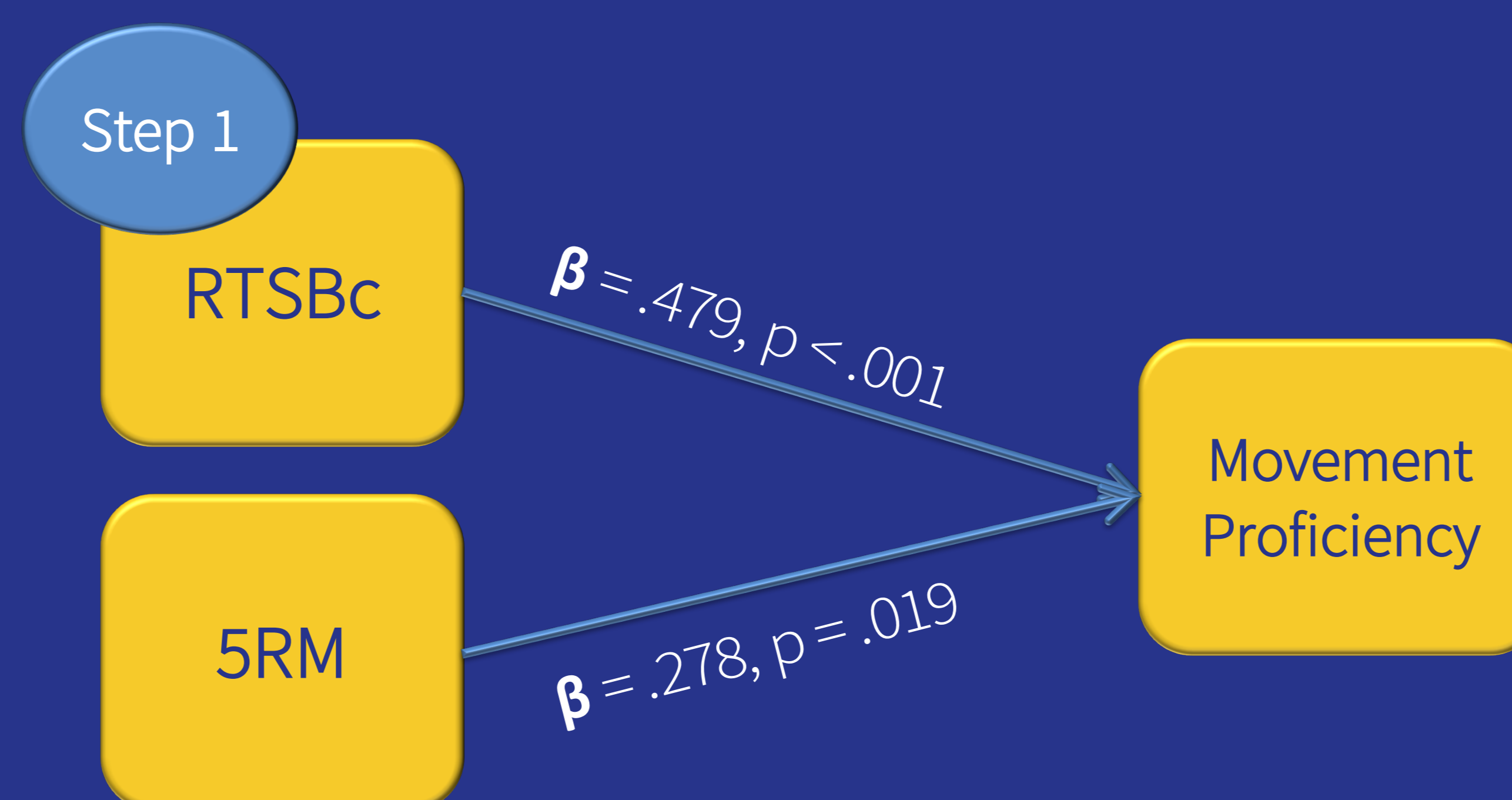
In the exploration of issues impacting movement proficiency in children, an emerging factor that warrants consideration is hypermobility. While hypermobility may be advantageous in certain sporting contexts (e.g. gymnastics), for some children it may restrict their ability to perform movements at an age appropriate level. Previous research has reported a link between muscle weakness and joint hypermobility (JH), but has examined hypermobility, not movement proficiency as the dependant factor. The present study aimed to examine how muscle strength and hypermobility impact movement proficiency.

METHODS

Sixty four children (M age 7.91±1.5 yrs) participated. Movement proficiency was assessed via the Movement Assessment Battery for Children-2 (MABC-2). Hypermobility measures included the revised Beighton criteria and the Lower Limb Assessment score. Strength was assessed using 5-repetition maximum (5RM) tests, the Resistance Training Skills Battery for Children (RTSBc) and peak torque of the knee flexors and extensors were assessed isometrically and isokinetically using a Biodex dynamometer. 17% of children were classified as clinically hypermobile.

RESULTS

Sequential regression analysis was performed, with strength variables entered on the first step, and hypermobility on the second step; Movement proficiency was the criterion variable. On the first step, strength variables collectively explained 41% of the variance in movement proficiency ($F(6,63) = 8.311, p < 0.01$).



On the second step, hypermobility failed to explain significant variance in movement proficiency beyond that explained at step one (R squared change = 0.002, F change (1,56) = 0.158, p = 0.692).

CONCLUSIONS

- Results show that strength may be an important predictor for movement proficiency, whether hypermobility is present or not. Furthermore, the movement limitations associated with hypermobility may relate more to symptoms of JH syndromes.
- Future research might also consider the relationship between severity of JH and muscle strength, and its impact on movement proficiency

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KEY REFERENCES:

- 1.Engelbert RHH, Kooijmans FTC, van Riet AMH, Feitsma TM, Uiterwaal CSPM, Helders PJM. The Relationship Between Generalized Joint Hypermobility and Motor Development. *Pediatric Physical Therapy*. 2005;17(4):258-263. doi:10.1097/01.ppt.0000186505.32548.84..
- 2.Smits-Engelsman B, Klerks M, Kirby A. Beighton score: a valid measure for generalized hypermobility in children. *The Journal of Pediatrics*. 2011;158(1):119-123.e4. doi:10.1016/j.jpeds.2010.07.021.
- 3.Jelsma LD, Geuze RH, Klerks MH, Niemeijer AS, Smits-Engelsman BC. The relationship between joint mobility and motor performance in children with and without the diagnosis of developmental coordination disorder. *BMC Pediatrics*. 2013;13(1):1-1. doi:10.1186/1471-2431-13-35.
- 4.Ferrari J, Parslow C, Lim E. Pediatric rheumatology Joint hypermobility: The use of a new assessment tool to measure lower limb hypermobility. *Clinical and Experimental Rheumatology*. 2005;(23):413-420.
- 5.Grahame, R., H. Bird, and A. Child, The revised (Brighton 1998) criteria for the diagnosis of benign joint hypermobility syndrome (BJHS). *The Journal of rheumatology*, 2000. 27(7): p. 1777.