

# **Rhythmic Auditory-Motor Skills in Children with Developmental Coordination Disorder (DCD)**

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### INTRODUCTION

- DCD is a neurodevelopmental disorder defined deficits in the acquisition and performance of fi and/or gross coordinated motor skills.
- Previous research suggests that timing deficits may be a core characteristic of DCD.
  - Children with DCD show visual-motor ar motor timing deficits.

	RESULTS		FUTURE ANALYSES: EEG	
d as Tine	Speech Perception Task 5 5 5 5 5 5 5 5 5 5 5 5 5	Group A	<ul> <li>EEG Recorded During:</li> <li>1) All production tasks</li> <li>2) Passive Listening</li> </ul>	
ld		Group B		

- Children with DCD have significantly higher thresholds for rhythm and duration discrimination (Chang et al., under review).
- The complex dynamics of auditory-motor synchronization are largely unexplored in DCD. • We hypothesize that children with DCD have deficits in both auditory timing perception and auditory-motor synchronization (Trainor, Chang, Cairney & Li, 2018).

### PURPOSE

- Do children with DCD have deficits in 1. both auditory-timing perception and auditory-motor synchronization?
- 2. Can auditory rhythmic stimuli help children with DCD to execute rhythmic motor movements?

### **EXPERIMENTAL DESIGN**





inote: Research is ongoing, and experimenters are blind to group allocations

\*\* Groups represent TD and DCD

#### QUESTION

Are there differences in neural synchronization to an auditory beat in children with DCD compared to typically developing children?

### **Future Analyses:**

- Auditory and motor source localization
- Induced oscillatory neural activity
- Inter-trial phase coherence (ITPC)

### DISCUSSION

Results shows a significant benefit of an auditory rhythmic cue on motor tapping behaviour in both typically developing children and children with DCD. This suggests that auditory-motor training Ο may confer additional benefit for children with DCD compared to conventional interventions based on motor function. There is a negative correlation between Ο difference scores for auditory timing perception and auditory-motor synchronization in one group • As this research continues, a larger sample size will provide more insight into group differences between TD and DCD children





0.8

0.6 -

0.4

0.2 -

### REFERENCES

- Chang, Li, Chan, J.F., Dotov, D.G., Cairney, J., & Trainor, L.J. (under review). Inferior auditory time perception in children with motor difficulties.
- McAuley, J.D., Shen, Y., Dec, S. *et al.* Altering the rhythm of target and background talkers differentially affects speech understanding. Atten Percept Psychophys 82, 3222–3233 (2020).
- Trainor, L. J., Chang, A., Cairney, J., & Li, Y-C. (2018). Is auditory timing a core deficit of developmental coordination disorder?

#### Isochronous metronomes •

PARTICIPANTS

Children with DCD and typically developing (TD) children aged 7-9

• n = 22 (13 in blinded group A; 9 in blinded group B)

0.20 production difference scores (metronome - continuation) and 0.15 perception difference scores 0.10 atio (no fluctuations - rhythmic fluctuations) **Group A**: r = -.69 2 Group B: r = -.14

0.4 0.5 0.6 Metronome - Continuation Annals of the New York Academy of Sciences, 1423, 30-39.



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