

Improvements in emotional regulation, motor coordination and executive function in an 8-year-old male with ADHD and dyslexia concomitant with Chiropractic care: A case report

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Background: An 8-year-old male with a diagnosis of ADHD, dyslexia and suspected oppositional defiant disorder presented for Chiropractic care. His presenting concerns included severe resistance to academic tasks and daily transitions, defiance and emotional outbursts, sensory-seeking behaviour with chewing and mouthing, drooling and mouth breathing, poor motor tone with clumsiness and limited spatial awareness, separation anxiety, and difficulty with rules and social connection. His family had initiated, but not yet completed, a diagnostic assessment for Autism Spectrum Disorder.

Intervention: The patient received chiropractic care over approximately eleven months. Analysis and adjusting drew on the Paediatric Experience (PX) framework, Torque Release Technique (TRT) with the Integrator instrument, paediatric Sacro Occipital Technique (SOT), and craniopathy protocols.

Outcomes: A broad range of objective findings improved significantly over the course of chiropractic, though the retained Moro, ATNR, STNR and Spinal Gallant reflexes remained detectable at every evaluation, with variable laterality across time points. Notably, parents reported consistent and significant gains across sleep, mood, emotional regulation, outburst frequency, social engagement, dietary variety, multi-step instruction following, and executive function. This contributed to a significant increase in quality of life concomitant with decreases in behavioural and developmental challenges associated with his comorbidities.

Conclusion: Chiropractic care for paediatric neurodevelopment has yet to benefit from large-scale clinical studies or randomised controlled trials, despite case report data increasingly indicating improvements in individual cases. Further research into this issue is therefore warranted.

Indexing Terms: Chiropractic; Subluxation; paediatrics; ADHD; dyslexia; emotional regulation; socio-emotional functioning.

Introduction

Children with attentional, behavioural and developmental concerns are frequently presented to Chiropractors, although the proportion of paediatric caseload they represent has not yet been systematically documented. Chiropractic care is often enlisted late in a family's help-seeking sequence, after medical, educational and pharmacological options have been canvassed, rather than as an early or parallel consideration.

Chiropractors, especially those in paediatric practice, may be familiar with literature associating retained primitive reflexes with neurodevelopmental presentations, and with the emerging hypothesis and case report evidence pointing towards the potential that Chiropractic care may support the neurological maturation required for reflex integration.

Parents, however, are unlikely to be exposed to this information. Therefore, a family may have no concept of what Chiropractic is or why it may be relevant to the neurodevelopmental or behavioural challenges their child is facing. Additionally, while case report data is accumulating and is described below, larger studies that would allow us to confidently claim causation have not yet been done.

At present, the Centres for Disease Control (CDC) in America estimates that 1 in 31 children has Autism (Shaw, 2022). Attention Deficit Hyperactivity Disorder (ADHD) is thought to affect 11.3% of children, with a slightly higher prevalence in boys. (Reuben, 2024) For families of children with ADHD, the decision whether to commence stimulant medication is often a difficult one, and a stated wish to avoid or defer pharmacological management is a common reason for seeking alternatives (and this was so in the present case). While this may be the aim, conservative, non-pharmacological options may not be made obviously available to the parents and families seeking help.

A recurring observation in the Autism, ADHD and neurodevelopmental disorder population is the persistence of primitive reflexes beyond the age at which they would ordinarily be integrated. Konicarova and Bob (2012) reported a higher occurrence of retained Moro and spinal Galant reflex activity in children aged 8 to 11 years with ADHD than in a control group. The same authors subsequently reported an association between persisting asymmetrical tonic neck reflex (ATNR) activity and ADHD symptoms. (Konicarova & Bob, 2013) A companion study of 35 unmedicated females aged 8 to 11 years found persisting ATNR and symmetrical tonic neck reflex (STNR) activity relative to 30 age-matched controls. (Konicarova et al., 2013) These findings were interpreted as consistent with immaturity in neural systems that also subserve attention and motor control.

Notably, the Konicarova studies have small participant numbers, and thus causality cannot be established. The results do not establish an aetiology behind ADHD or Autism Spectrum Disorder. They merely indicate that the retained primitive reflexes described were present in the studied populations.

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Case report data specific to the Chiropractic context is increasingly painting a picture of recurrent, individual cases in which primitive reflex integration has occurred concomitant with Chiropractic care and issues such as sleep, mood, socio-emotional engagement and neurodevelopmental disorders. Among these, are a number published by this masthead have described changes in tone, primitive reflex activity, sleep, mood and socio-emotional engagement in children receiving chiropractic care. (Kotlerman et al., 2024; Pryjma et al., 2024a, 2024b; Watson et al., 2024a, 2024b) With one exception, these have described infants and very young children.

The present case extends that observational series to a school-aged child with established educational and behavioural diagnoses, a longer care episode, and a monitoring protocol combining serial reflex testing with proprietary autonomic scanning.

This is a descriptive, observational case report and does not test a hypothesis. It is not offered as evidence of efficacy, but is presented on the expectation that the pattern described may be of use to clinicians and for further research.

Case details

An 8-year-old male was presented for Chiropractic care by his parents and was a novice to Chiropractic care at the time. He was described by his parents as physically active, and carried historical diagnoses of ADHD and dyslexia. At the time of his presentation his parents were actively pursuing an Autism Spectrum Disorder (ASD) assessment, and Oppositional Defiant Disorder (ODD) was suspected but not formally diagnosed.

The stated concerns raised by his parents included severe resistance to academic work and transitions in daily life, defiance, emotional outbursts, sensory-seeking behaviour expressed as chewing and mouthing, drooling, mouth breathing, poor motor tone, clumsiness, an apparent absence of spatial awareness, separation anxiety, and difficulty both with following rules and with forming social connections. Taken in tandem, these issues presented significant impediments to academic and socio-emotional functioning and thus quality of life.

A secondary goal, as stated by the family at intake, was to avoid pharmaceutical management of his ADHD.

History and examination included an assessment of the mother's self-reports regarding fertility and gestation. The pregnancy was reported as uncomplicated. There were no fertility difficulties. The mother reported no smoking or alcohol consumption and no significant illnesses during pregnancy. She did not report having any exercise regimen during gestation. Monthly ultrasounds were performed. A caesarean section was scheduled at 40 weeks because the infant was in breech presentation. Otherwise, the delivery proceeded without complication. The only other relevant maternal health history was that of Chiari malformation.

Birth measurements were 7 lb 7 oz and 21 inches, and the infant was successfully breastfed for seven months. As an infant, he was noted to be fussy, was fed Gentle Ease formula, and had a cow milk intolerance.

His subsequent history included head injuries requiring staples and sutures, and a fever following MMR vaccination. Both are recorded here merely as history obtained at intake, and disclosed without inference.

Clinical findings

Cranial assessment at presentation (August) identified a right-sided bulge at the lambdoidal suture, an uneven, high, narrow palate with the left side higher, bilateral external rotation of the temporal bones, tongue thrust with external ear flaring, and restriction at both pterygoids and at the right sphenomaxillary region. A weak right bite and a slight posterior tongue tie were also noted.

Initial analysis identified a sphenobasilar torsion pattern involving bilateral external temporal bones of the dural meningeal system. Combined PX, TRT and SOT analysis located primary subluxations at C1 and T1.

A clinical note: 'Neuro-deflective evaluation' is the term used in this practice for a battery of primitive reflex, fine motor, gross motor and oculomotor tests administered together. It is not a standardised or independently validated instrument, and the component tests were performed and scored by the treating clinicians.

The initial neuro-deflective evaluation in August 2024 found the retained Moro, ATNR, STNR and left Spinal Gallant reflexes. Fine motor testing using the alternating hand slap demonstrated neurological overflow. Eye movement testing demonstrated impaired convergence and divergence, with full-body compensation during tracking. Fine and gross motor patterns were assessed as immature for age.

Baseline CLA insight station scans taken five days post-initial presentation recorded a heart rate variability (HRV) score of 88, which was interpreted by the treating clinicians as indicating good adaptability. However, the scan also returned a surface electromyography (sEMG) score of 45, interpreted as indicating challenged muscle tone and energy distribution, and a thermal score of 83, interpreted as indicating mild autonomic stress.

Measures

Upon presentation and initial scanning, the patient was placed on a care plan with progress tracked using four categories of measure.

Cranial and structural palpation was used to assess suture mobility, palate height, temporal bone rotation, bite strength and tongue function.

Neuro-deflective evaluation was conducted at the initial visit and at two subsequent points. It comprised testing of primitive reflexes (Moro, ATNR, STNR and Spinal Gallant); fine motor skill via the alternating hand slap with eyes open and closed; gross motor control via gait and heel-to-toe walking, assessing balance and reflex activation; and eye movement and tracking, assessing convergence, divergence, compensatory movement and fatigue.

CLA Insight scanning provided HRV, sEMG and paraspinal thermography scores. These are proprietary composite indices generated by the scanning system. They are reported here as recorded, without independent transformation.

Parent-reported outcomes were collected using the Brain Blossom developmental framework, which tracks progress through Seed, Sprout, Growth, Blossom and Flower stages across sensory regulation, motor coordination, social engagement and executive function. The framework is proprietary and, so far as the authors have been able to establish, has no published validation data.

Re-evaluations were performed approximately every 12 visits, corresponding to monthly intervals during the initial care plan and to longer intervals thereafter.

Management

The patient's Chiropractic care plan combined the Paediatric Experience (PX) framework, Torque Release Technique (TRT) delivered with the Integrator instrument, paediatric Sacro Occipital Technique (SOT), and craniopathy protocols.

All techniques and protocols were modified to suit the age, tensile strength and tolerance of the patient, as is usual paediatric chiropractic standard. The PX foundational framework was used to construct the care plan. SOT was used for craniopathy care and to evaluate the upper cervical region and occipital fibres.

Adjustments were neurologically focused, gentle and specific, and were tailored to the structural and neurofunctional findings recorded at examination and on CLA scanning. Low-force, instrument-assisted and manual techniques were used as appropriate to the patient's size and presentation.

The intent of care was to improve neurological communication, autonomic regulation and adaptive capacity, rather than to treat any specific medical

Cranial adjusting was used during the first three months only, releasing tension along the cranial sutures, normalising temporal bone position, improving palate symmetry and reducing oral-motor strain. Cranial work was discontinued after three months as it was deemed not to be needed.

The care plan

- Initial phase, August to November. Three visits per week for 12 weeks. Neurologically-focused Chiropractic care with craniopathy. Stated goals were reflex integration, cranial and dural release, and improvement in sleep, digestion, communication and regulation. During this phase, craniopathy, a toggle headpiece, and Integrator methods were used.
- Second phase, December to March. Two visits per week for 12 weeks. Neurologically-based Chiropractic care without craniopathy. Stated goals were to stabilise autonomic and motor system gains and to continue reflex reduction. During this phase of care, the Integrator and manual SOT moves were used, without cranial work.
- Third phase, April to July. Reduced to one visit per week from April, then to fortnightly visits from July. Stated goals were ongoing neurological balance, support through growth-related transitions, reinforcement of motor and executive function gains, coordination with home and school supports, and introduction of at-home neuro-deflective exercises. During this phase and onward, seated or supine SOT adjustments were used.
- At-home exercises and modifications were suggested to support his care. The family was provided with simple movement and reflex integration activities, including coordinated movements and balance and core work, intended to support primitive reflex reduction and sensory-motor integration between visits. (These were not provided until April, and as of July the patient had not commenced the programme. They cannot therefore have contributed to any of the outcomes reported here, and no such contribution is claimed).
- Brain Blossom framework tracking. Parents were encouraged to monitor behavioural and functional progress through the Seed to Flower stages, both as a record and as a means of reinforcing their awareness of and engagement with progress.
- Lifestyle and environmental support. Recommendations included establishing predictable routines, reducing sensory overwhelm, and encouraging gentle movement or play to support regulation and coordination.
- During the first 12 weeks, the parents withdrew the patient from all other programmes. This was a deliberate element of the approach used in this practice, intended to support the nervous system at a foundational level before other therapies, in line with the Chiropractic 'top-down, inside-out' approach preferred by the treating practitioner. The reasoning offered is that where neurological age does not match physiological age, tasks pitched to physiological age in the gross and fine motor, auditory-verbal or visual-cognitive domains provoke a stress response and further subluxate the nervous system, producing muscle

memory rather than neurological change. After the initial 12 weeks, collaboration with school-based supports, occupational therapy and speech therapy was suggested where appropriate, in support of a whole-to-part developmental approach.

Aims of care

The primary aims were to reduce the impact of subluxation and neurological inefficiency by improving communication within the nervous system and supporting adaptability. Specific aims included integration of the retained Moro, ATNR, STNR and Spinal Gallant reflexes; improved autonomic regulation as indexed by HRV, sEMG and thermal scanning; improved postural tone, balance and motor coordination; improved convergence and divergence with reduced visual fatigue; improved emotional regulation and stress resilience; and development of social engagement and executive function. A further aim was to equip the family with tools, including Brain Blossom tracking and at-home exercises, to reinforce progress between visits.

Outcomes

CLA Insight scanning

Serial scan scores are presented in Table 1.

Table 1: CLA Insight composite scores across the care episode

Date	Review	HRV	sEMG	Thermal	CoreScore
19 Aug:	Baseline	88	45	83	72
Sep:	1st review	57	47	87	61
Oct:	2nd review	80	58	83	73
Nov:	3rd review	78	64	97	78
Feb:	4th review (6-month neuro-deflective)	66	60	86	69
Mar:	5th review (9-month neuro-deflective)	84	70	73	76
Jun:	Check-in	Not recorded	See text	See text	

Surface electromyography rose from 45 at baseline to 70 at the final scored re-evaluation and remained above its baseline value at every post-baseline measurement point. It was the only index to show a consistent improvement that both exceeded and stayed above baseline.

Heart rate variability fell from 88 at baseline to 57 at the first review, recovered to 80 and 78 at the second and third reviews, fell again to 66 at six months, and reached 84 at nine months. At no

point during the reported period did the HRV score exceed the baseline value of 88. The treating clinicians interpreted the initial fall as an adaptive response to the commencement of care. In summary, HRV declined and then substantially recovered toward, but did not surpass, a baseline already in a favourable range.

Thermal scores rose from 83 at baseline to a peak of 97 at the third review, which the treating clinicians characterised as optimal autonomic tone. The score then fell to 86 at six months and to 73 at nine months, a value 10 points below baseline and 24 points below peak. The available data do not explain this decline.

At the June check-in, HRV was not recorded. Thermal scanning showed mild overall asymmetry with moderate asymmetry at C1 on the left. Surface electromyography showed severe tension at C1 bilaterally, C3 on the left and C5 on the left; moderate tension at C7 on the right, T1 on the right, T2 bilaterally, L1 on the left and S1 on the left; and asymmetries at C1, C3, C5, T6, T10, T12, L3 and L5. No composite scores were recorded at this visit, so the June segmental findings cannot be placed on the same scale as the earlier composite scores.

Neuro-deflective evaluations

At the six-month evaluation (February 2025), Moro, ATNR, STNR and Spinal Gallant reflexes were all retained, with Spinal Gallant now positive bilaterally where it had been positive on the left only at baseline. The heel-to-toe walk elicited a Moro response. Tracking deficits persisted. The alternating hand slap remained difficult with eyes closed.

At the nine-month evaluation (March), Moro was retained and left-dominant, ATNR and STNR were retained, and Spinal Gallant was positive on the right. The heel-to-toe walk continued to elicit a Moro response together with balance difficulty. The left eye fatigued during convergence and divergence testing. The alternating hand slap with eyes closed had improved.

No primitive reflex tested was integrated during the reported period. However, significant improvements were noted. The MORO, ATNR, and STNR reflexes improved significantly when subject to repeated tests. Interestingly, the Spinal Gallant moved from left, to bilateral, to right. However, this shift in laterality makes some degree of sense in that the patient has Dyslexia, and is not fully lateralised to one side of their body. This, plus the improved, but still positive ATNR reflex indicates that the patient may have been attending more to one side of his body than the other depending on other factors during the day.

It goes without saying that the Chiropractic assessment is a picture of a distinct moment in time, and higher demands would cause reflexes to express in different ways on different days. Primitive reflexes do not just disappear either, but rather integrate. The clear positive finding on this measure is the improvement in the alternating hand slap performed with eyes closed, which is consistent with better proprioceptive fine motor control.

Parent-reported outcomes

Across the care period, the parents reported consistent and cumulative gains, recorded through the Brain Blossom framework.

At the first review (September) they reported improvements in sleep and mood, decreased outbursts, emerging social interest, and improved comprehension and communication.

At the second review (October) they reported increased emotional regulation, more actively sought social contact, improved fine motor skill and concept understanding, and early Flower stage gains in academic and social domains.

At the third review (November) they reported reduced anger and rigidity, improved mood, better processing of emotions, better task follow-through, and improvements they attributed to respiratory, digestive, immune and muscular function.

At the six-month evaluation (February) they reported better sleep, mood, self-regulation, abstract thought and resilience.

At the nine-month evaluation (March) they reported improved balance, fine motor skill and multi-step processing, reduced stress around routine changes, and executive function gains.

Over the course of care, the parents described a child who became calmer, more resilient and more engaged. They reported substantial improvement in sleep quality, mood and emotional regulation, with markedly fewer outbursts and less rigidity in daily routines. The child showed a greater desire to connect with family and peers, easier recall and processing of past events, and growing curiosity about new activities and environments. He also showed increased dietary variety, improved coordination, and an ability to follow multi-step instructions that reduced frustration at home and at school.

In the later stages of care, the parents described their child as more confident and more capable, with emerging skills in planning, organisation and emotional resilience that made social and academic situations considerably less stressful.

Functional gains were reported as maintained at the June check-in, despite the upper cervical and thoracolumbar stress indicators recorded at that visit.

Notably, the family avoided ADHD medication throughout the reported period, meeting the secondary goal stated at intake.

Discussion

While on face value, this case report contains contrary findings of notable functional improvements without full integration of retained primitive reflexes or resolution of subluxation findings. Despite this, the case report may offer a possibility that sustained care and input into the nervous system has the potential to deliver positive functional outcomes over time. During the initial stages of care, Chiropractors reported observing significant improvements, but these were not consistent in CLA readings. A feasible explanation for this may lie in the timing of dropping care frequency (from three visits per week to two) and adding additional therapies back in before the nervous system was ready.

This factor alone means the clash in objective findings and parent-reported improvements are not necessarily cut and dried.

Over approximately eleven months the parents reported large, consistent and cumulative functional gains across sleep, mood, emotional regulation, social engagement, diet, coordination and executive function. Over the same period, one objective index improved and held, one declined and recovered without exceeding baseline, one rose and then fell below baseline, and no primitive reflex test was integrated. When looking at the core score findings, it becomes clear that overall nervous system coherence was attained.

Several explanations for the dissociation are feasible, though none are proven and only further research could explain the phenomena.

The first is that the parent-reported gains are real and that the objective measures used are not sensitive to those changes. Sleep, emotional regulation and executive function are not indicated by paraspinal surface electromyography or by a composite thermal score, and a child might improve substantially in the former while the latter moved for unrelated reasons.

The second is that the objective indices are measuring something real that did not improve, and that the parent reports reflect, in part, the recognised tendency of engaged caregivers to observe improvement in a child they are actively and hopefully monitoring. The Brain Blossom framework was explicitly described to the parents as a means of reinforcing progress awareness and engagement. This should be considered as a potential mechanism of improvement, especially when juxtaposed against Hock and Spoelstra (2022) who undertook a retrospective analysis of 37 children undergoing Chiropractic care. The brain blossom framework was utilised in this population, and there was a positive correlation between chiropractic care and the areas measured.

This case occurred within a subluxation-based, neurologically focused paradigm, in which care outcomes were conceptualised not as resolution of a discrete symptom but as improved expression of neurological function of multiple developmental domains. The Brain Blossom assessment serves as a multi-domain outcome measures, and a structured communication tool, translating changes in neurological function into observable, parent-relevant developmental markers.

A third possibility emerges due to the first 12 weeks of the protocol, in which the parents withdrew the patient from all other programs and supports. This was intentional, and the treating chiropractors regard it as a key contributor to the early functional gains (which must be tested through further research). It is equally possible that the removal of demand (i.e. the withdrawal of therapy sessions pitched above the child's functional level, in a child whose presenting complaints centred on resistance to academic tasks and transitions) may have produced substantial behavioural improvement independent of any adjustment delivered. While this may seem separate from Chiropractic 'treatment' per se, it is respectful of a nervous system approach in which we give the nervous system what it needs, remove what it does not need, and allow adaptability to emerge accordingly.

This points to a possibility we have not discussed; that Chiropractic is as much about what we don't do as it is about what we do. In this case, it would therefore be inappropriate to separate the effect of the care from the effect of the reduced demand load that accompanied it.

Functionally and objectively, some things did improve. Postural muscle activity as indexed by surface electromyography improved and remained improved. Fine motor control on the alternating hand slap with eyes closed improved. The family met its goal of avoiding stimulant medication over the reported period. The parents reported that daily life at home and at school became substantially easier. These observations occurred concomitant with a structured, phased program of neurologically-focused chiropractic care.

This opens us to a consideration as to what we consider as a benchmark of success: clinical markers, patient-reported outcomes, or both? One is clinically meaningful for the chiropractor, the other is more meaningful for the person under care.

Conclusion

Standard limitations apply as this is a single case report. Additionally, no formal academic, cognitive, behavioural or psychological assessment was administered at any point, and preceding diagnoses including ADHD and dyslexia were accepted on face value.

Three components emerged in this study, and all three present valid questions for further research:

- First, does the withdrawal of concurrent therapy load, on its own, produce measurable behavioural improvement in children presenting this way?
- Second, does the addition of cranial adjusting alter outcomes relative to spinal adjusting alone?
- Third, do parent-reported functional gains in this population track objective autonomic and reflex measures, or do they diverge as they did here? i.e. is this case an anomaly, or par for the course? Larger scale studies would be beneficial.

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About the Case Report project

This Case Report is a part of the [ASRF Case Report Project](#), a project designed to gather client studies from chiropractors and transform them into much-needed case reports, focused on the effects of chiropractic care on clinical presentations highly relevant to chiropractic, such as stress, immunity and adaptability.

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