



3-2019

## Effectiveness of Movement-Based Interventions to Improve Low Tone in School-Aged Children

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### WMU ScholarWorks Citation

Pugh, Morgan and Bell, Katie, "Effectiveness of Movement-Based Interventions to Improve Low Tone in School-Aged Children" (2019). *Occupational Therapy Graduate Student Evidenced-Based Research Reviews*. 58.

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# Effectiveness of Movement-Based Interventions to Improve Low Tone in School-Aged Children

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## Description of Movement-Based Intervention

Movement-based approaches have been classified as task-oriented interventions and focus on children's 'occupations', such as tying shoelaces, ball catching, and handwriting. Children with developmental co-ordination disorder (DCD) have difficulty performing coordinated motor skills required for self-care, social activities, and academic achievement (Miyahara, Hillier, Pridham, & Nakagawa, 2017). Low muscle tone is a core feature of DCD as most children have low tone in their trunk, making stable sitting difficult and creates movement challenges while in the classroom (About Causes, n.d.).



### 1 Ask: Research Question

What are the effects of movement based interventions for improving low tone in school-aged children?

### 2a Acquire: Search

**Databases:** Pubmed, Clinicalkey, Cochrane Library, NCBI, CINAHL, Proquest.

**Search Terms:** Movement interventions; Improve tone; Child\*; Muscle strength; Muscle weakness; School; Yoga; Movement break; Developmental co-ordination disorder

**Patient/Client Group:** School-aged children

**Intervention:** Movement-Based Interventions

**Comparison:** Movement intervention versus no intervention

**Outcome(s):** Improvement in low tone as a result of movement interventions

### 2b Acquire: Selected Articles

**Miyahara, Hillier, Pridham, & Nakagawa (2017).** A systematic review that examined the effect of task-oriented interventions with inactive or active control interventions on children with a diagnosis of developmental co-ordination disorder (DCD).

**Au, Chan, Lee, Chen, Chau, & Pang (2014).** A randomized control study that examined the effectiveness of task-oriented motor training to improve motor proficiency in children with a diagnosis of DCD.

**Pless, Carlsson, Sundelin, & Persson (2000).** A single-blind, quasi-experiment that examined the effectiveness of motor skill interventions for children with a diagnosis of DCD.

### 3a Appraise: Study Quality

**Miyahara et al. (2017).** Level I, 15 studies, total n=649. Strengths: all studies were RCTs and quasi RCTs, rigorous inclusion criteria. Limitations: conducted outside the US, and risk of selection and performance bias.

**Au et al. (2014).** Level II, n=22. Strengths: longitudinal study, randomization in selection of participants and assignment. Limitations: small sample size, and lack of control group.

**Pless et al. (2000).** Level II, n=37. Strengths: two step selection procedure to ensure DCD diagnosis, random assignment, and longitudinal study. Limitations: small sample size, increased risk for type II statistical error, and cultural differences affected the results of a substest.

### 3b Appraise: Study Results

**Miyahara et al. (2017).** This meta-analysis showed mixed results. Two RCTs and four quasi-RCTs indicated improved motor performance compared to no intervention when using task-oriented approaches ( $p=.002$ ). A meta-analysis of two RCTs found no effect compared to no intervention ( $p=.38$ ).

**Au et al. (2014).** Task-oriented ( $p=.007$ ) and core stability ( $p=.008$ ) interventions were effective in improving motor performance in children with DCD.

**Pless et al. (2000).** As a result of motor skill interventions, participants improved on the movement ABC motor test ( $p=.001$ )

### 4 Apply: Conclusions for Practice

Children with low tone may show improvement as a result of movement based interventions through task-oriented and motor skill interventions. Further research is needed to investigate the effect of task-oriented interventions for children with low tone.

Task-oriented interventions can be integrated within the school, clinic and at home in order to improve low tone in school-aged children. Common strategies include integrating an obstacle course into their daily routine or calisthenics. Additional studies are needed that include larger sample sizes, a greater variety of movement based interventions, and comparisons of well-defined subgroups of children.

### References

Au, M., Chan, W., Lee, L., Chen, T., Chau, R., & Pang, M. (2014). Core stability exercise is as effective as task-oriented motor training in improving motor proficiency in children with developmental coordination disorder: A randomized controlled pilot study. *Clinical Rehabilitation*, 28(10). DOI: 10.1177/0269215514527596

Miyahara, M., Hillier, S., Pridham, L., & Nakagawa, S. (2017). Task-oriented interventions for children with developmental co-ordination disorder. *The Cochrane Database of Systematic Reviews*, 7(7). DOI: 10.1002/14651858.CD010914.pub2

Pless, M., Carlsson, M., Sundelin, C., & Persson, K. (2000). Effects of group motor skill intervention on five- to six-year-old children with developmental coordination disorder. *Pediatric Physical Therapy*, 12(4). PUBMED: 17091030

Resource used to define DCD available upon request

**Movement-based interventions show moderately positive results for improving low tone in school-aged children, but should be integrated with caution.**

