Evidence eBook

on Primitive Reflex Integration and Innate Rhythmic Movements

Research, Rationale, and Case Reports

by Sonia Story, M.S.

move · play · thrive
Brain and Sensory Foundations

This Evidence eBook provides supporting research, rationale, and case studies validating neurodevelopmental movements and the techniques taught in the Brain and Sensory Foundations course. We appreciate your help to spread the word. Please send this link to friends and colleagues so they can download their own copy:

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Thank you!

Sonia Story, M.S., developed the Brain and Sensory Foundations program to provide comprehensive training in the use of neurodevelopmental movements for addressing sensory, learning, physical, behavioral, emotional, social, and speech challenges. Sonia is the author of this Evidence eBook on Primitive Reflex Integration, which includes research, rationale, and case study evidence for the use of neurodevelopmental movements for optimizing function. Since 2006, she has been working with children, parents, and professionals in hands-on private sessions and training courses. Sonia's courses are approved for continuing education for professionals in occupational therapy, physical therapy, speech and language pathology, mental health, and massage therapy.

Contents

Introduction

Greetings!

Thank you for your interest in this Evidence eBook.

Understanding the rationale and supporting evidence behind an intervention helps us decide whether something is worthwhile to pursue for the benefit of our children and clients.

Here you will find peer-reviewed, published research and the rationale for using primitive reflex integration to promote maturity of the brain, body, and sensory systems, thereby improving functional skills. Primitive reflexes are expressed as a natural part of healthy infant development and they have been formally studied for decades. Beyond just published research, therapists and parents have used their experience, observational skills, and clinical reasoning to produce vast amounts of evidence supporting the efficacy of using primitive reflex integration activities beyond the infant stages to improve functional skills. Observation and clinical reasoning are valid forms of evidence that are less structured, but still highly reliable (Toews et al., 2024).

In addition to the research and rationale here, we will explore remarkable case study summaries showing how the use of primitive reflex integration, along with other integrative and neurodevelopmental movements, is associated with profound positive outcomes. The case studies presented here were all submitted by students of the Brain and Sensory Foundations, First Level, (Part 1) course.

The Brain and Sensory Foundations program provides a unique, holistic, and comprehensive training combining many types of integrative and neurodevelopmental movements, including:

- Primitive Reflex Integration activities
- Postural reflex integration activities
- Innate Rhythmic Movements
- Developmental movements
- Movements for stress release
- Movements to boost goal attainment
- Play

The tools from the Brain and Sensory Foundations curriculum are designed to calm the nervous system, boost development, and promote participation in activities of daily living (ADLs). Fostering enjoyment in movement and supporting individuals to achieve meaningful goals through a broad developmental approach are primary aspects of the training. This distinctive set of tools brings exceptional results for

individuals throughout the lifespan by maturing the neuro-sensory-motor systems and improving function across physical, social-emotional, and cognitive realms.

Sincere thanks for taking the time to explore this worthwhile subject. I welcome your questions and look forward to connecting.

Best wishes

Sonia Story, M.S.

Note: Supporting evidence cited here is from peer-reviewed published research, formal scientific conference proceedings, books, or dissertations. Observational (anecdotal) evidence in the form of case studies is also included as it supports the conclusions of the formal research and shows what is possible through the use of neurodevelopmental and integrative movements. These case studies—from students of the Brain and Sensory Foundations, First Level course—consistently show positive results associated with the use of these neurodevelopmental and integrative movement tools. The case studies are summarized here in "Before and After" graphic tables. Web links to read each full case study are also provided.

"The foundations for skills that are needed throughout life are established in early development."

(Kornhaber et al., 2007, p. 484)

Innate Rhythmic Movements of Infancy (IRM)

A key part of the broad developmental approach in the Brain and Sensory Foundations courses is utilizing the Innate Rhythmic Movements (IRM) that infants engage in during development, or rhythmic movements similar to what infants spontaneously do (also referred to here as IRM). The IRM appear to have critical importance to growth, motor development (Thelen, 1979), and emotional well-being (Provasi et al., 2021). In utero, the fetus recognizes maternal rhythms—such as the mother's heartbeat, breathing, voice, and walking—and modifies its own behavior in response to the mother's rhythms (Provasi et al., 2021).

In her landmark study of healthy infants, Thelen (1979) described many IRM, such as rocking, arm waving, and leg kicking, and found these spontaneous, stereotypical infant movements were highly correlated with advances in motor development. Similar to infant primitive reflexes, Thelen (1979) discovered the IRM had peaks in expression that gradually diminished as the infant matured. The IRM were associated with advances in primitive reflex integration (Grigg et al., 2023), and with the development of language (Iverson, 2010). Our ability to attune to rhythm and produce rhythm, also called steady beat competency, may help us to learn language and develop reading skills (Hannaford, 2002). Grigg et al. (2023) reported that children (between ages 6-8) who received just five minutes per day of IRM four times per week, showed statistically significant increases in reading scores compared to a control group. Their teachers also reported more focus and confidence in the students receiving the intervention (Grigg et al., 2023). Other researchers found that the IRM were effective in improving balance and reading skills in dyslexic children (Pérez-Rey et al., 2024).

In typical healthy development, babies crawl rhythmically on the belly and on hands and knees. Rhythmic crawling may make a difference in our ability to learn well. For example, crawling in infants (9 months of age) was associated with more flexible memory retrieval (Herbert et al., 2007). Innate Rhythmic Movements appear to promote relaxation and positive emotional states. For example, when infants were engaged in rhythmic movements they smiled more (Zentner & Eerola, 2010), and rhythmic stimulation for pre-term babies in neonatal intensive care units resulted in better physiological and emotional stability for the infants (Provasi et al., 2021). Giving children IRM in a school setting was associated with improvements in self-regulation (Overvelde, 2022).

Some of the IRM are included in the spontaneous general movements as described by Prechtl (1977). In a review of 37 studies, Zuk (2011) found that assessment of these spontaneous general movements of early infancy was effective for reliably predicting neurodevelopmental outcomes. When children moved poorly or did not engage in the full repertoire of these movements in infancy, compromised functioning was a common result (Zuk, 2011).

Rhythmic Impairment Is Associated with Dysfunction

Research by Ladányi et al. (2020) pointed to the importance of attaining competence in the perception and production of rhythm and rhythmic movement. Children with rhythmic impairment were at greater risk for developmental speech and language disorders (Ladányi et al., 2020). The lack of rhythmic ability was also associated with autism, attention deficit hyperactivity disorder (ADHD), developmental coordination disorders (DCD), and dyslexia (Lense et al., 2021). The dysrhythmia found in children with ADHD appears to persist through adolescence (Crasta et al., 2021) without diminishing over time, suggesting the need for intervention to address this deficit.

Rhythmic Input Is Beneficial to Function

Sensory-motor disorders constitute a defining characteristic of autism (Torres & Whyatt, 2018) and research points to rhythmic input as a possible beneficial intervention for individuals with symptoms of autism (Amos, 2013; Hardy & Lagasse, 2013). Rhythmical movement done to music could aid an individual with autism spectrum disorders (ASD) by increasing the functional connectivity in the brain (Barnhill, 2013). In neurorehabilitation, clinicians are advised to use rhythmic movements for calming and to improve hypotonia (Farber, 1982).

Rhythmic sensory input has been beneficial for helping with gait in patients with Parkinson's disease (Kadivar et al., 2011), and following stroke (Hong & Kim, 2016; Suh et al., 2014; Hayden et al., 2009). For example, rhythmic movements, such as crawling, have played a part in successful rehabilitation after stroke (Doidge, 2007). Rhythmic sensory input has been effective for helping children exposed to trauma, most likely via regulation of the brainstem (Perry, 2006). Evidence showed that children with neurodevelopmental challenges responded very positively to a combination of IRM and reflex integration movements (Perez-Rey et al., 2024; Grigg, et al., 2018; Gazca, 2012). For example, Hirose et al. (2025) included rhythmic movements in a 12 week movement program for children with autism and ADHD, and found that primitive reflex retention was reduced while fine motor coordination and behavioral outcomes improved.

Innate Rhythmic Movements Summary

Use of the Innate Rhythmic Movements is associated with gains in primitive reflex integration, reading ability, balance, self-regulation, and other positive improvements in function (Hirose et al., 2025; Pérez Rey et al., 2024; Grigg et al., 2023).

"The rhythmic movements have been integrated into our practice with most success to increase functional engagement when the kiddos can't seem to relax otherwise. They are also proving to be the gateway for motor development—amazing results where other interventions were not even close to helping. The kiddos love the "work" and the parents are relieved to find bedtime movements that relax everyone!!!"

Trish LaCour, OTD, OTR/L

Retained Primitive Reflexes Are Neurological Soft Signs Associated with Dysfunction

Along with the IRM, primitive reflexes are part of the broad range of movements in which human beings engage during development. According to authors of the Nelson Textbook of Pediatrics, the presence of primitive reflexes past the first year of life is considered abnormal and a neurological soft sign (Behrman et al., 2000). "The finding of two or more persistent soft signs correlates significantly with neurologic dysfunction, including attention deficit disorder, learning disorders, and cerebral palsy" (Behrman et al., 2000, p. 1800).

Persistent or retained primitive reflexes have been associated with various dysfunctions in children, such as:

- Pelvic asymmetries (Gieysztor et al., 2020)
- Irregular gait (Gieysztor et al., 2020)
- Developmental language disorder (Matuszkiewicz & Gałkowski, 2021)
- ADHD (Rathod et al., 2024; Wang et al., 2023; Bob et al., 2021; Konicarova et al., 2013; Konicarova & Bob, 2013; Taylor et al., 2004)
- Headaches (Wahlberg & Ireland, 2005)
- Learning challenges (Feldhacker et al., 2021; McPhillips & Jordan-Black, 2007; McPhillips & Sheehy, 2004; Goddard Blythe, 2001)
- Intellectual disability (Pavlović et al., 2025)
- Sensory disorders (Rathod, 2024; Pecuch et al., 2020)
- Motor challenges (Pecuch et al., 2021; Gieysztor et al., 2018, January; Bly, 2011)
- Toe walking (Accardo & Barrow, 2015)
- Emotional and behavioral difficulties (Taylor et al., 2020)
- Abnormal muscle tone (Fiorentino, 1972)
- Poor postural control (Gieysztor et al., 2020; Pecuch et al., 2020)
- Poor balance (Grzywniak, 2017)
- Scoliosis (Vlădăreanu et al., 2025; Sharma & Saxena, 2024; Gieysztor et al., March, 2018; Ferrari et al., 2010)

In adults, retained primitive reflexes were associated with:

- Poor cognition (Stephens-Sarlós et al., 2024)
- Poor mental health (Stephens-Sarlós et al., 2024)
- Dementia (Pavlović et al., 2025; Altunkalem Seydi et al., 2024)
- Parkinson's disease (McGee, 2007)
- Developmental Coordination Disorder (Niklasson et al., 2015)
- Schizophrenia (Hyde et al., 2007)
- Poor eating and risk of malnutrition (Hobo et al., 2014)

Retained primitive reflexes are common in cases of brain injury. However, retained primitive reflexes that are less severe than those occurring in cases of brain injury can still drive changes in muscle tone and postural control. These reflex-driven tonal and postural changes can significantly hinder function (Goddard Blythe, 2023; Kohen-Raz, 1986). In their AOTA continuing education article, Stallings-Sahler et al. (2019) included deficiencies in the postural reflex system as an indication of what they call "neurodevelopmental soft signs." Challenges with postural control have been observed in children with learning disabilities (Kohen-Raz, 1986), ADHD (Zoccante et al., 2021), and autism spectrum disorders (Doumas et al., 2016) at greater rates than in unaffected populations. In

Neurorehabilitation: A Multisensory Approach, occupational therapist Shereen Farber states:

> "A delay in primitive reflex integration will result in decreased segmentation of the trunk, decreased isolation of movement, decreased rotation component in any action, postural insecurity, decreased ability to develop anti-gravity muscles, increased synergy patterns (mass movement patterns) and increased dependence on environmental stimulation for changes in posture" (Farber, 1982, pp. 113-114).

Abnormal muscular and postural responses, as described by Farber, could interfere with the proper development of other sensory systems, such as vision. For example, multiple research studies showed that retained primitive reflexes were also significantly correlated with deficits in visual skills (Andrich et al., 2018; Gonzales et al., 2008; Wahlberg & Ireland, 2005).

In another example, proper gait is largely developed via the innate movements of infancy and when these infant movements are lacking, sensory-motor deficits result. Gieysztor et al. (2020) found that a retained Asymmetrical Tonic Neck Reflex (ATNR) in boys and girls with an average age of 5 years was associated with pelvic asymmetries and irregular walking gait. The quality of how we walk is significant and a symmetric, aligned, and proper walking gait is important for our ability to participate in life activities. From the above research, it is clear that having retained primitive reflexes could seriously affect an individual's ability to function well in many areas. Therefore, knowledge of these innate infant movements is important as part of an overall plan for holistic assessment and intervention.

Primitive Reflexes Summary

A large body of research points to the conclusion that retained primitive reflexes can have highly negative impacts on an individual's functioning and are associated with numerous physical, emotional, and cognitive challenges. For children with neurodevelopmental disabilities, the use of primitive reflex integration activities as part of remediation may be critically important because these movements build the basic developmental foundations for optimal use of the body and sensory systems.

Retained Primitive Reflexes Are Prevalent In School Children

Out of 120 school children in the UK between the ages of four and five, only three had no signs of motor abnormality (Goddard Blythe, et al., 2022). In a study of apparently healthy children (ages 3-8) without neurological disability in Córdoba, Spain, 89.5% had retained primitive reflexes (León-Bravo et al., 2023). In a study of 27 preschool children, 100% had at least one retained reflex (Hickey & Feldhacker, 2022).

Intervention: Benefits of Primitive Reflex Integration

Further discussion of primitive reflexes in development is warranted because the quality of functional skills and the ability to engage in daily activities may be hindered by the presence of one or more retained primitive reflexes. Through intervention, we may be able to help individuals integrate and mature the retained primitive reflexes while simultaneously boosting functional capacities. "Clinical experience demonstrates that lower level reflexes present beyond the appropriate age of disappearance can be inhibited [integrated]…" (Farber, 1982, p. 204). Research validates Farber's clinical experiences and shows that a reduction in the level of retained primitive reflexes can occur after intervention (Goddard et al., 2021) and is associated with improved functional outcomes (Melillo et al., 2020; Grigg et al., 2018; Grzywniak, 2017; Masgutova et al., 2016; Gazca, 2012; Goddard

Blythe, 2010; Jordan-Black, 2005; Wahlberg & Ireland, 2005; Bein-Wierzbinski, 2001; McPhillips et al., 2000).

With the use of primitive reflex integration activities, researchers report associated improvements in the following areas:

- Vestibular maturity (Stephens-Sarlós, 2024)
- Visual motor skills (Domingo-Sanz, 2024; Domingo-Sanz, 2022)
- Visual and auditory processing (Stephens-Sarlós et al., 2025)
- Balance (Infante-Cañete et al., 2023; Jeong et al., 2021; Grzywniak, 2017; Niklasson et al., 2017; Wahlberg & Ireland, 2005)
- Coordination (Grzywniak, 2017; Niklasson et al., 2017)
- Motor skills (Infante-Cañete et al., 2023; Pecuch et al., 2021)
- Fine motor abilities (Brown, 2010)
- Posture defects (Jeong et al., 2021; Gieysztor et al., 2018, March)
- Scoliosis (Gieysztor et al., 2018, March)
- Cerebral Palsy (Wagh et al., 2019)
- Reading (Grigg et al., 2023; McPhillips & Jordan-Black 2007; Wahlberg & Ireland, 2005; Jordan-Black, 2005; McPhillips et al., 2000)
- Headache reduction (Wahlberg & Ireland, 2005)
- Oculo-motor functioning (Bein-Wierzbinski, 2001, as quoted in Goddard, 2005)
- Mathematics (Jordan-Black, 2005)
- Copying ability [fine motor] (Brown, 2010)
- Writing speed (McPhillips et al., 2000)
- Concentration (Jeong et al., 2021)
- Cognitive function in elderly adults (Stephens-Sarlós et al., 2024)
- Mental health in elderly adults (Stephens-Sarlós et al., 2024)
- Social-emotional functioning (Grigg et al., 2018; Grzywniak, 2017)
- Self-regulation (Overvelde, 2022)

In their article, Stallings-Sahler et al. (2019) state: "Following principles of neuroplasticity, occupational therapy that addresses both the underlying sensory and motor origins of the child's difficulties, as well as the occupational outcome 'end products' of sensory-motor processing, may be the most successful approach" (Stallings-Sahler et al., 2019, p. CE-3, emphasis added). We utilize this same approach in the Brain and Sensory Foundations training courses: Following the principles of neuroplasticity and development, we include a wide range of innate infant movements, such as Innate Rhythmic Movements, primitive reflexes, postural reflexes, developmental movements, and play. We also incorporate integrative movements to release stress, enhance functional skills, and boost goal achievement. See specific information about individual primitive and postural reflexes.

"Reflexes and developmental movements facilitate neurological integration which in turn increases functional ability."

David J. McGlown

Supporting Evidence: Primitive Reflex Integration Promotes Functional Skills

Gross Motor and Fine Motor Skills

Gross and fine motor abilities are important for a successful transition to formal schooling. A lack of gross and fine motor skills is associated with peer victimization (Øksendal et al., 2022) and may affect self-esteem resulting in withdrawal from physical activities (Missiuna et al., 2003 as quoted in Callcott, 2012). Deficits in gross motor skills in the early stages of life were associated with lower cognitive abilities at school-age; gross motor deficits also correlated with less ability in working memory and processing speed (Piek et al., 2008). Gross motor performance in infancy and early childhood was predictive of the levels of anxious and depressive symptomatology for children between the ages of 6 to 12 years; that is, low gross motor performance in infancy and early childhood was associated with higher levels of anxiety and depression by the time children reached school age (Piek et al., 2010).

Gieysztor et al. (January 2018) showed that the presence of retained primitive reflexes in healthy preschool children (between the ages of 4 to 6 years) had an impact on the children's psychomotor development. Psychomotor efficiency is necessary for many higher-level learning tasks. Even mild levels of retained primitive reflexes could have negative impacts on a child's psychomotor abilities (Gieysztor et al., January 2018). Another study focused primarily on handwriting issues:

> "Primitive reflex retention may interfere with handwriting development. In a cross-sectional study, we explored a possible relationship between reflex retention and handwriting difficulties among 74 children ages 7-9 years. We found that more children with handwriting difficulties had reflex retention, and reflex retention was associated with handwriting ability, after controlling for vision, implying a likely need to address reflex integration" (Richards et al., 2022, p. 1).

In a mixed methods study of 40 Australian Indigenous children (4.6 to 5 years), Callcott (2012) found that 65% of the children had a retained ATNR that was significantly associated with poor fine motor skills and delays in school readiness. School readiness was determined by evaluating fine motor abilities such as cutting with scissors, drawing figures, and copying. For those children with moderate to high levels of retained ATNR, teacher reports also revealed behaviors such as inattention, hyperactivity, and impulsivity (Callcott, 2012).

The innate movements of infancy drive the development of gross and fine motor skills (Utley, 2018). We can use these innate movements—such as primitive reflex integration activities—beyond the infant stages in order to mature the gross and fine motor skills.

Supporting Evidence from the Literature—Gross and Fine Motor Skills

The following case studies show improvements in gross and fine motor skills for children who received interventions involving primitive reflex integration.

Primitive reflex activities have been associated with improvements in balance and postural stability (Infante-Cañete et al., 2023; Jeong et al., 2021; Grzywniak, 2017; Niklasson et al., 2017; Wahlberg & Ireland, 2005). One of the most foundational gross motor skills is the ability to balance and attain stability—this is a marker of vestibular maturity. In a recent study, 443 students performed primitive reflex integration activities 3–5 times a week for 7 months. A control group of 63 children attended only regular PE lessons. Compared to the control group, the children who participated in the primitive reflex integration activities

achieved statistically significant improvements in both their primitive reflex profile and their vestibular maturity as measured by both static and dynamic balancing tasks (Stephens-Sarlós, 2024).

For children between the ages of 6 and 11, Grzywniak (2017) used a primitive-reflex based intervention for 12 to 14 months and found statistically significant improvements for the experimental group in body balance, motor coordination, and visual-motor skills compared to children in a control group.

Niklasson et al. (2017) hypothesized that children (from the ages of 5 to 13 years) with DCD could reach the level of their normally developing peers on sensorimotor skills tests after undergoing sensorimotor treatment. Part of the initial assessment included scores for retained primitive reflexes (RPR) among other motor skills tests. Additionally, primitive reflex movements were used as a part of the therapeutic treatment plan for the children with DCD. This research supported the idea that RPR were associated with DCD and that the use of movements designed to integrate primitive reflexes could be part of an overall plan of care to help developmentally delayed children catch up to the level of functioning of their non-delayed peers. Strengths of this study included the use of comprehensive, individualized movement programs lasting 36 months, with post-tests done three months after the end of the treatment. The study design showed that maturity alone did not account for the observed changes. The treated children also improved in behavioral measures according to before-and-after surveys from parents and teachers.

Brown (2010) evaluated a program with 65 preschool children, comparing a primitive reflex-based movement intervention to a control intervention, to determine the impact on the children's fine motor skills. The results from the study provided evidence that the primitive reflex-based movement intervention had a significant effect on improving the children's fine motor skills.

Tools from the Brain and Sensory Foundations course appear to greatly enhance gross and find motor skills as seen in the following case studies.

5-Year-Old Boy with ADHD Gains Improvements in Behavior, Focus, and Fine Motor Skills

Constant fidgeting, attention issues, and fine-motor skills were some of the challenges this 5-year-old boy was facing. Find out how his OT introduced Innate Rhythmic Movements and primitive reflex integration from the Brain and Sensory Foundations course and, over the course of 16 sessions, saw significant improvements with all of these issues.

Submitted by Ingrid King, MScOT, BOT

Before	After
Could not maintain focus or sit for class mat times; fidgeted	Can now sit for longer periods
Tended to resist adult directions	Progressing significantly in following adult directions
Primarily engaged in parallel play	Plays cooperatively with other children more often
When playing, would become upset, throwing or knocking things over	No longer knocking down or throwing things at school
Unable to catch a large ball with both hands	Can catch a large and smaller ball with two hands
Swapped between right and left hands	Using his right hand more consistently
Used a fisted grasp when coloring	Intermittently uses a tripod grasp

Read the full case study.

7-Year-Old Integrates Reflexes and Becomes Proud of Handwriting

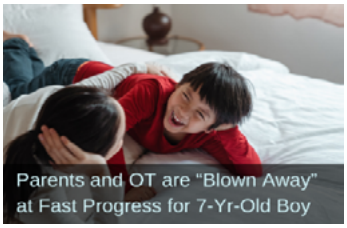
This young boy often refused to write due to fatigue, and had poor self-esteem. See how his therapist used Innate Rhythmic Movements, reflex integration, and the 5-Step Balance Process to completely change his experience with handwriting, and establish a more positive outlook on life. He also showed improvements in coordination and sensory processing.

Submitted by Nina Lechler, Occupational Therapy Assistant (OTA)

Before	After
Handwriting was very tiring; resistant to writing	Asking to write
Very unwilling to share his writing	Proudly showing written work to OTA
Negative self-perception	More positive self talk; able to state things more positively and recognize his own progress
Coordination challenges	Improvements in coordination and motor planning; movements are more fluid and intentional
Would squirm and wiggle away from touch	Experiencing less sensory discomfort and reduced tactile defensiveness

Read the full case study.

Head-Slapping and Thumb-Sucking Stop, While Fine and Gross Motor Skills Improve



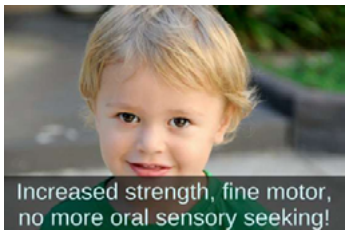
After just one week of Innate Rhythmic Movements, this 7-year-old made significant gains in fine motor ability and reduction of injurious behaviors. Three weeks later, with the addition of the Tonic Labyrinthine Reflex, all head-slapping and thumb-sucking had stopped, his writing improved, and his gross motor stamina increased dramatically.

Submitted by Natalie Green MOT, OTRL

Before	After
Exhibits head-slapping behavior that has not decreased with numerous types of treatments and sensory strategies	No longer head-slapping
Had been working on crab-walk for over a year, and had only been able to go for 30 feet	After 4 weeks, can now crab walk for 75 feet without any assistance
Would suck thumb to self-soothe	No longer thumb-sucking
Simple hand writing tasks would often take a full session to complete	Attending to fine motor tasks with better attention and writing with better accuracy

Read the full case study.

OT Stunned by 4-Year-Old's Progress



This little boy was in the 1st percentile for fine motor, demonstrated poor strength and gross motor functioning, and frequently put things in his mouth—including his thumb. After receiving movements from the Brain and Sensory Foundations course, he showed great gains in drawing and using scissors, could crawl properly, and all oral-seeking behaviors completely stopped!

Submitted by Ilene Miller, Occupational Therapist

Before	After
Poor fine motor skills	Now able to connect interlocking tools; able to easily pick up a small stick to use colored scratch art; using 3-fingered grasp; scissor cutting dramatically improved
Poor gross motor skills	Can now commando crawl consistently utilizing reciprocal movement of his left and right legs; able to hold his arm in space; able to crawl 10 feet while holding a stuffed animal under his chin
Would pick up items from floor, such as hair and string, and put them in his mouth; sucked thumb	Oral sensory seeking completely stopped!
Poor upper body strength	Increased upright posture when sitting

Read the full case study.

5-Year-Old Develops Attention and Fine Motor Skills

This preschooler's enjoyment of the playful developmental movements taught in the Brain and Sensory Foundations program increased his participation and success. Read about his improvements in a range of issues.

Submitted by Jessica Ullmann, OT, Colorado

Before	After
Limited attention span and focus	Increased ability to focus
Unable to sit still	Needs fewer verbal cues to stay seated
Mixed dominance	Starting to show right-hand dominance
Avoids working with tools such as pencils, crayons, scissors	Increased fine motor skills

Read the full case study.

Learning Disorders

The relationship between motor deficits and learning disorders has been well-established in scientific literature. According to the review study by Sigafoos et al. (2021), detection of unintegrated (retained) primitive reflexes (RPR) in children could signify a developmental or neurological problem that could impede learning, and the researchers recommended early and regular assessment of primitive reflexes in children.

Feldhacker et al. (2021) found that for typically developing children between 5 and 7 years of age, the presence of RPR were significantly associated with poorer scholastic performance in both boys and girls. In boys, RPR were associated with lower scholastic performance in reading, math, written language, and spelling. For girls, RPR correlated with lower math and reading scores. Feldhacker et al. (2021) concluded that primitive reflex screening could be useful for occupational therapists in the course of holistic client care.

Goddard Blythe (2001) concluded that a cluster of RPR could be a contributing factor in cases of dyslexia. The 54 children (8 to 15 years of age) in the Goddard Blythe (2001) study were independently diagnosed with dyslexia and had not improved with standard remediation methods. Goddard Blythe (2001) found that RPR in these children were significantly correlated with poor postural control, motor difficulties, visual challenges, and dyslexia. In particular, two RPR—Tonic Labyrinthine Reflex (TLR) and ATNR, were found in 100% of the children with dyslexia (Goddard Blythe, 2001).

In a causal-comparative study, 126 middle-school children between the ages of 10 and 13 years were assessed for two RPR, measured using inter-rater reliability. The results showed that 50% of the children in a Minnesota public school setting had RPR (Oliver, 2020). When comparing the children with and without RPR, academic scores were lower in both math and reading for the children with RPR. There were statistically significant differences in math achievement between students with and without persistent ATNR and Symmetrical Tonic Neck Reflex (STNR). The reading scores were also lower in the group with RPR, though were just under statistical significance, possibly because the older children in the study may have had more access over the years to remedial reading support (Oliver, 2020).

McPhillips and Jordan-Black (2007) found further evidence of the association between RPR and learning disabilities. They assessed a large cross-sectional sample (n = 739) of children (between ages 7 and 9 years) with and without dyslexia from mainstream schools of Northern Ireland. McPhillips and Jordan-Black (2007) revealed that persistence of the ATNR was significantly predictive of attainments in reading; the greater the level of ATNR retention, the lower the reading scores (McPhillips & Jordan-Black, 2007).

Supporting Evidence from the Literature—Learning Disorders

The following studies show improvements in gross and fine motor skills for children who received interventions involving primitive reflex integration.

Numerous studies have suggested that innate infant movements are an important factor in creating successful outcomes for children with learning challenges.

Because learning depends on auditory and visual skills, the following research is relevant: Stephens-Sarlós et al., 2025 created a sensorimotor program to study whether it could help to reduce unintegrated (retained) primitive reflexes and improve auditory and visual skills in children. Over 700 children participated in the study. Those children who received the sensorimotor intervention (3-5 times per week for six to eight months) were able to integrate their primitive reflexes and had significant improvements in auditory and visual skills compared to the control group.

Pérez-Rey et al., (2024) found that an 11-week program of rhythmic movements (six times per week, 10 to 15 minutes including rest between movements) was

associated with better balance and reading ability for children with dyslexia.

Grigg et al., (2023) used rhythmic movements and found that doing as little as five minutes per day, four times per week, integrated primitive reflexes and increased reading scores in school children, from ages six to eight years.

McPhillips et al. (2000) investigated whether RPR played a role in disrupting the development of reading in children with dyslexia, and whether the use of a primitive reflex movement program could help reduce reflex retention and improve reading. The study participants, between the ages of 8 and 11 years, were matched in terms of age, IQ, sex, spelling skills, reading assessments, and level of ATNR persistence. Participants were randomly distributed into one of three groups: Experimental, control, or placebo-control, and the study was double-blinded. McPhillips et al. (2000) found that by repetition of stereotypical infant primitive reflex movements, they were able to reduce the retention of ATNR; and as the level of ATNR persistence decreased, reading skills improved significantly in the experimental group.

Results corroborating McPhillip's study were found by Wahlberg and Ireland (2005) who used primitive reflex movements in children with reading disabilities between the ages of 7 and 11. Wahlberg and Ireland (2005) evaluated 22 reading-disabled students on a battery of assessments including three primitive reflexes, balance skills, eye movement skills, and fine motor ability. A headache questionnaire was also given. A portion of the treatment group was compared with a control group in an examination of reading fluency. Post-tests were given on the whole test battery after the treatment group had received nine months of a 10-minute movement program given on school days. The movements consisted of repetition of primitive reflex movement patterns. Wahlberg and Ireland (2005) used matched controls and a blinded design when assessing reading fluency. Post-tests revealed a reduction of primitive reflex persistence and statistically significant improvements in reading fluency, balance, and eye movements for children in the treatment group. Findings of this study were especially important because children receiving the movement program also showed a decrease in headaches.

In a study in Germany, movements based on early motor development and primitive reflexes were utilized to help elementary school children with learning challenges. The author found that as retained reflexes were corrected, oculo-motor functioning and reading skills improved (Bein-Wierzbinski, 2001, as quoted in Goddard, 2005). Jordan-Black (2005) conducted another study with 683 children between the ages of 6 and 11 years in two regular primary schools in Northern Ireland. The findings showed that when ATNR was retained, it interfered significantly with student scores in reading, spelling, and math. Jordan-Black (2005) found that the movement intervention, based on infant primitive reflex movements and the use of child-friendly songs and rhythms, "had a very significant impact on reducing the levels of ATNR persistence in children and that this was associated with very significant improvements in reading and mathematics, in particular (Jordan-Black, 2005, p. 101).

Goddard Blythe (2010) studied the impact of reflex integration on children between the ages of 4 and 6; all of whom had been previously identified as having literacy challenges. All children received the same educational support in reading, writing, and spelling. Half of the group received movements designed to mature primitive and postural reflexes. The control group received no intervention. Though the sample size was small, there was significantly greater improvement in the reading scores of children in the experimental group compared to the control group of children who did not participate in the daily movement program.

A study by Grzywniak (2017) determined the usefulness of primitive reflex movements for children ages 6 to 11 years who had learning difficulties. Children with learning difficulties participated, 54 in an

experimental group and 50 in a control group. The children received pre-tests and post-tests to assess the level of RPR, balance, visual perception, and auditory perception. The experimental group engaged in a primitive reflex-based movement program for 12 to 14 months. In comparisons of pre-test and post-test scores, the experimental group showed statistically significant improvement on all 21 tests. Parent and teacher interviews revealed that children were functioning better in school and home settings (Grzywniak, 2017). On 12 of 21 assessments, the control group also showed improvement. But when the 12 test scores were compared with those of the experimental group, the control group did not show the same level of improvement and the differences between the two groups were statistically significant. Grzywniak (2017) concluded that the movement program was effective and seemed to help learning-challenged children with a variety of other symptoms including emotional regulation, concentration, and coordination.

Research supports the idea that innate infant movements play a crucial role in creating successful outcomes for children with learning challenges. The case study summaries from students of the Brain and Sensory Foundations course also point to substantial gains in learning following the use of Innate Rhythmic Movements and Primitive Reflex Integration:

OT "Filled with Gratitude and Excitement"; Sees Profound Results for 6-Year-Old Boy

Innate Rhythmic movements and primitive reflex integration helped this 6-year-old boy improve many aspects of learning. Find out how this boy's spelling tests went from 64% to 100%. This case study shows how profound the effects of neurodevelopmental movements can be!

Submitted by Briana Dannecker, MS, OTR/L

Before	After
Deficits related to reading	Improved reading comprehension
Difficulties in school	Improved scores on assignments and exams
Inconsistent hand dominance	Demonstrates consistent right-hand dominance
Difficulties with handwriting	Improved formation, sizing, spacing, line placement, and directionality of uppercase letters
Inappropriate handwriting grasp	Utilizing an age-appropriate dynamic tripod grasp on writing tools
Often fixated on dislike, discomfort, or fatigue when writing	Increased motivation and stamina when writing, completing these tasks in less time with fewer breaks
Deficits related to attention	Improved attention span during all therapeutic tasks, including previously non-preferred activities
Poor eye contact	Improved eye contact
Poor conversational skills	Improved conversational skills

Read the full case study.

Therapist about 7-Year-Old Girl: "I Was Astounded by Her Quick Progress"

This little girl was struggling in and out of the classroom. A short attention span kept her from finishing tasks and she had difficulty reading, spelling, and writing. Doing school-work was exhausting, yet she had trouble sleeping. Meltdowns were frequent. After using the tools in the Brain and Sensory Foundations course, her therapist noted gains in focus, reading, handwriting, posture, emotional regulation, energy, and sleep.

Submitted by Anneli Tromp, Registered Biokineticist, South Africa

Before	After
Couldn't pay attention and focus to finish tasks	Definite improvement in focus and attention; completes tasks at school more easily and with less distraction
Difficulty in reading and spelling	Reading is more fluent
Struggled with handwriting; incorrect pencil grip	Writing and pencil grip are dramatically improved
Would have meltdowns when she couldn't get something right	Calmer when attempting homework that she doesn't immedi-ately understand; extreme fear of failure has decreased
Slouched at the desk	Posture is improved
Found reading tiring	Less fatigued when doing homework
Had trouble falling asleep	Sleeping better

Read the full case study.

4-Year-Old Boy—Not responding to Name, Becomes Able to Make Eye Contact, Learn, Sleep, Play

This parent was referred to the Brain and Sensory Foundations First Level course after both private and school-based speech therapy. Her son had severe communication challenges, as well as sleep, behavior, and fine motor challenges. In this case study, you'll see how 8 months of Innate Rhythmic Movements and primitive reflex integration helped him with his speech, eye contact, behavior, sleep, and more.

Submitted by Divya Jyothi, Teacher with Heartfulness Institute

Before	After
Trouble communicating; words would get stuck	Better able to use words for communication, even talkative
Messy handwriting	More flow to handwriting; words are straighter on the page
Would not try to draw	Now drawing recognizable pictures like cars and houses
Would scratch or hit if other children were not doing what he wanted	Can now talk to express what he wants; less frustrated when people can't understand him
Attention difficulties	Able to focus on games
Would get motion sick easily	Motion sickness almost completely disappeared
Would sleep very deeply but stay awake if wakened in the night	Wakes up in 2 or 3 calls and can go back to sleep within 5 minutes, which has resolved bedwetting issues
Could not learn more than one word or fact at a time	Now learns from whatever he watches or hears and is able to explain it what he has learned using his own words

Read the full case study.

From IEP to all As and Bs on Report Card

This 12-year-old girl had ongoing struggles with her expressive and receptive language, math skills, and social confidence. Using tools from the Brain and Sensory Foundations First Level course, her mom was able to help her improve her math scores, writing skills, and speech—to such an extent, she no longer needs speech therapy.

Submitted by Jennifer Davis, COTA/L

Before	After
Fearful of going anywhere in public without her mom	Able to visit the restroom on her own
Struggled with balance, skipping, hopping, and toe walking	Much less clumsy and has stopped running into things around the house; also shows improved gait pattern and stronger heel strikes
Struggled with writing fluency	Can write multiple paragraphs that are on topic, flow well, and use much more mature language and correct verb tense usage
Struggled with math	Scored an 'A' on a math test for the first time; also, mental math has improved significantly
Struggled with focus	Studying on her own without prompting, using much more mature language and vocabulary, and has all A's and B's on her report card
Required speech therapy since age 3	School speech pathologist says Reagan has met her goals for understanding and using analogies and idioms, Dismissed from speech therapy

Read the full case study.

Young Teen Finds Neuro-Movements Effective; Is Doing Them on His Own Now

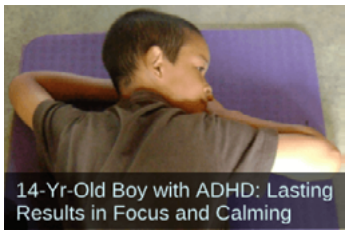
After two weeks of Innate Rhythmic Movements and primitive reflex integration, this mom saw improvements in her son's posture. After a month, his writing was more legible, his reading had improved, and he was no longer experiencing hand pain when writing.

Submitted by Arthi Gavatre, OTR/L

Before	After
Unable to maintain erect posture while sitting	No longer requires excessive verbal and tactile cues to correct posture
Continuously shook one or the other leg	Leg shaking is reduced
Illegible writing	Writing is more legible
Reading difficulty	Reading is improved
Experienced hand pain when writing, even after just 3-4 lines	No longer experiencing pain when writing

Read the full case study.

Focus and Calm Improve Homework, Learning, and Daily Tasks for Teen



This teenager was struggling with emotional regulation and focus. Read about his tremendous positive results using movements from the Brain and Sensory Foundations, First Level course. This boy's mother happily reported: "We found the exercises to have immediate and lasting results, especially for focus and calming."

Submitted by Laurie Bernstein OTR/L

Before	After
Difficulty reading	Reading fluency noticeably increased
Required 30-60 minutes of "self-talk" in order to fall asleep	Falls asleep quickly
Could not complete homework on his own	Able to complete his lessons by himself with good focus
Would complain about schoolwork	Complaints about schoolwork decreasing
Could not maintain sustained conversation	Now able to carry on a reciprocal conversation with his friends
Aversion to trying new foods	Has voluntarily asked to try two new foods

Read the full case study.

Sensory Processing Disorders, Anxiety, Emotional Dysregulation, and Social Impairments

Sensory processing disorders (SPD) impact how individuals respond to daily events and often co-occur with other challenges such as emotional dysregulation, anxiety (McMahon et al., 2019), and social impairments (Thye et al., 2018). Lane and Reynolds (2019) discussed research showing that sensory over-responsivity (SOR) can negatively impact participation in daily activities, and this was true for children without other diagnoses, as well as for children with diagnoses such as ADHD or ASD. SOR occurs in individuals who "experience sensations more intensely or for a longer duration than is normal, often resulting in 'fight or flight' behaviors" (Lane & Reynolds, 2019, p. 2). After examining children using both behavioral surveys and neurophysiological markers, Lane and Reynolds (2019) found a relationship between SOR and anxiety in both typical children and in children with ADHD. Their study indicated that SOR could be one cause of anxiety in children (Lane & Reynolds, 2019). For children who had both SOR and ADHD, there was a greater incidence of clinically significant anxiety (Lane & Reynolds, 2019). Amos et al. (2019) found SOR was a mediating factor between autistic traits and anxiety.

In a systematic review, Ghanizadeh (2011) found that sensory processing challenges were more common for children with ADHD than for typically developing children. Sensory processing problems were more severe in children who had both anxiety and ADHD symptoms (Ghanizadeh, 2011). Sensory disorders are also recognized as a core symptom of ASD (Thye et al., 2018; Baum et al., 2015).

Sensory problems in children may affect social behaviors. Ben-Sasson et al. (2009) found that children with SOR had more social-emotional problems and were less socially skilled than children without SOR. In their systematic review, Thye et al., (2018) also

identified links between sensory disorders and social deficits in children with ASD.

SPD does not seem to go away with the passage of time (McMahon et al., 2019; Ben-Sasson et al., 2017). Sensory disorders in childhood were associated with poor emotional regulation leading to a greater likelihood of anxiety disorders in adulthood (McMahon et al., 2019).

Supporting Evidence from the Literature—Sensory Processing Disorders, Anxiety, Emotional Dysregulation, and Social Impairments

Pecuch et al. (2020) studied the effects of retained primitive reflexes (RPR) on sensory functioning in healthy preschool children between the ages of 4 to 6 years. They found a significant correlation between the level of RPR and "sensory disorders such as dyspraxia, sensory-vestibular disorders, and postural disorders" (Pecuch et al., 2020, p. 1). For children having only one RPR, there was not an associated relationship to sensory disorders, however, when a cluster of reflexes were found in the same individual, it was significantly associated with sensory challenges (Pecuch et al., 2020).

Sensory disorders and anxiety have been strongly associated with certain types of ADHD (Lane & Reynolds, 2019). Likewise, children with ASD have sensory disorders (Ben-Sasson et al., 2007), and in a meta-analysis, van Steensel & Heeman (2017) found that children with ASD had elevated anxiety compared to typically developing children. Another commonality between ADHD and ASD appeared to be the presence of RPR at high rates of occurrence (Holmes et al., 2016).

In the discussion of Sensory Processing Disorders (SPD), it is important to highlight the balance sense because it is foundational to many other sensory systems and to overall functioning. When balance is poor in children, it is associated with anxiety (Bart et al., 2009). Anxiety has been directly associated with retained primitive reflexes (Carter, 2020; Forrest, 2002) as has poor balance (Grzywniak, 2017).

A sensory-motor intervention for improving balance had the effect of lowering children's anxiety and boosting self-esteem (Bart et al., 2009). Balance dysfunction was found to be common in ADHD (Bob et al., 2021; Kim et al., 2017; Iwanaga et al., 2006; Zang et al., 2002) and in ASD (Odeh, 2022; McPhillips et al., 2014). Co-morbid conditions—SPD, anxiety, ADHD, ASD, and balance challenges—are all associated with the presence of unintegrated primitive reflexes.

In the discussion about the co-occurring challenges of balance, anxiety, ADHD, and ASD, the following two studies are important:

- Stephens-Sarlós (2024) showed an increase in vestibular functioning (measured by balance tasks) in children after using primitive reflex integration.
- After primitive reflex integration with school children, Grzywniak (2017) found statistically significant improvements in body balance, motor coordination, and visual-motor skills compared to children in the control group.

Thye et al. (2018) concluded that sensory-based interventions might be helpful for individuals with ASD. Since movements provide sensory stimulation, motor interventions hold promise for individuals with ASD, especially if the intervention results in improvements in balance. Researchers have found that sensory stimulation such as that available with movement intervention can have positive effects for children with ADHD (Hirose et al., 2025; Melillo et al., 2020) and with ASD (Hirose et al., 2025; Masgutova et al., 2016; Cheldavi, 2014).

Tools from the Brain and Sensory Foundations courses appear to be exceptionally helpful for resolving sensory issues, anxiety, and for boosting emotional regulation as seen in the following case studies.

Severe Anxiety and Sensory Issues Transform with Neurodevelopmental Movements

This young girl struggled with anxiety and emotional issues—frequent tantrums, easily frustrated and irritated, and difficulty getting along with siblings. After 8 months of neurodevelopmental movements, she no longer experiences major emotional meltdowns, and her relationships with her siblings are much improved. See how her mom tailored the movements for her daughter to get great results.

Submitted by Alycia Marsh, Parent and former Nurse Practitioner

Before	After
Difficulty managing emotions; frequent tantrums	No more tantrums
Poor handwriting	Handwriting improved significantly after only two months
Separation anxiety when mom left the house, even for a short time (e.g., to take out the garbage)	No longer experiences separation anxiety
Anxiety-related stomachaches	No more stomachaches
Hypersensitive to loud noises	Feels less stress response to loud noises
Would sometimes have to leave school early due to anxiety	No anxiety-related absences for an entire school year

Read the full case study.

Pushing, Hitting, and Biting Diminish

This adopted boy had severe sensory and behavior issues: many smells made him gag, he often wore noise-cancelling headphones, and he frequently bit, hit, or shoved anyone around him. He had a 1-2 minute attention span, poor sleep, and was generally anxious. His OT used Innate Rhythmic Movements and reflex integration tools from the Brain and Sensory Foundations course, and saw great improvements in all areas!

Submitted by Jennifer Everett, OTR

Before	After
Extreme fear of going into public bathrooms without noise-cancelling headphones	Doesn't need to wear noise-cancelling headphones
Frequent gagging due to smell	Smells are no longer an issue
Would frequently not respond to name being called, despite having been tested by audiologist with normal results	Significant improvement to answer name when called (still needs work)
Only had a 1-2 minute attention span for play dough, trucks, helping with chores, or even helping mixing treats	Increased attention for playdough, cutting, chores, table-top activities
Tense in public situations, often "on-guard," anxious about school	No longer on-guard all the time; loves school
At school, was aggressive, would shove and bite, and would not "calm down"	Teachers have not noticed any behavior issues

Read the full case study.

Reflex Integration Leads to Eye Contact and Socializing

This preteen with severe social anxiety didn't like to leave the house, even to see familiar people and places. She could not make eye contact, and her legs would shake uncontrollably during conversations. By integrating her reflexes and using the 5-Step Balance from the Brain and Sensory Foundations course, she resolved these issues and was able to reconnect with friends as well as participate in a baking class.

Submitted by Christine Siu, M.Sci., M.Psy.Med., Registered Clinical Counsellor

Before	After
Avoided all eye contact	Able to initiate eye contact
Extreme anxiety in social situations	Less anxiety when talking to people, and able to hang out with friends
Response to fear was to cry, legs would shake, and she would bite her fingers	No more crying, shaking, or finger biting in response to fear
Unable to go out of the house	Requesting to attend a basketball camp and a baking class

Read the full case study.

Young Man Reduces Anxiety and Improves Sleep, Focus, and Academic Performance

This young man with autism and ADHD experienced significant social anxiety, difficulty with academic and functional tasks, and poor sleep; leading to concerns about attending college. Using Innate Rhythmic Movements and reflex integration from the Brain and Sensory Foundations course, he showed great improvements in all areas and successfully started college.

Submitted by Theresa Williams OTR/L

Before	After
Extreme anxiety when interacting with occupational therapist	Able to carry on a conversation with the occupational therapist without evidence of anxiety or stress
Extreme anxiety interacting with anyone other than his parents	Used the 5-Step Balance process to prepare for a successful meeting with a professor, without a parent present
Required daily naps	No longer falls asleep during the day
Frequent and multi-hour night-time wake-ups	Experiences more typical night-time sleep/wake cycles
Many years of struggle with academics and piano	Pronounced improvement in academics and piano over a 10-week period

Read the full case study.

5-Year-Old Gains Sensory Integration and Motor Planning

This case study describes a 5-year-old child with low muscle tone, extreme sensitivity to sounds, and motor planning challenges. After her OT used rhythmic and developmental movements to integrate retained primitive reflexes, this child experienced meaningful improvements in movement sequencing, self-regulation, and sensory integration.

Submitted by Monica Carlson, MOT OTR/L

Before	After
Required assistance and multiple trials for motor planning when moving from quadruped > half kneel > standing	Moves through these steps with SBA [Safety-Behavior Availability] only, fair trunk rotation, and no extra time needed to plan the sequence
Exhibited strong fear responses to sounds like rain and the dishwasher	Improved tolerance to auditory input

Read the full case study.

Extreme Sensitivity, Motor Skills, and Social Skills Improve

This young boy's sensory sensitivities interferred with using public restrooms or going to the barber, and the house being vacuumed was a highly stressful experience. His difficulties with balance and motor skills were severe enough that he could not perform ADLs such as dressing himself. After doing Innate Rhythmic Movements and reflex integration from the Brain and Sensory Foundations course, he became much more regulated and independent.

Submitted by Terran Daily, Occupational Therapist

Before	After
Screamed and cried about going into public restrooms because of the hand dryers	Able to use some less forceful hand dryers
Significant problems with motor skills and self care	Can now dress himself, apart from some closures, and can even unbutton his own shirt
Wouldn't let the barber get near him with a buzz cutter	Able to tolerate the buzz cutter on his entire head
Could not tolerate the sound of a vacuum cleaner	Now he's the one vacuuming!
Unable to balance on one leg or hop	Can balance up to 10 seconds on one leg and hop 15+ times
Unable to isolate finger movements and held his pencil in a dagger grasp	Can touch each fingertip to his thumb, and he holds his pencil in a good tripod grasp
Could not sit at circle time for more than 30 seconds without being a disruption	Can participate in group activities for 30-40 minutes, taking turns, following instructions, and respecting other children's space.

Read the full case study.

Reflex Integration Alleviates Hypersensitivities and Anxiety

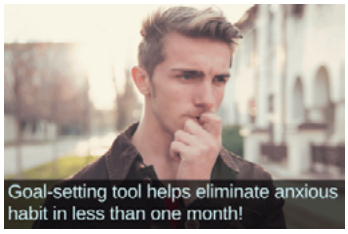
This little girl with autism showed dramatic improvements after receiving Innate Rhythmic Movements and reflex integration from the Brain and Sensory Foundations course: she now sleeps through the night, tolerates sensory input, participates in class without anxiety, transitions well, and no longer throws tantrums!

Submitted by Kendel Knudson OTD, OTR/L

Before	After
Trouble sleeping; had to be with mom and sitting up, frequent wake-ups	Now falls asleep at a normal hour, in her own bed, and sleeps through the night
Hypersensitivity of all senses	No longer bothered by smells; no longer startles at loud noises or light
Anxious, particularly going to school	Able to speak in front of the class and participate in group activities without anxiety
Frequent meltdowns and difficulties transitioning between activities	No more tantrums

Read the full case study.

Nail Biting Stops after Neurodevelopmental Movements



This college student with chronic anxiety had been biting his nails for years. He experienced a variety of emotional regulation, sensory-motor, and academic issues, with traditional interventions providing little relief. Once his occupational therapist implemented movements from the Brain and Sensory Foundations program, he quickly made tremendous gains—including completely stopping all nail biting!

Submitted by Jenna Duvall, OTR/L, ACN

Before	After
Struggled with nail biting for years	No longer biting his nails
Messy handwriting	Improved handwriting
History of anxiety and frequent feelings of overwhelm	Less anxious
Low tolerance for stress	Managing stress better
Difficulty managing changes to his routine	Increased adaptability to changes in routine
Poor focus	Better attention span
Bouts of aggressive behavior, emotional outbursts	Enhanced emotional regulation and decrease in aggressive outbursts
Poor upper extremity strength and posture	Improved upper extremity strength and posture

Read the full case study.

Attention, Opposition, and Behavior Regulation

Abilities such as maintaining attention and regulating behavior are precursors to joint attention, communication, and learning. It is likely that a lack of attention and an inability to regulate behavior are signs of neuromotor immaturity. Konicarova et al. (2013) described retained (unintegrated) primitive reflexes as "one of the most important postnatal developmental deficits" (p. 1457) because of their influence on higher level motor abilities and cognition, and because past studies showed unintegrated primitive reflexes were associated with neuropsychiatric disorders. Konicarova et al. (2013) examined the extent to which two RPR were present in 35 medication-naïve girls with ADHD (between the ages of 8 and 11), compared to an age-matched control group of 30 girls without ADHD. Results revealed that RPR were closely linked to ADHD symptoms including anxiety, impulsivity-hyperactivity, learning problems, and perfectionism. Interestingly, the impulsivity-hyperactivity was related to muscle tension that Konicarova et al. (2013) reasoned might lead to problems sustaining attention. This is noteworthy because the presence of RPR generated excess, suboptimal muscle tension in a study of 5-year-old school children (Gieysztor et al., 2020). It is reasonable then that reducing the levels of RPR, which has been shown to be possible with movement intervention (Goddard Blythe et al., 2022), might also help reduce muscle tension and improve attention.

Other researchers have corroborated the link between RPR and ADHD. In a 2004 study featuring boys between ages 7 and 11 years, the authors found that, "Boys diagnosed with AD/HD had significantly higher levels of reflex retention than non-diagnosed boys" (Taylor, et al., 2004, p. 23). Results from two more studies showed that ADHD symptoms were closely linked to RPR in boys and girls between the ages of 8 and 11 years. In the first study, Konicarova and Bob (2012) measured the infant Moro Reflex and Spinal Galant Reflex and compared these in children with ADHD and children without ADHD. In the second study, ATNR was measured in children with ADHD and age-matched controls. Both studies found that children with ADHD had a higher occurrence of RPR compared to controls, and that ADHD symptoms seemed linked to unfinished developmental processes (Konicarova & Bob, 2013; Konicarova & Bob, 2012). Other researchers expressed the same conclusion: "The association between persisting primitive reflexes and [poor] motor skills suggests that ADHD symptoms may represent a compensation for unfinished developmental phases related to declining reflexes" (Rathod et al., 2024, p. 2170).

Within the realm of behavior regulation, Hickey and Feldhacker (2022) found that the activity of certain RPR among males in preschool was significantly associated with opposition/defiance (retained ATNR) as well as with inattention (retained Moro Reflex). They noted that: "The findings of this study support prior research which indicates a need for early screening of primitive reflexes as client factors which could impact occupational performance" (Hickey & Feldhacker, 2022, p. 1).

Taylor et al. (2020) noted that children with various psychosocial problems, also called emotional and behavioral difficulties (EBD), experienced co-occurring challenges such as family disruption, ADHD, poor literacy, and motor deficits. They designed a study to see if there were significant differences in motor skills among children with EBD versus children without EBD. Taylor et al. (2020) measured the levels of ATNR retention, a marker of neurodevelopmental delay, and gained insight into the impact of retained ATNR on EBD. Motor skills and ATNR were measured in EBD and non-EBD groups in the context of co-occurring issues such as family disruption, ADHD, and poor literacy. They suspected that motor difficulties were among the factors involved in severe EBD, and their study showed the relative impact of motor difficulties even after taking into account co-occurring factors involved in EBD. Results were statistically significant showing that motor skill deficits and the presence of ATNR were each independent predictors of EBD in

children, even after correcting for the influence of the co-occurring problems associated with EBD.

Further Supporting Evidence from the Literature—Attention and Behavior Regulation

A series of studies concluded that symptoms of ADHD are associated with a delay of normal brain maturation (Sripada, et al., 2014; Rubia, 2007; Shaw et al., 2007). Basic body functions appear delayed in ADHD also. Studies of children with ADHD have confirmed developmental delays in motor-skills, balance, postural control (Bob et al., 2021; Konicarova et al., 2014; Iwanaga et al., 2006), and rhythmic ability (Gustafsson et al., 2023).

Since the innate movements of infancy drive brain growth and maturation in early life, it is reasonable to assume that these same innate movements promote brain growth and maturation later in life and therefore can help with ADHD symptoms. In an effort to determine whether a combined program of Innate Rhythmic Movements and reflex integration was effective for helping with motor deficits and neurodevelopmental challenges in children from birth to 18 years, Gazca (2012) used an online survey of 79 Rhythmic Movement Training (RMT) practitioners. The RMT practitioners consisted of therapists, parents, and educators who had been using the RMT program with children for at least three months. For five of the six ADHD-related items on the survey, between 82% and 92% of Gazca's respondents agreed or strongly agreed that RMT was effective for helping with ADHD symptoms. In addition, approximately 75% of respondents agreed or strongly agreed that RMT was effective for sensory sensitivities to touch and motion. High agreement from the respondents (94.8%) indicated that RMT was effective in reducing muscle tension. This is significant because muscle tension is a known element of primitive reflex activity (Gieysztor et al., 2020) and is associated with hyperactivity and impulsivity (Konicarova et al., 2013). In Gazca's RMT study, over 87% of respondents indicated that RMT was effective for reducing anxiety (87.5%) and hyperactivity (87.5%), both of which are commonly found in ADHD (Gair et al., 2021; Schatz & Rostain, 2006).

The assessment and intervention activities from the Brain and Sensory Foundations course appear to help children overcome challenges with inattention and behavioral issues, as seen in the following case studies.

Movement Helps Sensory & Behavior for 9-Year-Old

Innate Rhythmic Movements made a big difference for this boy who had an under-responsive sensory system, challenges with self-regulation, and difficulty attending to academic tasks.

Submitted by C.S., Occupational Therapist

Before	After
Poor body awareness and coordination	Improved coordination and gross motor movements
Under-responsivity to vestibular and proprioceptive input	Improved balance; using more appropriate force in play with peers
Difficulty self-regulating	Increased self-control throughout the day; better attention in therapy and academics

Read the full case study.

Case Study submitted by H.S., OTR/L

Full case study is contained in the graphic below (emphasis added).

Help for Behavior Issues

"I had one of my patients begin doing the rhythmic movements 6 weeks ago. This child is 8 years old and attends a special school for emotionally and behaviorally challenged children that can't attend regular public education. When he gets frustrated at school, it typically results in a major melt down with hitting, throwing desks and chairs, and yelling. He has had 4-5 adults holding him down on the floor at times. **This boy has not had hardly any behavior or emotional outbursts like I described since he has started doing the rhythmic movements at home or at school.** He has already **made great gains with balance, coordination, sensory processing, impulse control, and frustration tolerance and it has only been 6 weeks. Amazing!!"**

15-Year-Old Girl with Autism Gains Communication, Coordination, and Overcomes Meltdowns

Coordination, communication, and meltdowns were all struggles for this 15-year-old autistic girl. See how Innate Rhythmic Movements and primitive reflex integration helped with all of these issues.

Submitted by D.P., OTR

Before	After
Poor bilateral coordination	Significant improvement in coordination
Difficulty expressing herself through verbal communication	Communicating better; much more expressive
Would punch and kick her sister and her sister's boyfriend; required to be separated	Spotted sitting with her sister and her sister's boyfriend, laughing and talking
Significant meltdowns related to transitions, especially when going to choir	Now able to go to choir without resistance

Read the full case study.

Improvements in Self-Regulation, Controlling Anxiety, and Fine-Motor Skills!

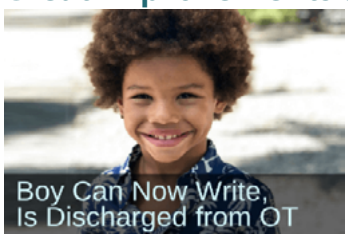
Daily headaches after preschool had this 4-year-old's mother worried. After using tools from the Brain and Sensory Foundations course, his mother assessed his retained reflexes, and worked with him to resolve his headaches—in addition to addressing his social-emotional regulation, sleep issues, anxiety, and fine-motor skills.

Submitted by Kendra Browder, OTR/L

Before	After
Extreme meltdowns; easily triggered	No more "rage episodes"
Struggled participating in daily routines	Less resistant to daily routines
Frequently ran into walls/doorways	No more running into walls
Gross/fisted grip	Uses a quadruped grasp
Unknown hand dominance	Consistently right-hand dominant
Could not sit still	Able to sit and focus on tasks
Unable to track smoothly through midline	Can now track smoothly through midline
Frequent wake-ups	Now sleeping through the night
Daily headaches	No more headaches
Unable to calm himself	Uses calming strategies to self-regulate

Read the full case study.

Boy with ADHD Symptoms Gains Emotional Regulation, Focus, Great Improvements at School



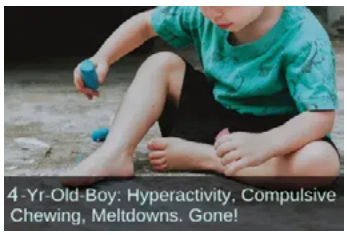
This young boy exhibited functional and expressive writing challenges, attention deficits, and poor self-regulation. After 7 months of traditional OT services, he had not made any significant progress. His therapist began doing Innate Rhythmic Movements and reflex integration, and he quickly became calmer, better coordinated, and more focused. He was also able to engage in creative writing with proper spacing and spelling!

Submitted by Lisa Van Heukelom, OTR/L

Before	After
Difficulties with pencil grasp, expressing ideas through writing, and copying words from the board.	Able to think of a topic to write about and produce at least four sentences with correct word spacing, spelling, and no letter reversals.
Difficulties sitting still and following directions.	Able to sit and attend to lessons in his class.
Big emotional outbursts toward sister and bus-mates.	Emotional regulation has improved; calmer at home and at school.
Started occupational therapy in February 2018, with little to no results for the first 7 months of treatment.	Saw positive changes after starting Innate Rhythmic Movements and reflex integration; has met all OT goals, and will be discharged from OT.

Read the full case study.

4-Year-Old Boy: Hyperactivity, Compulsive Chewing, Meltdowns. Gone!



This 4-year-old with autism experienced an array of learning, motor, behavioral, and emotional challenges; as well as compulsive chewing of non-food items. With the rhythmic and reflex integration movements from the Brain and Sensory Foundations course, he made tremendous progress in all areas.

Submitted by Kendel Knudson OTD, OTR/L

Before	After
Difficulties sitting still	Much less hyperactive
Chewed on things (blinds, curtains, toys)	No longer chews on non-food items
Unable to follow directions	No longer requires a visual schedule
Difficulties transitioning	Now able to transition easily between activities
Scribbled aimlessly	Coloring is more organized
Frequent meltdowns	Fewer meltdowns
Unable to maintain a tripod grasp	Can maintain a tripod grasp for ~5 minutes
Difficulty imitating lines, shapes, and block patterns	Can imitate horizontal/vertical line, circle and cross, and write name
Poor core strength	Improvements in core strength and ability to lift head

Read the full case study.

Walking and Toe Walking Remediation

The ability to walk is fundamental to engagement in daily life activities for nearly all children and adults. The development of walking gait begins in early infancy and is contingent on a variety of sensory-motor inputs over time. The innate movements of infancy—including primitive reflex movements—appear to be key in providing the sensory-motor inputs for developing our movement capabilities (Preedy et al., 2022). When these sensory-motor inputs are lacking, or disrupted in early life, it often results in motor deficits. For example, as mentioned earlier, Gieysztor et al. (2020) found that the presence of a retained ATNR in young boys and girls was associated with pelvic asymmetries and irregular walking gait.

Researchers found that abnormal gait patterns were also common for individuals with autism (ASD), and having an abnormal gait was associated with social impairments (Gong et al., 2020). In children with autism, toe walking was associated with a retained Tonic Labyrinthine Reflex (Accardo & Barrow, 2015).

Researchers studying children ages 5 to 9 concluded that integration of primitive reflexes could be helpful in the treatment of scoliosis and posture defects (Gieysztor et al., 2018) which could in turn have a positive influence on walking gait. Using the innate IRM and reflex movements from the Brain and Sensory Foundations course appears to help establish proper walking gait and to remediate some instances of toe walking, as seen in the following case studies.

Teen Boy With Severe Toe Walking Sees Extreme Improvement

This teenager was facing surgery to correct his chronic toe walking, and had issues with regulation and behavior management. His occupational therapist gave him Innate Rhythmic Movements from the Brain and Sensory Foundations course, and in one month he experienced huge changes.

Submitted by KJM, Occupational Therapist

Before	After
Toe walking so severe that surgery was being considered	Returned to normal walking
Tendency toward hyper-excitability	Extreme reduction in need for behavior management

Read the full case study.

Chronic Toe Walking Resolves, Emotional Regulation Improves

This child was referred to occupational therapy for several issues, including severe toe-walking and difficulty regulating emotions. Standard coping and sensory integration methods weren't helping enough. See the great improvements that resulted when his OT introduced Innate Rhythmic Movements and primitive reflex integration.

Submitted by A.H., Occupational Therapist

Before	After
Chronic toe-walking, to the point that leg braces were necessary	No longer walking on toes; leg braces no longer required
Difficulty regulating emotions	Dramatic improvement in emotional regulation
Signs of fatigue with "superman" exercises	Better stamina

Read the full case study.

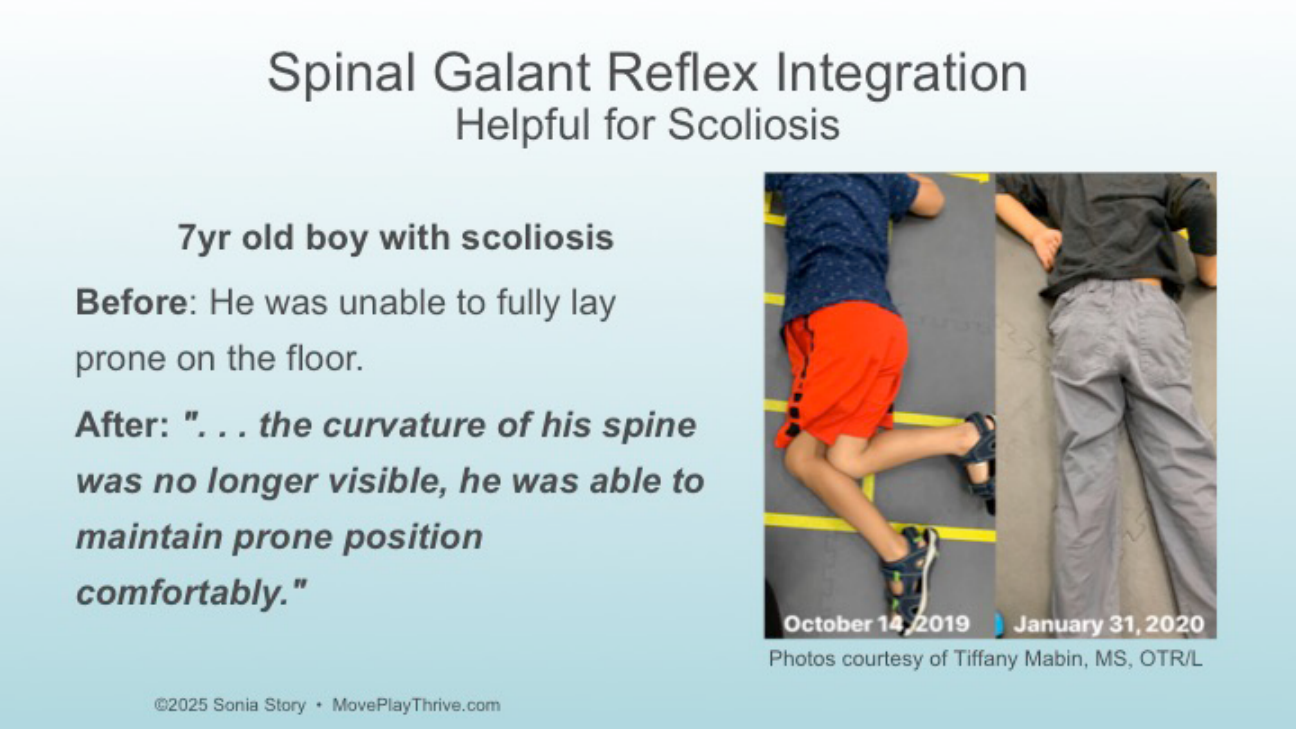
Scoliosis

While there are many possible contributing factors in scoliosis, when the Spinal Galant Reflex is unintegrated on one side, it is associated with scoliosis (Sharma & Saxena, 2024; Gieysztor et al., March 2018; Ferrari et al., 2010) and with issues involving posture and gait (Goddard, 2023).

The photos below show a child with scoliosis who could not comfortably be flat on the floor in prone. His occupational therapist used the Innate Rhythmic Movements and Spinal Galant Reflex integration from the Brain and Sensory Foundations, First Level (Part 1) course to help him. In 3.5 months he showed major improvements. His OT reported:

> "…curvature of his spine was no longer visible, he was able to maintain prone position comfortably." (Tiffany Mabin, MS, OTR/L)

This OT's experience with this boy is supported by researchers who concluded that integration of primitive reflexes in children ages 5 to 9 may be helpful in the treatment of scoliosis and posture defects (Gieysztor et al., March 2018). Vlădăreanu et al. (2025) concluded that primitive reflex testing and integration are likely useful for the prevention and rehabilitation of idiopathic scoliosis.



Photos courtesy of Tiffany Mabin, MS, OTR/L

Visual Skills

Human beings are innately wired to develop our visual systems in infancy. In fact, visual skills cannot fully mature without sensory-motor input from the infant primitive and postural reflexes plus other neurodevelopmental movements (Domingo-Sanz, 2024; Gessel, 1952).

For most human beings, daily activities require extensive visual processing. While all of our sensory systems are highly complex, human vision outranks other sensory systems in terms of its intertwined sensory, motor, autonomic, and higher cortical connections (Gesell, 1952). As Gesell (1952) describes, the [asymmetrical] tonic-neck-reflex pattern (ATNR) is one of the important primitive reflexes that helps develop the eye-hand-brain complex (Gesell, 1952).

Along with ATNR, many primitive reflexes support visual skills development throughout infancy and early childhood. Marusich (2002), a developmental optometrist, explains that poor integration of early infant reflexes can be the basis of deficits in ocular movement, binocularity, accommodation, and visual performance.

When there are visual skills deficits, neurodevelopmental movements appear to be very effective for remediation. For example, numerous researchers have shown that school-age children with visual challenges show significant improvements in visual skills (Domingo-Sanz, 2024, Domingo-Sanz, 2022) and in reading scores (Pérez-Rey et al., 2024; Jordan-Black, 2005; Wahlberg & Ireland, 2005; McPhillips, et al., 2000), when they are given specific sensory-motor activities for primitive reflex integration. The following case studies from participants in the Brain and Sensory Foundations, First Level course are in alignment with the research showing considerable advancement in visual skills through the use of neurodevelopmental movements.

Skeptical OT Convinced by "Profound Success" in Short Time Frame

Here is an example of how an initially skeptical OT helped her 8-year-old client. This little boy struggled for years with poor handwriting and difficulty attending to structured tasks, but saw profound improvements through neurodevelopmental movements in just five sessions.

Submitted by Jessica Rilee, OTD, OTR/L

Before	After
Struggled for years with poor handwriting, despite trying many traditional strategies such as special pencil grips and chair cushions.	Experienced remarkable improvement in confidence and fluidity during handwriting tasks; achieved "above average legibility" on a handwriting assignment.
On a vision performance screen, visual tracking was equivalent to a 5-year-old, an approximate 3-year delay.	On a vision performance screen, this 8-year-old performed at the speed and accuracy of a 10-year-old

Read the full case study.

Struggles with Visual Memory, Hand-Eye Coordination, and Writing All Ease for 8-Year-Old Girl

This little girl struggled with many tasks. Find out how, through the use of Innate Rhythmic Movements and primitive reflex integration, she drastically improved visual memory, the ability to track objects, handwriting skills, and posture.

Submitted by Sue Lapp OTR/L

Before	After
Sat on knees with head bent forward	Sitting posture improved
Walked with head far forward	Better able to maintain her head upright
Poor visual memory	Visual memory skills have increased from 33% accuracy to 72% accuracy on average. Visual sequential memory for up to seven targets has increased from 32% to 84%
Poor tracking skills and eye/hand coordination	Able to track objects while separating head/eye movements
Difficulty forming letters	More consistent forming letters with a top to bottom sequence; reversals have decreased

Read the full case study.

In 12 weeks, At-Risk 4-Year-Old Boy Scores at Age Level on Beery Visual-Motor Test

Assessed as at-risk and below average for visual motor tasks via the Beery Visual-Motor Test, this preschooler was struggling in school, as well as with fine and gross motor skills. Over the course of 12 weeks, his OT used tools from the Brain and Sensory Foundations First Level course resulting in "extra ordinary progress," including bringing him up to age level in design duplication on the Beery Visual-Motor Test.

Submitted by Michele Riak OTR/L

Before	After
Poor coordination and motor planning; often fell	Able to jump from two different colored cube chairs to a colored mat on verbal cues
Assessed as at-risk and below average for visual motor tasks via the Berry Visual-Motor Test	Tested at age level in design duplication on the Beery Visual-Motor Test
Unable to track lit-up dots, most notably on his right side	He is now tracking bilaterally with increased ease
Impulsive	Impulsivity has reduced considerably

Read the full case study.

Neurodevelopmental Movements for Early Assessment and Intervention

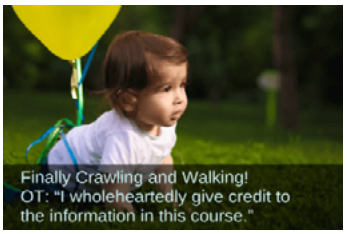
When it comes to neurodevelopmental delays, the call for early assessment and early intervention appears to be unanimous by researchers, policy makers, and clinicians. Because of their fundamental importance in human development, the innate infant movements appear to be especially useful in assessment for risk of neurodevelopmental delays. In their review study, McWhirter et al. (2024) found that motor function of preschool children predicts academic achievement; and they encouraged assessment of primitive reflexes as a means of early identification of children at risk. Using innate movements for early assessment can help address motor deficits and their co-occurring disorders (McWhirter et al., 2024) and maximize potential outcomes (Zuk, 2011).

Other researchers concluded that assessment of primitive reflexes appears to be a cost-effective, non-invasive method for identifying children at risk of idiopathic scoliosis before clinically significant deformity develops (Vlădăreanu et al., 2025).

For children with neurodevelopmental disabilities to be more physically and academically capable, the use of innate infant movements in remediation may be important for building the basic foundations for optimal functioning. Research has indicated that in the absence of intervention, children do not grow out of developmental motor deficits and their associated challenges. For example, Salavati et al. (2021) showed that poor quality of infant movements in preterm babies were correlated with poor motor and cognitive skills at the ages of 2, 4, and 8. In addition, Salavati et al. (2021) found that the gap in functioning compared with normally developing peers was greatest at the age of 8 years for the preterm babies, indicating that the children did not grow out of the motor and cognitive deficits that were present in infancy. The same was true in a study of children with learning disabilities (ages 7 to 18 years): "It was found that the vestigial [retained] primitive reflexes occur in the case of school-age children suffering from academic difficulties. Those reflexes do not decrease simultaneously with the passage of time, but rather become more intensified" (Grzywniak, 2016, p. 113). In a study of young children, without intervention, retained primitive reflexes remained in place whereas, for the children who received intervention, their primitive reflex status improved (Goddard et al., 2022). The importance of early intervention was also highlighted by the following studies:

- Delays in attaining early motor milestones resulted in more severe repetitive and restricted behaviors in children and adolescents with ASD (Uljarević et al., 2017).
- Poor motor skills in infancy and early childhood were associated with poor motor skills, and less cognitive ability (Piek et al., 2008) and with anxiousness and depressive symptoms (Piek et al., 2010) by the time children were 6 to 12 years old.

1-Year-Old with High Muscle Tone, Who Would "Never Crawl," Is Now Crawling...and Walking!



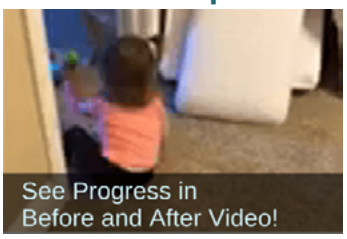
This infant with high muscle tone could not independently move the upper and lower halves of her body, resulting in the inability to crawl. Doctors claimed this would never change, but when she received Innate Rhythmic Movements this little girl's motor skills developed so much that she was able to crawl and later walk!

Submitted by Michele Riak OTR/L

Before	After
Unable to crawl	Began crawling reciprocally with fluidity
Parents were told child would never be able to crawl	Now walking
Unable to separate her upper and lower halves of her body	Can now move upper and lower extremities separately

Read the full case study.

Delayed Toddler Goes from Only Bottom Scooting to Walking After Two Months of Neurodevelopmental Movements



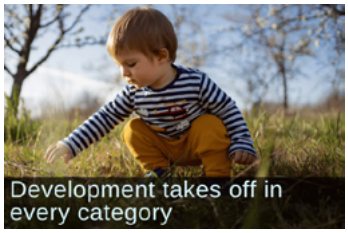
At the time of intervention, this 20-month-old with severe developmental delays could not crawl, stand, or walk—her only means of locomotion was bottom scooting. Her PT began providing Innate Rhythmic Movements and reflex integration, with astounding results: By 4 weeks she was creeping typically, by 2 months she was walking through the house. By the time she was 28 months old, she was evaluated as being at age level in all domains!

Submitted by Melody Edwards, PT

Before	After
Scooting on bottom was primary means of mobility; unable to commando crawl, creep, or pull to stand or walk	Walking throughout the house with a near-typical gait pattern of a new walker; walking independently on uneven surfaces, going up/down stairs with handrail support
Scored -2.13 standard deviations below the mean on the gross motor sub-tests of the Peabody Developmental Motor Scales	A global evaluation at 28 months (8 months after starting the movements) revealed she was functioning at age level in all domains

Read the full case study.

Delayed Toddler Flourishes with Reflex Integration



This young toddler demonstrated severe motor delays, hypotonia, and poor balance, and he had difficulty feeding himself. After receiving Innate Rhythmic Movements and reflex integration from the Brain and Sensory Foundations course, he met all of his original occupational therapy goals!

Submitted by Jaime Carlson, MSEd, OTR/L

Before	After
Could only commando crawl	Able to crawl on all fours
Could not complete most transitional movements with any sort of motor planning/control without significant physical assistance	Pulling to stand on furniture without assistance, and taking independent steps
Balance issues	Can tilt chin up and down without losing balance or becoming upset; can stoop to pick up toys and return to standing without falling over
Only had a few words/gestures/signs	More vocal
Poor core strength	Improved core strength and neck strength
Head banging to self-soothe	Head banging is decreasing
Would not cross midline	Now crossing midline
Avoided sensory input on his palms or soles of feet	Able to touch damp textures without upset
Could not eat independently	Feeding himself using a pincer grasp on small foods, can hold cup and drink from a straw
Would stand only on tip-toe	Heels are coming down in standing; no need for orthoses

Read the full case study.

Neurodevelopmental Movements for Teens and Adults

In geriatric populations, a body of research has shown a strong association between retained primitive reflexes and dysfunction. This association is so reliable that researchers advocate for using primitive reflex assessment as a convenient, low-cost method for early detection of cognitive decline (Altunkalem Seydi et al., 2024) and Alzheimer's disease (Gabelle et al., 2016).

Though there is less research on the use and benefits of Innate Rhythmic Movements and primitive reflex integration for teens and adults, preliminary evidence shows that these movements are highly supportive throughout the lifespan for addressing a large variety of challenges. For example, physiotherapists stated they found primitive reflex integration to be useful in rehabilitation for their adult clients in many areas including: cognitive issues, motor challenges, fatigue, anxiety, and persistent pain (Ikäheimonen & Petäistö, 2025). These physiotherapists reported associated benefits of primitive reflex integration in the areas of sensory integration, nervous system regulation, musculo-skeletal symptoms, and emotional improvements—resolution of back pain was the most common individual benefit the physiotherapists reported (Ikäheimonen & Petäistö, 2025).

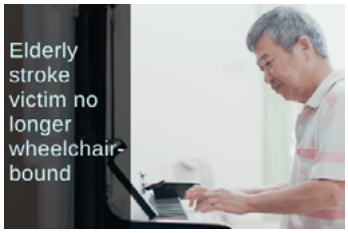
Integration of primitive reflexes in older adults was also associated with better cognition and mental health. In a study of adults over the age of 60, the experimental participants engaged in a 16-week sensorimotor exercise program aimed at integrating primitive reflexes. The experimental group showed more integration of their primitive reflexes, increases in cognitive function, and greater well-being. In contrast, members of the control group showed a worsening in primitive reflex retention, and had no gains in cognition. In addition, the control group showed declines in mental health that were measured by self-reported feelings of hopelessness and perceived stress (Stephens-Sarlós et al., 2024, September).

Blomberg (2015), a psychiatrist, found that it is possible to improve mental health by maturing the brain via the use of neurodevelopmental movements. He gave his adult patients Innate Rhythmic Movements once a day for approximately 10 minutes. His patients enjoyed the movements and reported relief from depression, anxiety, and psychotic symptoms (Blomberg, 2015). According to Blomberg (2015), his adult patients were:

- Less withdrawn
- Showing greater psychological development
- More active
- More interested in socializing

Applying Innate Rhythmic Movements and primitive reflex integration for rehabilitation appears to be exceptionally helpful as well. For example, an 86-year-old stroke survivor had shown only minimal progress after five months of traditional therapy. However, the patient made significant improvements once his occupational therapist introduced neurodevelopmental movements from the Brain and Sensory Foundations course. Within 2.5 months, the man regained the ability to bend at the waist, stand with minimal assistance, feed himself, walk with support, and even play the piano again—an outcome his occupational therapist described as one of the most remarkable recoveries he had seen in his 30-year career. This case study is summarized in the chart on the next page. Additional case studies show real-life examples featuring teens and adults who have utilized the Brain and Sensory Foundations tools with great success.

Stroke Patient Can Walk After Primitive Reflex Integration



This elderly man was confined to a wheelchair after a stroke, and required full assistance for transfers and ADLs. Five months of rehab yielded few improvements. Once his OT began providing Innate Rhythmic Movements and reflex integration, this man saw tremendous gains: After 2.5 months he could bend at the waist, stand with minimal help, feed himself, and walk with support. He even resumed playing the piano!

Submitted by John Maynarich, Occupational Therapist

Before	After
Mutism with strangers	Able to speak around others
Wheelchair-bound; unable to walk or stand	Can ambulate with the assistance of one person for guidance and fall prevention
Required hoyer lift for all transfers	Requires minimal assistance from one person for transfers
Lost ability to play piano due to right-sided weakness	Playing the piano again
Maximally dependent for all ADLs	Feeding himself with his right hand; can groom himself if the supplies are laid out

Read the full case study.

Reflex Integration Boosts Social Skills, Coordination, and Self-Regulation

This young teen had substantial challenges with coordination and clumsiness, often feeling "glued to the floor." She had a constant headache, could not handle silence, was socially challenged, and had poor stamina and sensory processing. Her physical therapist began using Innate Rhythmic Movements and reflex integration, and in 8 sessions her headaches were gone. After 13 sessions, she demonstrated massive improvements in all areas.

Submitted by Crystal T. Miller, PT, DPT

Before	After
Multiple injuries from tripping and falling; lack of coordination and body control	Easier, more coordinated movement; reports feeling more comfortable in her body
Often felt physically "stuck" when moving her body	No longer feeling like her feet are "glued to the floor"
Excessive talking (uncomfortable with silence)	More comfortable with silence
Struggled socially, to the extent that she wanted to change schools	Fewer social issues; has decided to stay at her current school
Sleep issues	Better sleep
Struggles with stamina	Improved stamina
Often felt "cloudy"	Feeling "less cloudy"
Constant headache, never fully pain-free	Now consistently headache-free

Read the full case study.

Huge Improvements in Focus, Balance, Handwriting, and Organization for 13-Year-Old Boy

This teenage boy was often impatient and resistant to daily tasks. He had a hard time sitting still, was messy, and exhibited balance issues. See how using Innate Rhythmic Movements and integrating his reflexes resulted in notable progress across many areas of functioning.

Submitted by AT, OTR/L

Before	After
Often resistant to completing writing tasks	More willing to complete writing tasks; more confident and comfortable when writing
Poor balance	Improved ability to stand on one foot with hands on hips
Impatient when completing tasks at home	More patient
Challenges sitting still and paying attention	Better able to sit still and pay attention
Would often not complete homework	More willing to complete homework
Messy	Keeping his room more organized
Clumsy	Less clumsy

Read the full case study.

Telehealth Sessions Relieve Anxiety, Bring Focus for 18-Year-Old with Autism

This 18-year-old non-speaking autistic worked with his occupational therapist and his mother via telehealth to receive neurodevelopmental movements from the Brain and Sensory Foundations course. After eight sessions spread across four months, he showed notable improvements in: attention span, task independence, anxiety reduction, ability to navigate transitions, and motor coordination—particularly crossing midline.

Submitted by Emily E Nemec, OTD, OTR/L

Before	After
Difficulty focusing	Able to pay attention for much longer periods
Anxious	Handles anxiety and transitions much more easily
Difficulty coordinating use of both arms and crossing midline	More comfortable in his body; improved quality and control of movement
Had trouble completing multi-step tasks independently	More independent in routines and tasks

Read the full case study.

Mother is in Awe of what Simple Movements Can Do

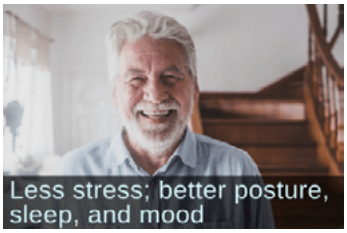
This woman had frequent pain in her wrist, shoulders, back, hips, and heels, and was reliant on steroids and other medication. Her heel pain was so severe that her doctor was recommending steroid injections. After three weeks of integrating her feet reflexes, her heel pain was 80% resolved. By continuing to integrate more reflexes she ultimately experienced a substantial reduction in overall pain levels.

Submitted by CHL

Before	After
Daily activities would trigger shoulder, wrist, hip, and lower back pain	Much reduced use of pain killers and steroid medication because there is very little pain
Ongoing heel pain	Heel pain is almost 80% resolved, without steroids

Read the full case study.

Primitive Reflex Integration Helps OT with Anxiety and Pain



This occupational therapist experienced anxiety, chronic pain and tension, postural challenges, and difficulty sleeping. He started using rhythmic movements and reflex integration activities from the Brain and Sensory Foundations course, and in just a few weeks experienced substantial changes in all areas.

Submitted by J., Occupational Therapist

Before	After
Diagnosis of anxiety disorder	Significant reduction of overall anxiety
Chronic left shoulder pain, stiff neck and bilateral shoulder tension, occasional right knee pain and tightness in right calf	Decreased overall tension and pain
Anxious when speaking in meetings	More confidence in meetings and with public speaking; a sense of calm when dealing with others
Imbalance of posture	Improved posture and body awareness
Trouble sleeping due to mind chatter, worry, and anxiety	Better sleep quality

Read the full case study.

Conclusion, Where to Learn More

The neurodevelopmental movements of infancy and early childhood fuel growth and provide a foundation for the infant's future functioning. These special movements "allow connection of the different brain regions which will later be important for the learning process, behaviour, communication and emotions" (Rashikj-Canevska & Mihajlovska, 2019 pg. 514). The underlying rationale to support the use of infant movements for helping remove obstacles to functioning is based on the principles of development itself. The human brain grows faster in infancy than at any other time in life (Carmody et al., 2004) and this development is largely fueled by the innate infant movements. In their imaging study, Carmody et al. (2004) found great increases in myelin during normal development of healthy infants. Sampaio-Baptista et al. (2013) found that learning new motor skills appeared to increase myelin in the brain. Since learning new motor skills is something infants are regularly engaged in as part of the normal course of development, it follows that the innate infant movements stimulate myelin formation and develop important neuro-sensory-motor pathways. Given what we see in healthy development, it is very likely that innate infant movements are unique in their ability to stimulate and develop the brain and body, more so than other types of movement, and at least one study has supported this conclusion (McPhillips et al., 2000). Further research is necessary to confirm the possible unique qualities of innate infant movements to promote brain growth, connectivity, and functional outcomes.

Current research and clinical evidence suggest that innate infant movements boost brain and body maturity beyond infancy to address challenges for children and adults. Because development is synergistic, with various categories of innate movements working in concert, we provide supporting evidence here for the use of multiple categories of innate movements. In the Brain and Sensory Foundations program, the use of Innate Rhythmic Movements, infant reflex movements (primitive and postural), developmental movements, and play is consistent with the principles of neurodevelopment and can serve as part of an overall plan for assessment and intervention that is low-cost, non-invasive, and effective. The program also emphasizes collaborative goal setting and goal attainment. For these reasons, Brain and Sensory Foundations tools make a highly relevant, comprehensive, and holistic contribution as they work to improve physical, social-emotional, and cognitive skills that are useful in nearly all aspects of life.

"…when the body feels safe and the reflexes are integrated, a child's natural desire to explore and succeed can finally emerge."

Cheuk Yan Wong, Occupational Therapist

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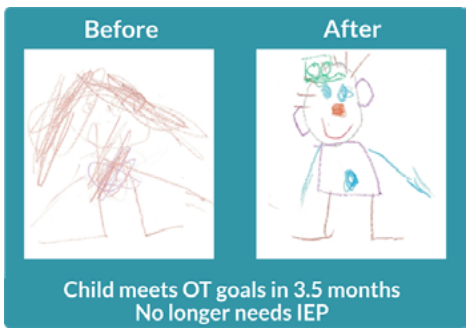
Elaine Kayhan, OT

"I'm amazed with the great results I've seen…a phenomenal course and would recommend this to all therapists."
Anneli Tromp, PT

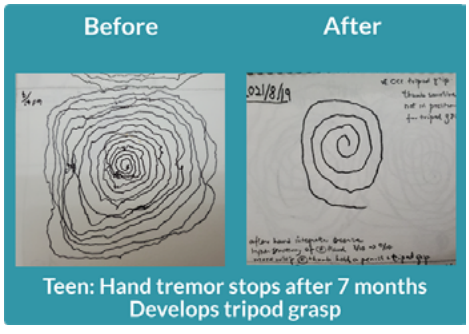
"I've done other reflex courses and this, by far, is the most practical and fun for children."
C.M., parent

"I have seen astounding changes in relatively short periods of time by implementing reflex integration and neurodevelopmental movements."
Carrie Eskenazi, SLP

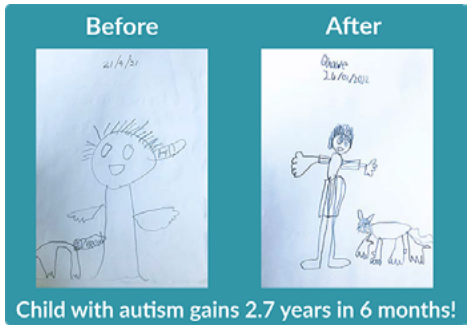
"Extremely thorough course…so many treatment ideas are shared for all ages, interests, and abilities."
Yaffa Strassfeld, OTR/L



4-year-old gains hand dominance, improves fine-motor accuracy.



Improved writing speed: 5 wpm to 11 wpm
Nystagmus greatly reduced



Before: 8.9 years old, test age 4.9 years
After: 9.3 years old, test age 7.6 years

Be empowered to helpc hildren, teens, and adults like never before!

See evidence and enroll at MovePlayThrive.com