ISSN No: -2456-2165 https://doi.org/10.38124/ijisrt/26jan1368

The Use of Neurofeedback Therapy to Improve Behavioral and Cognitive Skills in Children with Autism Spectrum Disorder

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Publication Date: 2026/02/07

Abstract: This paper explores the use of neurofeedback therapy as a supportive, non-medical intervention for children diagnosed with Autism Spectrum Disorder (ASD). The study focuses on a group of 20 children aged between 6 and 15 years. Improvements were observed in several areas, including sleep patterns, attention and concentration, emotional calmness, reduced irritability, and gradual improvement in writing skills. In addition to reviewing previous scientific studies, this paper also includes practical observations from real-life therapeutic settings, showing that improvements were not only noticeable during treatment but continued over time.

How to Cite: Samira Rozalin Sabbagh (2026) The Use of Neurofeedback Therapy to Improve Behavioral and Cognitive Skills in Children with Autism Spectrum Disorder. *International Journal of Innovative Science and Research Technology*, 11(1), 3201-3202. https://doi.org/10.38124/ijisrt/26jan1368

I. INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition that affects communication, behavior, attention, and emotional regulation. Many children with ASD experience difficulties such as poor concentration, sleep problems, frequent emotional outbursts, and challenges in academic skills like writing.

Because there is no single treatment that fully treats autism, therapists and researchers often use supportive approaches alongside behavioral and educational programs. One of these approaches is neurofeedback therapy, which has gained attention due to its focus on training brain activity rather than using medication.

➢ *What is Neurofeedback Therapy?*

Neurofeedback therapy is a type of EEG-based brain training. During sessions, sensors are placed on specific areas of the scalp to measure brainwave activity. The child receives visual or auditory feedback (such as a video or game), which changes according to their brain activity.

Over time, the brain learns to regulate itself more effectively.

Neurofeedback is based on the concept of neuroplasticity, meaning the brain can change and adapt through repeated training.

➢ *Brain Areas Targeted by Neurofeedback*

In children with ASD, neurofeedback commonly focuses on the following brain regions:

- *Frontal Lobe (Especially the Prefrontal Cortex):*
  Responsible for attention, impulse control, emotional regulation, and executive functions. Training this area often leads to improvements in focus and reduced impulsive behavior.

- *Central Region (Sensorimotor Cortex – C3, C4):*
  Frequently trained using SMR (Sensorimotor Rhythm) protocols. This area is linked to motor control, calmness, and sleep regulation.

- *Temporal Lobes:*
  Associated with emotional processing and language. Training these areas may help reduce emotional reactivity and improve social responsiveness.

Therapists usually select the trained regions based on EEG assessment and the child's main difficulties.

II. METHODOLOGY

➢ *Participants*

The group consisted of 20 children diagnosed with ASD, aged 6–15 years. All children had previously shown difficulties in attention, emotional regulation, and daily functioning.

➢ *Treatment Process*

Children attended regular neurofeedback sessions over several weeks. The number of sessions varied, but most children received between 20 and 40 sessions.

- *Progress was Monitored Through:*
  Therapist observations Parent reports

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Changes noticed in daily life and school performance

III. REAL-LIFE OBSERVATIONS AND PRACTICAL EXPERIENCES

Based on practical experience with children receiving neurofeedback therapy, several patterns of improvement were observed:

- *Attention and Concentration*

Many children showed gradual improvement in their ability to sit for longer periods and complete tasks. Parents reported that children were more able to follow instructions and stay focused during homework and therapy sessions.

- *Emotional Calmness and Reduced Irritability*

A noticeable reduction in emotional outbursts and aggressive reactions was reported after several sessions. Children appeared calmer and more able to handle frustration. Therapists observed that emotional regulation continued to improve even after sessions ended.

- *Sleep Improvement*

Some parents reported improved sleep quality, including falling asleep faster and fewer night awakenings. These improvements were often linked to training SMR frequencies in the sensorimotor cortex.

- *Writing and Academic Skills*

While neurofeedback does not directly train writing skills, improvements in attention, fine motor control, and emotional regulation had a positive effect on handwriting and academic performance over time.

- *Long-Term Improvements*

One important observation was that improvements did not disappear immediately after treatment stopped. In many cases, children maintained better attention levels and emotional stability for months following the completion of sessions. This supports the idea that neurofeedback creates lasting changes through brain self-regulation rather than temporary behavioral control.

IV. DISCUSSION

The findings of this paper are consistent with previous research suggesting that neurofeedback therapy is not a cure for autism but can be an effective supportive intervention. The most significant benefits were seen in attention, emotional regulation, and sleep, which indirectly supported learning and daily functioning.

The effectiveness of neurofeedback varied among children, depending on factors such as age, severity of symptoms, and consistency of training.

V. LIMITATIONS

- Small number of participants Lack of a control group
- Dependence on observational and parent-reported outcomes

VI. CONCLUSION

In conclusion, neurofeedback therapy appears to be a valuable complementary approach for children with Autism Spectrum Disorder. Training specific brain regions such as the prefrontal cortex and sensorimotor areas can lead to meaningful and lasting improvements in attention, emotional control, sleep quality, and daily functioning. When combined with behavioral and educational interventions, neurofeedback may contribute positively to long-term development.

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