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# EFFECTIVENESS OF MASGUTOVA NEUROSENSORIMOTOR REFLEX INTEGRATION (MNRI) PROGRAM ON OCCUPATIONAL PERFORMANCE AMONG CHILDREN WITH ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

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**ABSTRACT**

Developmental disabilities are very commonly among children and can influence their functional independence in occupational every day activities. ADHD is one of the neurodevelopmental disorders, affecting ability to focus, self-control, motor coordination, ability to organize tasks, play and school function. During, preserved primitive reflexes are believed to play a major role in developmental activities, particularly Asymmetrical Tonic Neck Reflex (ATNR). MNRI-based reflex integration is the type of a sensorimotor based reflex integration intervention. This aim at improving neuromotor control and reflex integration. Sixty children aged 7 to 12 years with preserved ADHD and were randomly selected and equally distributed into two groups of 30 children each, with experimental group receiving MNRI-based reflex integration training, while control group continued their routine therapy services. The treatment was given during 45 minutes a day, three times a week for total 8 weeks. Pre and post-tests were carried out on ATNR using the Schilder test and occupational performance and satisfaction by COPM were done. Data were collected before and after an experiment. Data were statistically analyzed using Wilcoxon signed rank test and Mann-Whitney U test. Significance levels were set at 0.05. Results support the incorporation of MNRI-based reflex integration into occupational therapy practice of ADHD children.

**KEYWORDS:** ATNR, Occupational performance, Occupational satisfaction, MNRI, Reflex Integration

## INTRODUCTION

ADHD is a common neurodevelopmental condition. It begins in childhood; it influenced by a combination on genetic predispositions and ecological factors. Some studies provide strong evidence that the interaction between these factors contributes to the wide variation in symptom presentation and severity (Poddar et al., 2025). According to World Health Organization's, DSM-5 and ICD-11, ADHD is presented by three major

types one is inattention, another is hyperactivity, impulsivity, and a common presentation. The inattention type includes more trouble in paying attention, being disorganized, and forgetfulness. The hyperactive/impulsive type includes excessive activity, impulsivity, and difficulty waiting. The combined type shows symptoms of both (Musullulu et al., 2025). Globally, ADHD disturbs almost 5.2% to 7.2% children (Wang et al., 2023). Recent umbrella reviews report a worldwide ADHD frequency of about 8% between children and teenagers, with consistently higher rates in boys than in girls (Ayano et al., 2023). Overall, current data suggest that the prevalence has remained stable despite increased awareness and improved screening.

ADHD has a significant impact on a children occupational functioning and poses a variety of challenges when participating in everyday activities. Children problems with executive function, self-regulation,attention regulation, behavioral inhibition, and motivation can lead to a lack of independence and task accomplishment (APA, 2013; Helmer et al., 2024). These difficulties may negatively influence occupational performance, and emerging evidence suggests that retained primitive reflexes may also contribute to these functional limitations. Occupational therapists play an important role in improving children work performance by addressing sensory, motor coordination, cognitive and behavioral deficits**.** Occupational therapy interventions use meaningful everyday activities to promote health, well-being, and functional independence across life domains (AOTA, 2020). Through, a functional, goal-oriented approach, therapists support children in improving engagement in school, play, and self-care (Helmer et al., 2024).

Research shows that these children often show decreased playfulness and increased troublemaking behaviors during play. Reduced motivation limits their ability to sustain attention and effort (Idiculla et al., 2024). ADHD also significantly affects educational participation. Limited engagement in school activities can negatively impact academic success, social-emotional well-being, and future career chances. Furthermore, children with ADHD commonly exhibit executive functioning deficits, including difficulties with organization, planning, time management, listening, and sustained attention. They may also show problems with time perception, such as time discrimination and reproduction (Wennberg et al., 2021). When these primitive reflexes fail to integrate properly, they can persist beyond infancy and interfere with normal motor and neurological development. Retained reflexes are associated with poor balance, clumsiness, coordination difficulties, sensory processing issues, and learning problems. These difficulties can negatively impact academic performance, writing, reading comprehension, attention span, and daily functional independence**.**

Among the primitive reflexes, the Asymmetric Tonic Neck Reflex (ATNR) is particularly important. ATNR usually develops around 18 weeks of gestation and consolidates between 3 and 9 months of age. This reflex remains unintegrated, it can have significant effects on bilateral coordination, visual tracking, postural control, and hand-eye coordination (Adams et al., 2014).
Research has also shown that maintenance of ATNR is associated with increased severity of ADHD symptoms and behavioral problems such as impulsivity, emotion dysregulation, and learning difficulties (Goodarzi et al., 2025).

MNRI method is created by Dr. Svetlana Masgutova in 1989 of Russia and later expanded across Eastern Europe before being introduced internationally in the United States in 1996 and is currently used internationally for individuals with conditions such as cerebral palsy, autism, developmental delay, ADHD and learning disabilities (AF et al., 2018; Koberda et al., 2016). The first goal of MNRI is to enhance the integration of primary reflexes through neurosensorimotor stimulation. This process supports motor development, cognitive functions, communication, emotional regulation, behaviour, and understanding abilities.

Although the efficacy of MNRI treatment has been demonstrated by clinical observations and early results, evidence in this area remains very limited, especially with regard to ADHD. Current research in this area

has several methodological shortcomings. First, most studies use small sample sizes. Another limitation is the short follow-up period used in the study design. This makes the results obtained less reliable and trustworthy. Reflex-based treatments for ADHD have not been thoroughly examined in the Indian context, even though India has a large number of children need effective and suitable therapy. Because of this, there is a need for more studies that focus on appropriate treatment methods of the local population. Addressing these gaps are contribute to strengthening the evidence base, informing clinical decision-making, and enhancing occupational therapy interventions aimed at enhance participation and daily functioning in this population.

## AIM AND OBJECTIVE

### Aim of the Study

To Study the Effectiveness of MNRI Program on Occupational Performance among Children with ADHD

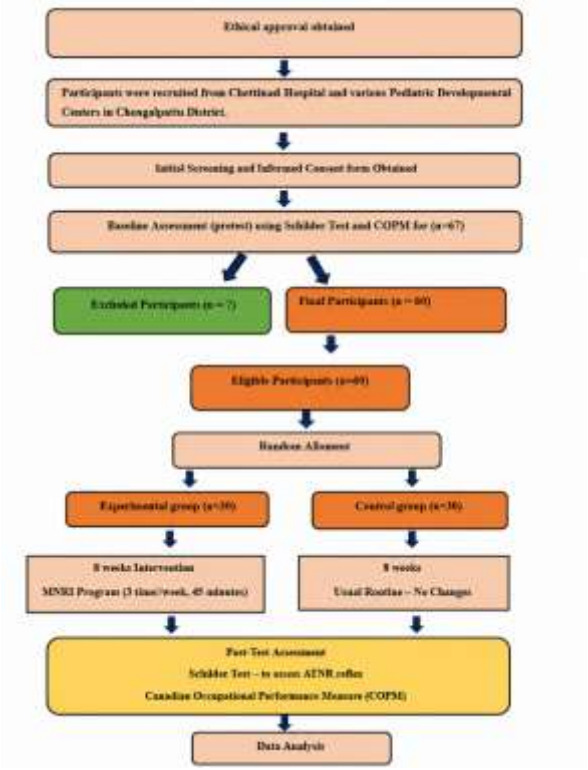
### Objectives

- To determine association of demographical variables
- To determine the pretest outcomes of the Control and Experimental Group using the Schilder test and Canadian Occupational Performance Measure (COPM)
- To determine Posttest outcomes on the control and experimental group using the Schilder test and Canadian Occupational Performance Measure (COPM)
- To compare Pretest and Post test outcomes within the control and experimental group using Schilder test and Canadian Occupational Performance Measure (COPM)
- To compare the Pretest and Post test outcomes between the Control and Experimental Group using Schilder test and Canadian Occupational Performance Measure (COPM)

## METHODOLOGY

This research study is an RCT to measure effectiveness of the MNRI-based reflex integration intervention to improving reflex integration and occupational performance among ADHD children. This research study is an RCT to measure effectiveness of the MNRI-based reflex integration intervention to improving reflex integration and occupational performance among ADHD children. In this research, sixty children within the age range of 7 to 12 years who had been diagnosed with ADHD in the past were selected from Chettinad Hospital and Research Institute and other Pediatrics Development centers in and around Chengalpattu District. They were screened on the basis of the inclusion and exclusion criteria set for this study and the presence of ATNR was identified by Schilder Test. They were then randomly assigned into Experimental group (n=30) and Control group (n=30) using sealed opaque envelopes. Baseline tests and post intervention tests were performed using the Schilder test to evaluate retained ATNR and COPM (Canadian Occupational Performance Measure) to measure occupational performance and satisfaction during personal activities, productivity and leisure. Intervention was performed on the experimental group through an MNRI-based reflex integration program that lasted eight weeks where the experimental group engaged in three sessions weekly for 45 minutes in each session. The interventions consisted of Reflex Repatterning, Archetype Movement Integration and Vestibular-Proprioceptive Integration. Each session involved various activities including crawling exercise, cross lateral movement, spinal movement exercises, balance exercises and reflex integration activities. At the same time, the control continued their routine previously ongoing therapy services and usual activities without receiving the MNRI intervention. At the end of the 8 weeks of the intervention period, the post-tests were done using the same outcome measures. The results of the tests were statistically analyzed to determine whether there were significant differences between the pretest and post-test results and to establish whether the MNRI-based reflex integration was effective on reflex integration and occupational performance of the children.

**Figure 1. Study procedure flowchart**




## RESULT AND ANALYSIS

This randomized controlled trial investigated the effectiveness of Masgutova Neurosensorimotor Reflex Integration (MNRI) program on enhance reflex integration, occupational performance, occupational satisfaction among children with attention deficit hyperactivity disorder (ADHD) using Schilder Test and COPM.

**Table 1. Demographic distribution of variables (Age)**

| Variable | Groups | Mean± SD | Minimum Age (Years) | Maximum Age (Years) |
|---|---|---|---|---|
| Age (Years) | Control Group | 8.4±1.37 | 7 | 12 |
| | Experimental Group | 8.3±1.05 | 7 | 11 |

Table 1 shows the mean age of individuals was 8.4 ± 1.37 years in the control group and 8.3 ± 1.05 years in the experimental group. The results suggest that both groups were similar in terms of age before the treatment.

**Within-Group Analysis (Wilcoxon Signed-Rank Test)**

**Table 2. Within-Group Analysis Control Group**

| Parameter | Pre -Test | Post - Test | Z - Value | P- Value |
|---|---|---|---|---|
| | Mean ± SD | Mean ± SD | | |
| Schilder Test Scores | 5.5± 0.78 | 5.3± 0.87 | -.815 | 0.415 |
| COPM Performance Scores | 1.6± 0.23 | 1.8± 0.29 | -.568 | 0.213 |
| COPM Satisfaction Scores | 1.4± 0.21 | 1.7± 0.27 | -.049 | 0.327 |

Table 2 shows that there were no statistically significant differences in Schilder Test score, COPM Performance Score, and COPM Satisfaction Score for the control group between the pre- and post-tests ($p > 0.05$). These results imply that there were no significant changes in reflex integration, occupational performance, or occupational satisfaction during the experiment period.

**Table 3. Within-Group Analysis Experimental Group**

| Parameter | Pre- test | Post- test | Z- Value | P -Value |
|---|---|---|---|---|
| | Mean ± SD | Mean ± SD | | |
| Schilder Test Scores | 5.6 ± 0.68 | 0.5 ± 0.68 | -4.852 | **p < 0.001** |
| COPM Performance Scores | 2.0 ± 0.52 | 4.7 ± 0.48 | -4.790 | **p < 0.001** |
| COPM Satisfaction Scores | 1.6 ± 0.45 | 4.3 ± 0.49 | -4.790 | **p < 0.001** |

Table 3 shows that statistically significant improvements were achieved for all research variables between pre- and post-test measurements ($p < 0.001$). This evidence shows that the treatment was successful in integrating the ATNR reflex, enhancing occupational performance, and occupational satisfaction among children diagnosed with ADHD.

**Between-Group Comparison (Mann–Whitney U test)**

**Table 4. Pre-Test Comparison Between Groups**

| Pre Test | Control group | Experimental group | Z-Value | P-Value |
|---|---|---|---|---|
| | Mean± SD | Mean± SD | | |
| Schilder Test Scores | 5.5± 0.78 | 5.6± 0.68 | -.411 | 0.681 |
| COPM Performance Scores | 1.6± 0.23 | 2.0± 0.52 | -2.874 | 0.404 |
| COPM Satisfaction Scores | 1.4± 0.21 | 1.6±0.45 | -2.091 | 0.057 |

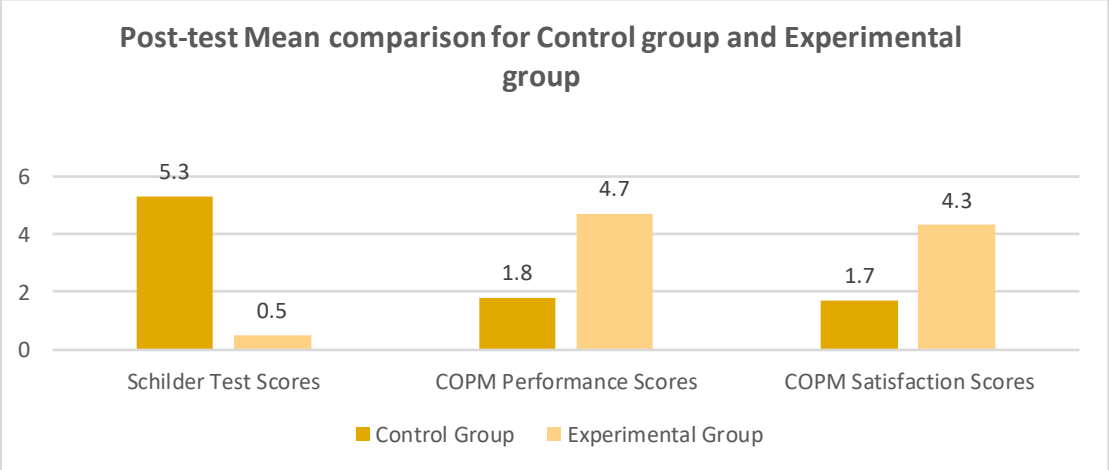
Table 4 shows there was no significant difference between the control and experimental groups regarding Schilder Test, COPM Performance Score, and COPM Satisfaction score before the experiment ($p>0.05$). This suggests that the two groups were equal at the beginning of the intervention.

**Table 5. Post-test Comparison between groups**

| Post test | Control group | Experimental group | Z- Value | P -Value |
|---|---|---|---|---|
| | Mean± SD | Mean± SD | | |
| Schilder Test Scores | 5.3±0.87 | 0.5±0.68 | -23.84 | **p < 0.001** |
| COPM Performance Scores | 1.8± 0.29 | 4.7±0.48 | -6.719 | **p < 0.001** |
| COPM Satisfaction Scores | 1.7± 0.27 | 4.3±0.49 | -6.700 | **p < 0.001** |

Table 5 shows there were statistically significant differences between the control and experimental groups in all post-test assessments ($p<0.001$). The results indicate that the intervention was successful in enhancing the ATNR reflex integration, occupational performance, and occupational satisfaction of the experimental group in comparison with the control group.

**Figure 2: Comparison among post-tests scores between groups**



The findings presented in Figure 2 suggest that experimental group outscored a control group in Schilder Test, COPM Performance, and COPM Satisfaction post-tests. These results demonstrate the effectiveness of the intervention program in enhancing reflex integration, occupational performance, and occupational satisfaction in ADHD children.

## DISCUSSION AND CONCLUSION

It was established that MNRI-based reflex integration training of 8 weeks duration positively impacted on reflex integration, occupational performance, and occupational satisfaction of children suffering from ADHD. The experimental group showed statistically significant improvements in Schilder test scores, COPM performance scores (1.8 to 4.7), and COPM satisfaction scores (1.7 to 4.3) ($p < 0.00$). It was established that MNRI-based reflex integration training of 8 weeks duration positively impacted on reflex integration, occupational performance, and occupational satisfaction of children suffering from ADHD. However, the control group demonstrated very small progress without achieving any significant results. In addition, between-groups analysis showed that the post-test results of the experimental group demonstrated statistical significance compared to the control group ($p < 0.001$). Therefore, the study results demonstrate the efficacy of MNRI techniques as an effective method that helps to enhance neurosensorimotor organization and raise the level of functional activity and participation. Although there were some limitations related to the relatively short duration of the intervention and lack of follow-up period, it can be concluded that this research confirms the effectiveness of using reflex integration techniques in Occupational therapy practice.

## LIMITATIONS AND FUTURE RECOMMENDATIONS

This study had certain limitations. First, this study was conducted with a relatively small number of participants and children of a specific age, so the results cannot be generalized to others. Second, the current study only investigated a single primitive reflex and did not include assessments of other primitive reflexes, such as attention, behavior, sensory integration, executive function, or academic ability. Third, some participants may have continued treatment throughout the study period, making it difficult to attribute positive changes to the MNRI intervention alone. Furthermore, there is no information on the follow-up evaluation that would allow determining the long-term effects of the intervention. Future research should include larger samples, follow-up studies, different ages, other preserved reflexes, parental involvement, and more standardized tests to measure other functional outcomes.

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