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# Neurosensorimotor Reflex Integration in Autism Spectrum Disorder: A Case Report

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**Abstract**

**Background**: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by impairments in social communication, behavioral regulation, sensory processing, and adaptive functioning. Persistent primitive reflexes and sensorimotor integration difficulties have been reported in some children with ASD and may contribute to functional limitations.

**Objective**: To evaluate the clinical outcomes of Neurosensorimotor Reflex Integration (NSMRI) on autism severity, primitive reflex integration, and sensory responsiveness in a child with ASD.

**Methods**: This single case report involved an 8-year-old boy diagnosed with ASD. NSMRI was administered twice weekly for three weeks, resulting in six treatment sessions. Outcomes were evaluated using the Childhood Autism Rating Scale (CARS), Children's Primitive Reflex Integration Measurement Scale (CPRIMS), and structured clinical observation. Data were analyzed descriptively by comparing pre- and post-intervention findings.

**Results**: Following intervention, the CARS score decreased from 50 to 39, representing a reduction of 22.0%, while the CPRIMS score decreased from 12 to 9, representing a reduction of 25.0%. Clinical observations indicated improvements in eye contact, compliance with simple instructions, emotional regulation, attention during activities, cooperation throughout therapy sessions, and tolerance to tactile stimulation. Despite these improvements, the participant remained within the severe ASD category. No adverse events were reported during the intervention period.

**Conclusion**: NSMRI may provide potential benefits as a complementary physiotherapy intervention for improving primitive reflex integration, sensory responsiveness, and behavioral regulation in children with ASD. However, findings should be interpreted cautiously because they are derived from a single case without long-term follow-up.

**Keywords**
Autism Spectrum Disorder; Primitive Reflexes; Sensory Integration; Child Development Disorders; Rehabilitation

## Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by persistent deficits in social communication and social interaction accompanied by restricted, repetitive patterns of behavior, interests, or activities. The clinical presentation of ASD is highly heterogeneous, ranging from mild social difficulties to severe impairments affecting communication, learning, adaptive functioning, and participation in daily activities. In addition to the core diagnostic characteristics, many children with ASD experience sensory processing abnormalities, motor coordination deficits, emotional dysregulation, and behavioral difficulties that substantially affect quality of life and long-term functional outcomes.[1–3] These associated impairments often require comprehensive multidisciplinary management involving medical, educational, psychological, and rehabilitation interventions.[4]

The prevalence of ASD has increased considerably over recent decades, making it one of the most common neurodevelopmental disorders worldwide.[5] Current epidemiological studies estimate that ASD affects approximately 1 in 36 children, although prevalence rates vary across countries and diagnostic systems.[2,6] Improvements in screening programs, diagnostic awareness, and early identification have contributed to the increasing number of diagnosed cases. However, growing evidence also suggests that genetic susceptibility, prenatal and perinatal factors, environmental influences, and neurodevelopmental abnormalities contribute to ASD pathogenesis.[4] Despite advances in understanding ASD, the complex interaction between neurological, behavioral, and sensory factors continues to present challenges for clinical management and rehabilitation.

Among the most frequently reported associated features of ASD are abnormalities in sensory processing and sensorimotor integration. Children with ASD commonly demonstrate either hypersensitivity or hyposensitivity to sensory stimuli, including tactile, auditory, visual, vestibular, and proprioceptive input.[3] These atypical sensory responses may interfere with attention, emotional regulation, motor performance, learning, and social participation.[3,7] Furthermore, sensory processing abnormalities have been associated with increased behavioral difficulties, avoidance responses, anxiety, and reduced engagement in therapeutic activities.[3,7,8] Consequently, interventions that target sensorimotor function and sensory regulation have gained increasing attention within pediatric rehabilitation.[9]

Another area of growing interest involves the persistence of primitive reflexes beyond the expected developmental period. Primitive reflexes are automatic motor responses mediated primarily by lower neural centers during infancy and are typically integrated as cortical maturation progresses.[10] When these reflexes remain active beyond early childhood, they may interfere with postural control, motor planning, sensory processing, attention, emotional regulation, and adaptive behavior.[11,12] Previous studies have reported associations between retained primitive reflexes and various neurodevelopmental disorders, including ASD, suggesting that incomplete reflex integration may contribute to functional difficulties observed in affected children.[7,13] Although the exact relationship remains incompletely understood, retained primitive reflexes have been proposed as a potential target for therapeutic intervention.[7,13,14]

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Neurosensorimotor Reflex Integration (NSMRI) is a sensorimotor-based therapeutic approach designed to facilitate the maturation and integration of retained primitive reflexes through structured tactile, proprioceptive, vestibular, and movement-based stimulation. The intervention is based on the premise that repetitive sensorimotor input may promote more organized neural processing, facilitate adaptive motor responses, and improve functional behavior through neuroplastic mechanisms.[14,15] Repeated stimulation is believed to activate neural pathways involved in sensory integration, postural control, movement coordination, and behavioral regulation.[15,16] Consequently, NSMRI has been proposed as a complementary intervention for children presenting with sensorimotor dysfunction and retained primitive reflexes.

Despite increasing clinical interest in reflex integration approaches, the available scientific evidence remains limited. Several studies have reported improvements in motor performance, sensory regulation, attention, and behavioral outcomes following reflex integration interventions, whereas others have highlighted methodological limitations and insufficient high-quality evidence to support definitive conclusions.[7,13,14,17] Consequently, the effectiveness of NSMRI remains a subject of ongoing debate. Available publications include theoretical reports, observational studies, and small-scale clinical investigations, as well as case reports describing changes in autism-related outcomes, primitive reflexes, and sensory responsiveness following intervention.[7,13,14,18] This limitation highlights an important gap in the literature and underscores the need for additional clinical evidence to better understand the potential contribution of NSMRI within multidisciplinary ASD management.

From a physiotherapy perspective, interventions targeting sensorimotor integration may provide benefits beyond conventional motor rehabilitation by addressing underlying mechanisms associated with sensory processing and behavioral regulation. Improved sensory modulation may enhance participation, cooperation, and engagement during therapeutic activities, potentially supporting broader functional development.[9] However, because evidence regarding NSMRI remains limited, careful clinical documentation is required to evaluate its potential effectiveness and practical applicability.

Therefore, this case report aimed to evaluate the clinical outcomes of Neurosensorimotor Reflex Integration (NSMRI) on autism severity, primitive reflex integration, and sensory responsiveness in an 8-year-old boy with Autism Spectrum Disorder. The clinical lesson highlighted in this report is that sensorimotor-based reflex integration approaches may provide potential benefits as complementary physiotherapy interventions for children with ASD who demonstrate retained primitive reflexes and sensory processing difficulties.[7,14,18] However, further high-quality studies are required before definitive clinical recommendations can be established.[7,9,13,14]

## Methods

This study was conducted as a single case report following the CARE (CAse REport) Guideline to ensure transparent and comprehensive reporting of patient information, intervention procedures, and clinical outcomes. A longitudinal single-subject design was employed to evaluate the effects of Neurosensorimotor Reflex Integration (NSMRI) on autism severity, primitive reflex integration, and sensory responsiveness in a child with Autism Spectrum Disorder (ASD).

The study was conducted at Griya Fisio Bunda Novy between September and October 2025. The participant was an 8-year-old boy previously diagnosed with ASD by a pediatrician based on developmental and behavioral assessment. According to information obtained from the caregiver, the child demonstrated delayed communication skills, limited verbal expression, poor social interaction, reduced attention span, emotional dysregulation, and sensory processing difficulties. Clinical observation further revealed tactile hypersensitivity, particularly involving the feet and trunk, as well as a habitual toe-walking gait pattern. Information regarding prenatal history, perinatal history, developmental milestones, medication use, family history, diagnostic reports, and previous rehabilitation services was unavailable in the clinical records and therefore could not be verified. These limitations should be considered when interpreting the findings.

Written informed consent for intervention, data collection, and publication of anonymized clinical information was obtained from the participant's parent prior to the study. Patient confidentiality was maintained throughout the reporting process. This case report was derived from routine physiotherapy management and did not involve experimental procedures or modifications to standard clinical care. Therefore, formal ethical approval was not obtained. This condition is acknowledged as a limitation and should be interpreted according to the ethical policies of the target journal.

Baseline assessment was conducted before intervention, followed by post-intervention evaluation after completion of six treatment sessions. Outcome measures consisted of the Childhood Autism Rating Scale (CARS), Children's Primitive Reflex Integration Measurement Scale (CPRIMS), and structured clinical observation. These instruments were selected to evaluate changes in autism severity, primitive reflex integration, and sensory-behavioral responses.

The Childhood Autism Rating Scale (CARS) was used to assess autism severity.[19] CARS consists of 15 domains evaluating social interaction, communication, emotional response, sensory behavior, adaptation to change, and general behavioral characteristics associated with ASD. Each item is scored from 1 to 4, with higher scores indicating greater symptom severity. Total scores below 30 indicate non-autistic behavior, scores between 30 and 36.5 indicate mild-to-moderate ASD, and scores of 37 or higher indicate severe ASD. The instrument has demonstrated good validity and reliability for clinical assessment of autism severity.[19]

Primitive reflex integration was assessed using the Children's Primitive Reflex Integration Measurement Scale (CPRIMS). This instrument evaluates the degree of persistence of primitive reflexes commonly associated with neurodevelopmental dysfunction, including the Moro Reflex, Asymmetrical Tonic Neck Reflex, Symmetrical Tonic Neck Reflex, Tonic Labyrinthine Reflex, Spinal Galant Reflex, Spinal Perez Reflex, and Landau Reflex. Each component is scored according to the severity of retained reflex activity, with higher scores indicating poorer reflex integration. CPRIMS has demonstrated satisfactory psychometric properties for the evaluation of primitive reflex integration in children.[20]

In addition to standardized outcome measures, structured clinical observation was performed throughout the intervention period. Observations focused on eye contact, attention during activities, compliance with verbal instructions, emotional regulation, cooperation during therapy, tactile hypersensitivity, and responses to sensorimotor stimulation. To improve consistency, all assessments and observations were conducted by the same physiotherapist using standardized observation procedures.

The intervention consisted of Neurosensorimotor Reflex Integration (NSMRI), a sensorimotor-based approach designed to facilitate primitive reflex integration through repetitive tactile, proprioceptive, vestibular, and movement-related stimulation. Intervention was administered twice weekly for three consecutive weeks, resulting in a total of six treatment sessions. Each session lasted approximately 20–30 minutes.

The NSMRI protocol involved the application of gentle tactile stimulation with a pressure range of approximately 30–60 grams. The stimulation intensity was selected to provide sufficient sensory input while minimizing discomfort and excessive sensory reactivity. Intervention was performed in three therapeutic positions, including supine, side-lying, and prone positions, to facilitate multisystem sensory stimulation and body awareness.

Several therapeutic techniques were applied during each session. Whole-body stroking was performed from the head toward the lower extremities to provide generalized tactile stimulation. Smooth star stroke and wave star stroke techniques were applied to the trunk using rhythmic movement patterns intended to stimulate tactile and proprioceptive receptors. Contract-stretch stimulation was delivered around selected joints to enhance proprioceptive awareness and body perception. Figure-one and figure-eight tracing techniques were subsequently applied through repetitive movement patterns designed to support sensorimotor integration and movement organization.

Although the intervention protocol remained consistent throughout the study period, minor adjustments were made according to the child's tolerance and behavioral condition during each session. When avoidance responses, discomfort, or reduced cooperation were observed, stimulation intensity and duration were temporarily modified to maintain participation and prevent overstimulation. No adverse events or unexpected clinical reactions were reported during the intervention period. To facilitate understanding of the study procedure, the clinical timeline is presented below (Figure 1).

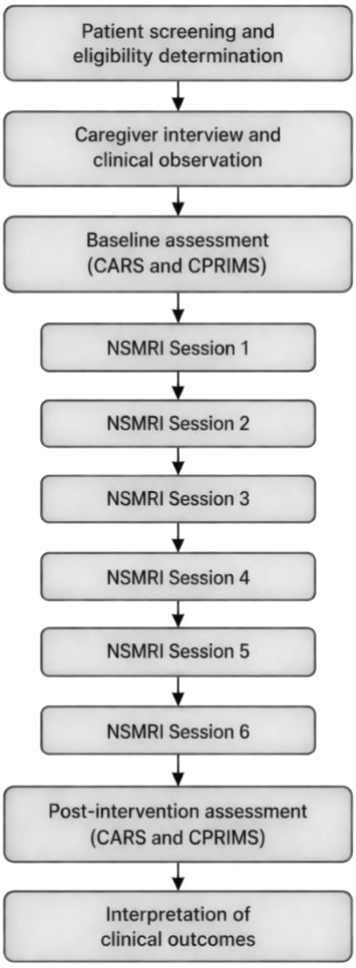


**Figure 1.** Clinical assessment and NSMRI intervention flow

Data analysis was performed descriptively by comparing baseline and post-intervention findings. Changes in CARS and CPRIMS scores were analyzed quantitatively using absolute score differences and percentage changes. Changes in sensory responsiveness and behavioral performance were evaluated qualitatively based on structured clinical observations recorded throughout the intervention period. Because this study involved a single participant without a comparison group, no inferential statistical analysis was performed. Interpretation focused on the direction, magnitude, and potential clinical relevance of observed changes following intervention.

## Results

This case report evaluated changes in autism severity, primitive reflex integration, and sensory responsiveness following six sessions of Neurosensorimotor Reflex Integration (NSMRI). Outcome evaluation was performed using the Childhood Autism Rating Scale (CARS), Children's Primitive Reflex Integration Measurement Scale (CPRIMS), and structured clinical observation. All six intervention sessions were completed as planned, and no adverse events or unexpected clinical reactions were reported during the study period.

To determine whether NSMRI influenced autism severity, CARS assessments were performed before and after completion of the intervention program. The findings are presented in Table 1.

**Table 1.** Changes in Childhood Autism Rating Scale (CARS) Scores Following NSMRI Intervention

| Assessment Time | Total Score | Clinical Category |
|---|---|---|
| Baseline (T0) | 50 | Severe ASD |
| Post-intervention (T6) | 39 | Severe ASD |
| Change | -11 | Improved |

The findings presented in Table 1 demonstrate a reduction in autism severity following the intervention period. The total CARS score decreased from 50 at baseline to 39 after six treatment sessions, corresponding to an absolute reduction of 11 points and a relative improvement of 22.0%. Although the participant remained within the severe ASD classification, the magnitude of change

suggests improvement across several behavioral domains assessed by the instrument. Clinical observations indicated that improvements were particularly evident in eye contact, responsiveness to verbal instructions, emotional regulation, attention during activities, and participation in therapeutic sessions. Therefore, while the diagnostic severity category remained unchanged, meaningful improvement in behavioral functioning was observed during the intervention period.

In addition to autism severity, the study evaluated primitive reflex integration using CPRIMS. This assessment was performed to determine whether repeated sensorimotor stimulation was associated with changes in retained primitive reflex activity. The results are summarized in Table 2.

**Table 2.** Changes in Children's Primitive Reflex Integration Measurement Scale (CPRIMS) Scores Following NSMRI Intervention

| Assessment Time | Total Score | Interpretation |
|---|---|---|
| Baseline (T0) | 12 | Mild Primitive Reflex Integration Impairment |
| Post-intervention (T6) | 9 | Near-Normal Reflex Integration |
| Change | -3 | Improved |

As shown in Table 2, the CPRIMS score decreased from 12 to 9 after completion of the intervention. This reduction represents a 25.0% improvement in primitive reflex integration. The findings suggest a decrease in retained primitive reflex activity and indicate improved sensorimotor organization. During treatment sessions, the participant demonstrated greater ability to maintain therapeutic positions, improved tolerance to movement-based stimulation, and more organized motor responses. These clinical observations were consistent with the quantitative changes observed in CPRIMS scores and suggest that the intervention may have facilitated improved sensorimotor regulation.

To complement the standardized outcome measures, structured clinical observations were conducted throughout the intervention period. These observations focused on sensory responsiveness, behavioral regulation, attention, cooperation, and participation in therapeutic activities. The purpose of these observations was to identify clinically relevant changes that might not be fully captured by standardized instruments. The findings are presented in Table 3.

**Table 3.** Changes in Clinical Behavioral and Sensory Responses

| Clinical Domain | Baseline Observation | Post-intervention Observation |
|---|---|---|
| Eye Contact | Limited and inconsistent | More frequent and sustained |
| Attention During Activities | Easily distracted | Improved task engagement |
| Compliance with Instructions | Frequently difficult to direct | More responsive to verbal commands |
| Emotional Regulation | Frequent frustration and tantrum behavior | Improved emotional control |
| Cooperation During Therapy | Limited participation | Increased cooperation |
| Tactile Hypersensitivity | Marked avoidance of tactile stimulation | Improved tolerance to touch |

The observational findings demonstrated a consistent pattern of improvement across multiple behavioral and sensory domains. At baseline, the participant exhibited pronounced tactile hypersensitivity, particularly involving the feet and trunk. Tactile stimulation frequently triggered withdrawal responses, avoidance behavior, and reduced willingness to participate in therapeutic activities. Furthermore, attention span was limited, eye contact was inconsistent, and cooperation during structured tasks was often difficult to maintain.

Progressive improvement was observed across the six intervention sessions. The participant gradually became more tolerant of tactile stimulation and demonstrated fewer avoidance behaviors when sensory input was applied. Eye contact became more frequent and sustained, while responsiveness to simple verbal instructions improved. In addition, the child appeared calmer during therapeutic activities and demonstrated greater willingness to engage in sensorimotor tasks. Episodes of emotional dysregulation became less frequent, and overall participation improved throughout the intervention period.

From a clinical perspective, the most prominent changes were observed in sensory responsiveness and behavioral regulation. Improved tolerance to tactile stimulation appeared to facilitate greater engagement during therapy and reduced resistance to sensorimotor activities. Likewise, improvements in attention and cooperation may have contributed to more effective participation during intervention sessions. Although these changes were assessed primarily through structured clinical observation, their consistency across multiple treatment sessions suggests sustained changes in the observed clinical and functional outcomes.

Overall, the findings indicate that six sessions of NSMRI were associated with reductions in autism severity scores and improvements in primitive reflex integration. Quantitative assessment demonstrated reductions in both CARS and CPRIMS scores, while qualitative observations revealed improvements in sensory processing, emotional regulation, attention, eye contact, and therapeutic participation. Nevertheless, because this report involved a single participant without a control condition or follow-up assessment, the long-term sustainability and generalizability of these outcomes remain uncertain.

## Discussion

This case report evaluated the clinical outcomes of Neurosensorimotor Reflex Integration (NSMRI) in an 8-year-old child with Autism Spectrum Disorder (ASD). Following six intervention sessions, reductions were observed in both Childhood Autism Rating Scale (CARS) and Children's Primitive Reflex Integration Measurement Scale (CPRIMS) scores, accompanied by qualitative improvements in sensory responsiveness, attention, emotional regulation, eye contact, and cooperation during therapeutic activities. Although the participant remained within the severe ASD category after intervention, the findings suggest that NSMRI may contribute to positive changes in sensorimotor and behavioral functioning when used as a complementary physiotherapy intervention.[14,18]

One of the principal findings of this study was the reduction in CARS scores from 50 to 39 following the intervention period. This change indicates improvement in several behavioral domains commonly affected in ASD, including social engagement, responsiveness to environmental stimuli, emotional control, and participation during structured activities. Nevertheless, the participant remained classified within the severe ASD category, indicating that the intervention did not alter the overall diagnostic classification. This finding is not unexpected given the complex and multifactorial nature of ASD. Autism is characterized by persistent neurodevelopmental differences involving social communication, sensory processing, behavioral regulation, and adaptive functioning that generally require long-term multidisciplinary intervention.[1,2,4] Therefore, the observed reduction in CARS scores should be interpreted as improvement in functional and behavioral performance rather than resolution of the underlying neurodevelopmental condition.

The behavioral improvements observed during intervention may be associated with enhanced sensory processing and sensorimotor regulation. Sensory processing abnormalities are highly prevalent among children with ASD and have been linked to difficulties in attention, emotional regulation, social participation, and adaptive behavior.[3,7,21] Children who demonstrate tactile

hypersensitivity frequently exhibit avoidance behaviors, reduced engagement in therapeutic activities, increased emotional reactivity, and difficulty maintaining attention during structured tasks.[3,21,22] Consequently, interventions that facilitate more effective sensory modulation may indirectly improve behavioral performance by reducing sensory overload and enhancing the child's ability to engage with environmental demands.[9,23,24] The progressive reduction in tactile defensiveness observed in this case may therefore have contributed to the improvements in cooperation, attention, and participation documented throughout the intervention period.

Another important finding was the reduction in CPRIMS scores from 12 to 9, representing a 25% improvement in primitive reflex integration. Primitive reflexes are automatic motor responses that emerge during early infancy and are normally inhibited as cortical maturation progresses.[10] Persistent primitive reflexes beyond the expected developmental period may interfere with postural control, motor planning, sensory integration, learning processes, and behavioral regulation.[7,11,14] The observed reduction in CPRIMS scores suggests improved integration of retained primitive reflexes and may indicate enhanced organization of sensorimotor responses following intervention. Although causal relationships cannot be established from a single case report, the findings are consistent with the theoretical framework underlying NSMRI.

The potential mechanism responsible for these improvements may be explained through principles of neuroplasticity.[16] Neuroplasticity refers to the capacity of the nervous system to modify its structural and functional organization in response to repeated stimulation and experience.[15] Sensorimotor interventions such as NSMRI provide repetitive tactile, proprioceptive, vestibular, and movement-based input that may facilitate adaptive neural reorganization.[14] Repeated exposure to structured sensory stimulation may strengthen neural pathways involved in sensory processing, motor coordination, postural regulation, and behavioral adaptation.[23,25] Although direct neurophysiological measurements were not performed in this study, the improvements observed in both CPRIMS scores and clinical behavior are compatible with theoretical models proposing that repeated sensorimotor experiences can influence neural organization and functional performance.

The improvement in tactile hypersensitivity observed during the intervention period warrants particular consideration. At baseline, the participant demonstrated marked avoidance of tactile stimulation, especially involving the feet and trunk. Such sensory defensiveness is frequently reported in children with ASD and has been associated with altered sensory modulation and atypical neural processing of sensory information.[3,18] As treatment progressed, the participant gradually tolerated tactile stimulation with fewer avoidance responses and greater cooperation. This change may indicate improved sensory adaptation and reduced reactivity to previously aversive stimuli. Because tactile hypersensitivity can interfere with participation in educational, social, and therapeutic activities, improvements in sensory tolerance may have practical implications beyond the immediate clinical setting.[26,27]

The present findings also have implications for physiotherapy practice. Historically, physiotherapy interventions for children with ASD have focused primarily on motor development, balance, coordination, physical activity, and participation.[28] However, emerging evidence suggests that sensorimotor dysfunction may contribute substantially to behavioral and functional challenges experienced by children with ASD.[9,29] Consequently, interventions targeting sensorimotor integration may complement traditional rehabilitation approaches by addressing underlying mechanisms associated with sensory processing and behavioral regulation. Within this context, NSMRI may represent a potentially useful adjunctive intervention. Nevertheless, it should not be considered a replacement for evidence-based multidisciplinary management that includes behavioral therapy, occupational therapy, speech and language therapy, educational support, and family-centered intervention.[4]

Despite the positive findings observed in this case, several limitations should be acknowledged. First, this study involved only a single participant, which substantially limits generalizability. Second, the intervention period consisted of only six treatment sessions delivered over three weeks. A longer intervention period may have produced different outcomes and allowed evaluation of more sustained changes. Third, no follow-up assessment was conducted after completion of treatment. Consequently, the persistence and long-term clinical significance of the observed improvements remain unknown. This limitation is particularly important because short-term improvements do not necessarily predict long-term functional change.

Several patient-related factors also could not be evaluated because the information was unavailable in clinical records. Data regarding prenatal and perinatal history, developmental milestones, medication use, family history, diagnostic reports, and previous rehabilitation services were not available for verification. These missing data limit the ability to fully characterize the participant and identify potential confounding factors. In addition, behavioral outcomes were assessed primarily through structured clinical observation rather than objective instrumental measures. Although efforts were made to standardize observations by using the same evaluator throughout the intervention period, observer bias cannot be completely excluded.

Another important consideration is the limited evidence base supporting reflex integration approaches. Although several studies have reported positive outcomes associated with reflex integration interventions, methodological limitations such as small sample sizes, lack of control groups, heterogeneous intervention protocols, and variability in outcome measures continue to restrict definitive conclusions regarding effectiveness.[7,13,14] Therefore, the findings of this report should be considered preliminary clinical evidence rather than confirmation of therapeutic efficacy. High-quality randomized controlled trials, prospective cohort studies, and longitudinal investigations are required to establish the effectiveness, mechanisms, and clinical applicability of NSMRI more rigorously.

From a clinical perspective, this case report suggests that NSMRI may contribute to improvements in primitive reflex integration, sensory responsiveness, attention, emotional regulation, and participation in therapeutic activities among children with ASD. The intervention appeared particularly beneficial in reducing tactile hypersensitivity and improving engagement during treatment sessions. However, because the findings originate from a single case without a comparison condition or long-term follow-up, NSMRI should currently be regarded as a complementary physiotherapy intervention rather than a primary treatment modality for ASD.

**Study Limitations**

Several limitations should be considered when interpreting the findings of this case report. First, the study involved only a single participant, which limits the generalizability of the results to the broader population of children with Autism Spectrum Disorder (ASD). Second, the intervention period consisted of only six treatment sessions over three weeks, which may not have been sufficient to evaluate the full therapeutic potential of Neurosensorimotor Reflex Integration (NSMRI). Third, no post-intervention follow-up assessment was conducted. Consequently, the long-term sustainability of the observed improvements remains unknown.

Additional limitations relate to the availability of patient information. Data regarding prenatal and perinatal history, developmental milestones, medication use, family history, diagnostic documentation, and previous rehabilitation interventions were unavailable in the clinical records and therefore could not be verified. These missing data limited the ability to fully characterize the participant and identify potential confounding factors.

Furthermore, behavioral and sensory outcomes were assessed primarily through standardized scales and structured clinical observation rather than objective instrumental measures. Although efforts were made to maintain consistency by using the same

evaluator throughout the intervention period, observer bias cannot be completely excluded. Finally, because this study lacked a comparison group, the relative contribution of NSMRI cannot be distinguished from other factors such as natural developmental maturation, increased therapist-child interaction, environmental adaptation, or placebo effects.

**Clinical Implications**

Despite its limitations, this case report provides clinically relevant information regarding the potential role of NSMRI in pediatric physiotherapy practice. The findings suggest that sensorimotor-based interventions targeting primitive reflex integration may contribute to improvements in sensory responsiveness, behavioral regulation, attention, and participation during therapeutic activities in children with ASD.[7]

The observed reduction in tactile hypersensitivity may be particularly important because sensory defensiveness frequently interferes with engagement in rehabilitation, educational activities, and social participation. Improved sensory tolerance may facilitate more effective involvement in multidisciplinary intervention programs and enhance the child's ability to interact with the surrounding environment.

From a rehabilitation perspective, NSMRI should be considered a complementary intervention that may support broader therapeutic goals rather than a stand-alone treatment for ASD.[4,14] Its application should remain integrated within comprehensive multidisciplinary management involving physiotherapists, occupational therapists, speech and language therapists, psychologists, educators, physicians, and family members. Further research is necessary to determine optimal treatment dosage, long-term effectiveness, and patient populations most likely to benefit from this intervention.

**Patient/Caregiver Perspective**

According to information provided by the caregiver during the intervention period, the child appeared calmer and more cooperative during therapy sessions compared with baseline observations. The caregiver also reported improvements in the child's willingness to participate in therapeutic activities and a reduction in avoidance behaviors when tactile stimulation was applied. However, no formal patient or caregiver satisfaction questionnaire was administered, and these observations should therefore be interpreted as informal clinical feedback rather than standardized outcome measures.

**Conclusion**

This case report demonstrated that six sessions of Neurosensorimotor Reflex Integration (NSMRI) were associated with improvements in autism-related symptoms, primitive reflex integration, sensory responsiveness, and behavioral regulation in an 8-year-old child with Autism Spectrum Disorder. The Childhood Autism Rating Scale (CARS) score decreased from 50 to 39, while the Children's Primitive Reflex Integration Measurement Scale (CPRIMS) score decreased from 12 to 9. In addition, structured clinical observations indicated improvements in eye contact, attention, emotional regulation, cooperation during therapy, and tolerance to tactile stimulation.

These findings suggest that NSMRI may provide potential benefits as a complementary physiotherapy intervention for children with ASD who demonstrate sensory processing difficulties and retained primitive reflexes. The intervention appeared particularly beneficial in improving sensory tolerance and engagement during therapeutic activities. Nevertheless, the participant remained within the severe ASD category following intervention, indicating that the observed improvements should be interpreted as functional and behavioral changes rather than resolution of the underlying neurodevelopmental condition.

Because this report involved a single participant, a short intervention period, and no follow-up assessment, the findings should be interpreted cautiously and cannot be generalized to the broader ASD population. Future studies should employ larger sample sizes, controlled study designs, longer intervention periods, objective outcome measures, and long-term follow-up to further evaluate the effectiveness, clinical significance, and neurophysiological mechanisms of NSMRI in children with ASD.

**Author Contribution**

Hanifah Imtiyas: Conceptualization, Methodology, Investigation, Data curation, Writing – original draft.
Adnan Faris Naufal: Conceptualization, Methodology, Supervision, Validation, Writing – review and editing.
Novy Hikmah: Investigation, Resources, Supervision, Validation, Writing – review and editing.

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**Conflict of Interest Statement**

The authors declare that they have no conflicts of interest related to this case report.

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**Ethics Statement**

Written informed consent was obtained from the patient's parent or legal guardian for participation in the case report and for the publication of relevant clinical information. All information was handled confidentially, and the patient's identity was protected throughout the preparation and publication of this manuscript.

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