



## Effectiveness of Motor Imagery Training for Children with Developmental Coordination Disorder Among Indian Children - A Pilot Study

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### ABSTRACT

Children with developmental coordination disorder (DCD) experiences difficulty in performing coordinated movement task as there is a defect in the internal modelling of movements. The aetiology of DCD has been examined in several studies which reveal several viable hypotheses including reduced processing speed, problems in executive functioning, poor cross-model integration and low perceptual-motor coupling. Researchers well documented that the predictive control of movements is impaired in children with Developmental Coordination Disorder (DCD), it was examined that impaired control of movements was due to a deficit in the internal modelling of movements. Motor imagery training has been used to test this internal modelling deficit. Motor imagery training is useful for children with DCD as it focuses on internal modelling of movements. The current study aims to examine the effectiveness of Motor imagery training focused on mental imagery task to enhance the movement coordination abilities of children with DCD. By random sampling, 20 children with DCD were randomly divided into two groups, Group A received MI training, and Group B received COOP- Cognitive orientation to daily occupational performance. Both groups received intervention for nine sessions of 45 minutes. The results provided by the current study will help to describe treatment protocol for children with DCD with evidence. Both children and therapist will be benefited from the study.

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cally developing children (Guze, 1995). They have poor motor task performance. The prevalence estimate for DCD among primary school children is 7% (Monisha and Sankar, 2018), and there is a need for early identification of the disorder among children as it might have a strong negative influence over social and academic functioning (Monisha and Sankar, 2019). The cause for the recurrence of the disorder among children of age five years was examined with multiple hypotheses like slow processing speed, problems in executing the task, cross-model integration defect, low perceptual-motor coupling.

### INTRODUCTION

Motor performance in children with developmental coordination disorder is always less than typi-

In previous research studies, it is made clear that defect in motor learning was related to predictive control of movements. This defect is termed as IMD- Internal modelling deficit (Adams *et al.*, 2016).

IMD affects motor learning and sequencing among children with DCD. It has been established that internal models provide stability for the motor system (Ertelt *et al.*, 2007). IMD provides feedback for a motor task and aids in correcting the task execution. The current study aims to examine those DCF children's experience problems in the motor task as because of low internal modelling system (Ferguson *et al.*, 2015). This error in the performance of the motor task is expected to be due to inaccurate or incomplete internal model of movements.

**METHODOLOGY**

Children were recruited from 2 private practice clinics for an occupational therapist in and around Chennai. Only those who were willing to participate were included in the study. The therapist who was involved in assessing and evaluating the child with DCD participated in the training sessions provided by the primary researcher. (Figure 1) Children were included in the study if they were aged 5-10 years and diagnosed as DCD using DSM-5 criteria and screened by DCDQ. After the inclusion of these children, they were allocated into two groups. Group A, with ten children who received MI training and Group B with COOP. Both MI and COOP interventions will be delivered for nine weeks, and the total duration of sessions will be 45 minutes.

However, the participants were asked to perform a homework diary from the primary researcher and advised to follow the homework for four times a week for 10 minutes at home. Motor coordination questionnaire was filled up by the parents and children with the assistance of the therapist to examine the motor skill defect experienced by the children during their ADL. Written informed consent for participation was signed by parents as well as children's. Statistical methods to assess the difference between groups will be ANOVA and Mann Whitney U tests. Between groups, the comparison will be made for primary and secondary outcome measures.

**RESULTS**

**Table 1: Mean Scores of MI Intervention**

Motor test batteries	Groups	Pre-test	Post-test
MABC	Group - A	15.5	14.2
	Group - B	16.9	15.8

**DISCUSSION**

MI training is described as a possible treatment for children with DCD, as there are no specific set of treatment options and no specific set of protocols. It is imperative to consider that children with DCD learn to compare predicted and actual sensory feedback and finally learn to execute movements.

MI training helps the child to learn how to compare the predicted consequences of executing particular movement and actual consequences of performing the same movement pattern. Thus MI training facilitates a child with DCD to acquire knowledge and learn the movement execution task (Guillot *et al.*, 2015).

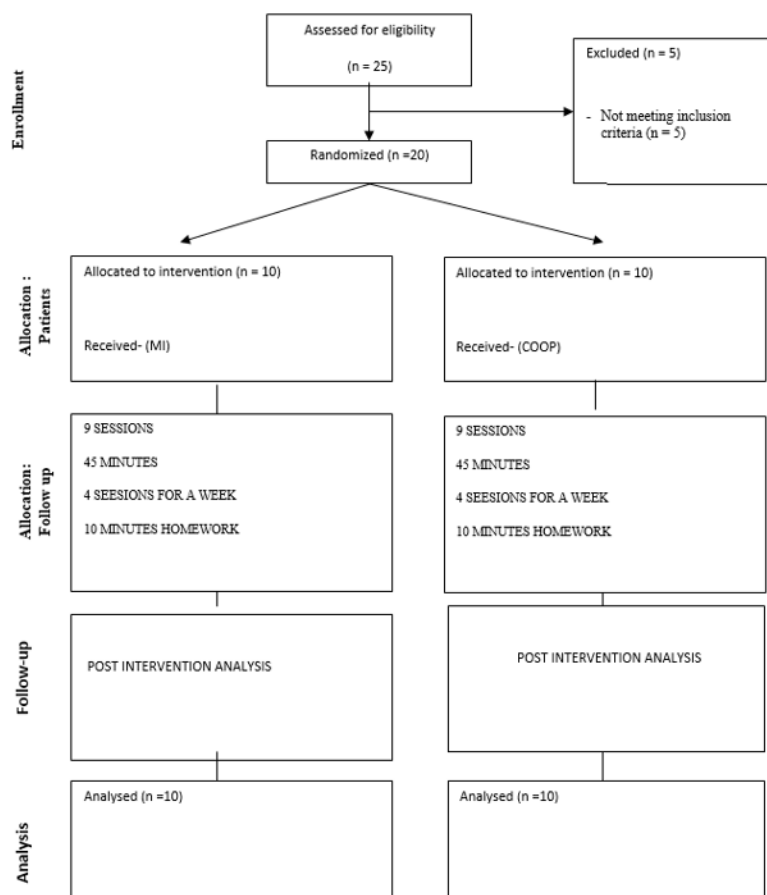
Currently, from the rehabilitation team members, three professional's namely Occupational therapist, physical therapist and special educators were dealing with a child diagnosed as developmental coordination disorder (Crajé *et al.*, 2010).

It is the role of the occupational therapist to examine the capacities and performance of the child with DCD, however through assessment; occupational therapist develops therapy solutions for problems that restrict the child from performing the motor task. They execute the task by coordinating with parents, caregivers and school teachers, as well as a child with DCD (Sankar and Monisha, 2019) physical therapist, deals with mobility.

COOP and NTT are frequently used by the therapist to treat children with DCD. COOP focus on activities, where a child with DCD wants to get master with. COOP involves enhancing the knowledge of the task, adaptation to environment and occupation. Several kinds of research have proved that COOP strategies enhance the motor performance of a child with DCD (Miller *et al.*, 2001).

Mi training makes the child with DCD to be aware of how they can predict the consequences of executed movements. MI training was only used among children with a lower score on MABC-2. The current study has examined the effectiveness of MI training in children with DCD (Jelsma *et al.*, 2014).

However, at the end of 9 weeks of Mi intervention sessions, children have scored a clinical range on the MABC-2 score. There are no significant improvements documented for children with DCD (Table 1), Debates lies at whether the sample size used in the study is small, further research is needed to validate the feasibility of MI intervention among primary school children with DCD.



**Figure 1: Flow of Patients through the Study**

**CONCLUSION**

Conclusions about MI training for DCD should be documented with Care, and there are debates whether it is effective in children whose scores were in the clinical range of MABC-2, but meets with the DSM-V diagnostic criteria of DCD. The present pilot study will provide an opportunity to examine the feasibility of Mi training, and there is a need for an evidence-based form of MI treatment for children with DCD.

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**Conflict of Interest**

The authors declare that they have no conflict of interest for this study.

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