



Effects of Neuromotor Task Training (NTT) - A new approach for children with Developmental Coordination Disorder (DCD) in Indian context

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ABSTRACT

Developmental coordination disorder is gaining increased recognition among the researchers. Despite a high prevalence rate, the uncoordinated movements and performance difficulties in daily life activities in children with Developmental Coordination Disorder were gained increased recognition. Caregivers and parents were not aware of any such intervention and waste a lot of time and money over therapist and therapy, which are not appropriate for their children with DCD. NTT- Neuro-motor Task Training relies on motor control and motor learning. Treatment of each child with DCD requires a unique holistic approach, to examine the effects of NTT among Indian children with DCD, this pilot study was conducted in 10 children with developmental coordination disorder. Movement assessment battery for children was used to assess the gross and fine motor difficulties among children with DCD. NTT intervention was delivered for ten sessions. The total duration of the intervention is 30 minutes. Positive effects of NTT were reported in every child in the intervention group. Their performance enhanced in gross motor and fine motor task. MABC and TGMD-2 results were improvements following the intervention, and the present findings indicate that therapists can take children's behaviour into account to conclude the positive treatment effects of NTT.



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INTRODUCTION

Children with developmental coordination disorder (DCD) have gained increased recognition among researchers from the Indian context. There are various treatment programmes to address the defects

faced by children with DCD. To define each treatment/intervention programme in detail, there is a broad classification of interventions delivered to children with DCD. The classification includes a task-oriented approach and process-oriented approach. When any intervention programme, which focuses on the deficits in processes to accomplish motor coordination task, is termed as a process-oriented intervention. However, the task-oriented approach focuses on functional skills, where the child experience difficulty (Bell, 1994).

Process-oriented interventions include sensory integration therapy, which examines the kinesthesia role towards movement control among children with developmental coordination disorder. It was believed that over the past forty years, DCD was the result of a defect in kinesthetic awareness. Sensory integration therapy focuses on enhancing the child's motor skills by stimulating the tactile,

vestibular, visual and other sensory systems. It has been proved by many researchers that sensory integration therapy will enable the children with DCD to integrate sensory information into motor responses (Sankar and Monisha, 2018).

However, it has been popularly used by therapist all over India and worldwide. There is insufficient evidence of process-oriented intervention. Over the last decade, researchers focused on task-oriented intervention to enhance motor skill among children with DCD. They believed that task-oriented intervention would enhance motor competence. But to enhance skill learning, problem-solving strategies must be learned. Children learn to ask questions about their skills and performance in an activity they do and learn everybody. By using these strategies, authors of the current study aimed to enhance and transfer the motor skill learning outside the therapy programme. However, the task-oriented interventions were new, and the first positive or negative results regarding their effectiveness over Indian children's were promising (Sankar and Monisha, 2019c).

Neuro-motor task training involves children with developmental coordination disorder and the children's form a heterogeneous group. These children differ greatly in motor profile; the clinical picture gets complicated due to the presence of co-morbidity. It has been hypothesized that the percentage of co-morbidity between DCD and ADHD is 50% and the percentage of co-morbidity between DCD and LD is 60%. However, DCD, ADHD and LD, these three conditions share co-morbidity (Sankar and Monisha, 2020b).

NTT- Neuro-motor Task Training relies on motor control and motor learning. But NTT also includes motor teaching and motivation component. Treatment of each child with DCD requires a unique holistic approach. Understanding the nature of the impairment is the primary need to establish treatment strategies for children with DCD (Watkinson *et al.*, 2001). Individualized treatment strategies need to be adapted for treating each child. NTT is a task-specific treatment strategy, which focuses on teaching the skill for each child with DCD.

METHODOLOGY

To examine the effects of NTT among Indian children with DCD, this pilot study was conducted in 10 children with developmental coordination disorder. Movement assessment battery for children was used to assess the gross and fine motor difficulties among children with DCD. But without a gold standard assessment tool to identify children

with DCD in the Indian context, it is difficult for the researchers to use more than one assessment tool to identify the motor coordination difficulties among children. Total of ten children with DCD, five boys and five girls of age group 5-10 years participated in the study. Ten children were randomly assigned into two groups, and group A received NTT and group B received no-treatment. The five children in the control group were not referred to a primary researcher for the intervention programme, and children in the intervention group were referred to a primary researcher. The secondary researcher administered MABC at the baseline and after the NTT intervention of 10 sessions. The total duration of the intervention is 30 minutes.

However, a small group of children were included. NTT showed a positive effect. When further focused on the activity, where the child gets improvement, it has been proved that children with DCD improved in motor skill which was practised by them. Children were later tested for activity which was not practised by them; it has been proved that they fail to acquire the skill. Thus, there is a need for conducting the same research over a large scale of children with developmental coordination disorder in the Indian context.

RESULTS AND DISCUSSION

Positive effects of NTT were reported in every child in the intervention group. Their performance enhanced in gross motor and fine motor task. MABC and TGMD-2 results were improvements following the intervention.

The current study evaluates NTT for children with DCD. This pilot study included an only limited number of children, and it was sufficient to prove that NTT is successful. Results (Table 1) analyzed that group A received the intervention with NTT and have statistically significant improved on MABC and TGMD tests components when compared with the group B. it is proved that children in group B deteriorated without any interventions which enhance their motor skill and competence. TGMD-2 scores in Group B were substantially deteriorated (Niemeijer *et al.*, 2006).

The results add to evidence that NTT adds improvement for children in activities that need motor planning and sequencing. NTT is having a positive impact on children with DCD. There is documented evidence that within nine sessions of NTT children with DCD showed spontaneous development in motor task execution, which is considered to be

Table 1: Mean scores on two general motor tests

Motor test batteries	Groups	Pre-test	Post-test
MABC	GROUP- A	15.2	10.9
	GROUP- B	16.9	18.5
TGMD-2	GROUP-A	70.2	50.9
	GROUP- B	69.4	73.5

previously difficulty and rare skill to execute for children with DCD ([Sankar and Monisha, 2019a](#)).

However, in the majority of the studies in the Indian context, used MABC to screen children with DCD. But MABC and BOTMP are showing inconsistency in assessing children and their lags sensitivity and specificity. However, the major limitation of the studies in DCD in the Indian context is there is no gold standard assessment tool that independently assesses and replaces the clinical reasoning skill of the therapist treating children with DCD ([Peters and Wright, 1999](#)).

To predict the improvement in motor skill execution and planning, there is no one single gold standard assessment tool, and the therapist was using more than one assessment tool to document the progression and regression of skill. In the current study to measure changes in performance, we used MABC and TGMD-2. Control group with five children who have not received any intervention from the primary researcher did not improve on the MABC scores. But instead, they had deterioration of skills as compared to baseline ([Sankar and Monisha, 2019b](#)). This clarifies that the improvement attained in Group A children with DCD is due to NTT.

However, these results declare that NTT is effective for children with DCD, the improvement attained were not solely related to the task, few children gained control and balance improvement on balance tasks whereas the activity which enhances balance were not provided to children ([Smits-Engelsman et al., 2013](#); [Sankar and Monisha, 2020a](#); [Christiansen, 2000](#)). It is clear that further studies with a large sample size are needed to analyze the improvement attained in untrained activity is because of the treatment effects of NTT?

CONCLUSION

More research is needed to explore the child-related characteristics that pay the way for the next step towards improving treatment programmes. However, the present findings indicate that therapists can take children's behaviour into account to conclude the positive treatment effects of NTT.

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Conflict of Interest

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

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