JCCP

JOURNAL OF CLINICAL CHIROPRACTIC PEDIATRICS

VOLUME 23 • NO. 2 • NOVEMBER 2026
PUBLICATION OF THE COUNCIL ON CHIROPRACTIC PEDIATRICS
INTERNATIONAL CHIROPRACTORS ASSOCIATION

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The following will be considered:

Case Reports and Case Series – presentations of individual or groups of cases deemed to be of interest to the professional and scholarly community.

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- Abstract
- Manuscript
- Acknowledgements
- References
- Tables
- Figures

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Manuscript length will vary with the type of article; in general, manuscripts are expected to be 1,500-3,000 words in length, excluding references, tables and figures. These may vary with the type of article. For case reports and case series, see, "Instructions for Case Reports and Case Series." In general, for manuscripts reporting research studies, the order of components is:
- Introduction: succinctly describe the relevant literature supporting the need for the study.
- Methods: describe the methods used to accomplish the study, in detail sufficient to allow the informed reader to evaluate their appropriateness.
- Results: present the results of the study, without interpretation.
- Discussion: describe limitations of the study; interpret results; compare results to those of other relevant studies; discuss value and implications of the study.
- Inclusion of appendices is discouraged.

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Reference format—examples

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- Book: Task Force on Community Preventive Services. Guide to Community Preventive Services. New York: Oxford University Press; 2005.
- Website/webpages: Author. Title. Name of website. URL. Date of publication. Updated date (if applicable). Date accessed. Example: Fox F. Promoting and sustaining collaborative networks in pediatrics. Pew Research Center. http://www.pewinternet.org/2013/06/14/promoting-and-sustaining-collaborative-networks-in-pediatrics/. Published June 14, 2013. Accessed September 3, 2017.

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Instructions for Case Reports and Case Series

Abstract
The abstract should be 250 words or fewer. It may be either structured or unstructured. If structured, use the same sections as described below for the components of the report (Introduction, Case Presentation, Intervention and Outcomes, Discussion).

Case Report Components

• **Introduction**: State why this case is unusual or important.

• **Methods**: describe the search engine and key words used to review previously published literature on the subject

• **Case presentation**: Provide a brief summary of the patient's presenting demographics, other relevant characteristics, complaint(s) and related symptomatology.

• **Intervention and outcomes**: Describe the course of treatment, including frequency and duration, and summarize the patient's clinical outcomes, using recognized outcome measures if possible. Include whether informed consent was obtained and if there were any adverse events reported.

• **Discussion**: Succinctly state the important aspects of the case, in terms of its implications for patient care in general, or for specific patient populations or conditions. You may also compare/contrast the case to other cases in the published literature. Be cautious about overstating the importance/implications of your case.

Evidence-based Case Report Instructions

An Evidence-based Case Report (EBCR) is NOT the same as a traditional case report. The EBCR focuses on an answerable clinical question, how it was explored in the search, appraising the results and how it applies to the case, along with the integration of this information with the patient interaction. The final stage in this process is to audit the results.

These are the steps to include:[1,2]

• Brief summary of the chief complaint: 50-100 words

• Briefly describe the clinical case: 250-400 words

• Explain how you developed the clinical question: 200-300 words

• Explain your search for evidence (key words, databases used, number of articles retrieved): 50-100 words

• Evaluate the articles retrieved: critically appraise the evidence for validitiy and relevance: 200-300 words

• Describe how you made your clinical decision by applying these findings to the case, including how you considered and integrated the patient's preferences and values: 250-400 words

• Evaluate your performance: 50-100 words

1. Heneghan C, Badenoch D. *Evidence-based Medicine Toolkit*, 2nd ed. Oxford, UK: Blackwell Publishing, 2006. http://onlinelibrary.wiley.com/doi/10.1002/9780470750605.index/summary (download pdf of "all chapters" for free copy of the publication)

2. Jones-Harris AR. The evidence-based case report: a resource pack for chiropractors. *Clin Chiropr* 2003;6 73-84. (download for free from www.chiro.org/cases/FULL/Evidence-based_Case_Report.pdf)

Additional interesting articles to read about EBM and writing and EBCR:

Review an example of an EBCR at:
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Iran J Pediatr. 2010 Sep; 20(3): 261—268. Evidence Based Medicine in Pediatric Practice: Brief Review
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3446038/

J Can Chiropr Assoc. 2014 March; 58(1): 6—7. **Evidence-based case reports**
http://pubmedcentralcanada.ca/pmcc/articles/PMC3924510/

3 BMJ. Vol 7, Issue 3, 2002, **Evidence-Based Medicine in Practice: EBM Notebook**
http://ebm.bmj.com/content/7/3/68

Editorial

By Joyce Miller BSc, DC, FACO, FCC, FEAC (Paeds)
Editor, Journal of Clinical Chiropractic Pediatrics

By Sharon Vallone, DC, FICCP
Editor, Journal of Clinical Chiropractic Pediatrics

To our dedicated readership and new comers to JCCPonline.com. Here's some positive chiropractic publishing news published in 2025:

"**Conclusions:** This scoping review reports the volume and nature of indexed publications relating to chiropractic learners and programs worldwide. This body of literature contains learner competencies in knowledge, skills, and attitudes, as well as studies about chiropractic programs. The increasing number of publications and proportion of study designs over time show that chiropractic scholars and programs are engaged in collecting, analyzing, and distributing data relevant to education and training. The map of professional competencies in the chiropractic education literature shows that the profession possesses the fundamental traits needed to contribute to the global health care workforce."

> *Global status of chiropractic education research and scholarly publications: a scoping review*
> – Johnson, C. et al.

So how much of this is our pediatric literature? Are we doing our share of researching or observing, writing and publishing? Are we reading our own literature?

We have started something new this edition and we would like to hear your thoughts. It is called "Re-Publication "of previously published articles. These articles can come from other journals (with permission) or from our own past editions.

The reasons we have initiated this process are several. First, our own readers are busy and may not be able to browse all journals widely. We were asked by one author to re-publish from another journal to bring a wider audience's awareness to her research. This seemed like a win-win and we were happy to disseminate new information as widely as possible as it may be relevant to our unique audience.

Second, some older articles are landmarks that introduced important theories or methods. Republishing them helps modern readers understand how a field developed. It is also a benefit for students and researchers to learn from classic studies, including their strengths, limitations, and their influence on later research. An older article may become important again when new discoveries, technologies, or events make their findings especially relevant, or can renew our interest in the way that studies have been conducted and it may be relevant to continue that process.

Further, many older papers were difficult to obtain or were published before digital archives existed. Republishing them in an open-access journal makes them easier for researchers to access.

Some important contributions may have been overlooked when first published. Bringing them back to attention can give proper credit to researchers and ideas that were ahead of their time. It also reminds us that modern articles build upon previous work. Republishing foundational papers alongside new commentary helps readers see the connections between past and present research. It is also relevant for journals to republish older works with modern analyses or commentaries, encouraging discussion about how scientific understanding has changed over time.

In short, publishing articles from the past helps preserve scientific history, improve education, provide context for current research, and make important knowledge more accessible.

Scientific journals publish articles from the past because they strengthen the scientific record, improve present-day research, and recover knowledge that could otherwise be lost.

Please let us know what you think about our endeavor to add to your knowledge base in this particular manner.

May you have a peaceful year end, celebrating holidays or not, as we enter the season of rest and rejuvenation so that we can continue to be present for our young patients and rekindle our enthusiasm for our own endeavors to expand our horizons by reading, learning, practicing, writing and reporting to support each other in the care of this precious population.

Photobiomodulation as a Conservative Adjunct in Adolescent Idiopathic Scoliosis: A Three-Year Case Report

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ABSTRACT

Adolescent idiopathic scoliosis (AIS) presents challenges for conservative management, particularly in adolescents with large curves at diagnosis. This case report describes the three-year course of care for a 15-year-old female with severe AIS who received photobiomodulation therapy (PBM), integrated within routine chiropractic care that included spinal adjustments and exercise-based musculoskeletal support, as part of a non-bracing conservative management plan. Treatment included musculoskeletal and cranial PBM delivered with a 635 nm device using pulsed frequencies selected to support postural control and neuromuscular function. Radiographs obtained at six-month intervals demonstrated progressive reductions in Cobb angles, with thoracic curvature decreasing from 65° to 24° and lumbar curvature from 36° to 11°. Improvements were also observed in posture, pain, range of motion, and functional mobility, with no adverse effects reported. This case highlights the potential role of PBM as an adjunctive modality within conservative AIS management and supports further investigation into its clinical applications.

Key Words: Adolescent idiopathic scoliosis; photobiomodulation; low-level laser therapy; conservative management; chiropractic; case report

Introduction

Adolescent idiopathic scoliosis (AIS) affects approximately 2—3% of adolescents and is characterized by a lateral spinal curvature of unknown origin.[1] Conventional management strategies include observation, bracing, and surgical correction, each with limitations related to progression risk, patient tolerance, or long-term outcomes. These constraints have contributed to growing interest in non-invasive adjunctive approaches that may support musculoskeletal function and postural regulation.

Photobiomodulation therapy (PBM), also referred to as low-level laser therapy, has been explored in musculoskeletal rehabilitation for its potential effects on cellular metabolism, tissue recovery, and neuromuscular coordination.[2-5] Early reports combining PBM with postural rehabilitation techniques in AIS populations have described favorable changes in curvature magnitude and trunk symmetry, although published protocols vary widely.[6,7]

Given the need for additional documentation of conservative, non-invasive strategies for AIS, this case report describes the clinical presentation, intervention, and outcomes of a three-year course of musculoskeletal and cranial PBM in an adolescent with severe AIS.

PBM was selected as an adjunctive modality based on its emerging evidence base in musculoskeletal rehabilitation, including reported effects on cellular metabolism, neuromuscular coordination, and postural control.[2,8,9] Given the patient's preference for a non-bracing approach and the family's interest in conservative options, PBM was incorporated to support musculoskeletal function and postural regulation while avoiding the psychosocial and tolerance challenges associated with bracing. Figure 1 illustrates the interdisciplinary domains–photobiology, systems biology, energy medicine, and neurochemical modulation–that informed the PBM strategy applied in this case.

Case Presentation

A 15-year-old female was referred for evaluation following a school scoliosis screening that identified visible trunk asymmetry. Standing posteroanterior radiographs confirmed a right-convex thoracic curve from T3 to T10 measuring 65° at the apex of T7—T8, and a left-convex

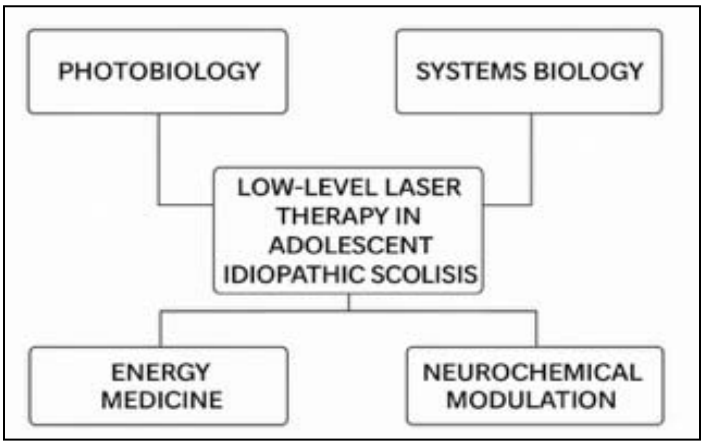


Figure 1. The interdisciplinary domains–photobiology, systems biology, energy medicine, and neurochemical modulation–that informed the PBM strategy.

lumbar curve from L1 to L4 measuring 36° at the apex of L2. Scoliosis severity was classified according to widely used radiographic thresholds, with curves greater than 40—45° considered severe due to their high likelihood of progression and reduced responsiveness to bracing; the patient's 65° thoracic curve and 36° lumbar curve therefore met criteria for severe AIS at presentation. Table 1 summarizes commonly used radiographic thresholds for AIS severity classification.

Axial rotation was most pronounced at the thoracic apex, corresponding to a right-sided rib prominence on the Adams Forward Bend Test. Sagittal views demonstrated preserved lumbar lordosis and mild thoracic hypokyphosis.

The patient reported intermittent discomfort during prolonged standing and occasional fatigue with physical activity. She denied radiating pain, numbness, weakness, or changes in bowel or bladder function. There was no history of trauma, congenital spinal deformity, or prior treatment for scoliosis. Neurological examination revealed normal reflexes, strength, and sensation in all extremities.

AIS Severity classification	Cobb Angle Range	Clinical Significance
Mild	10° – 25°	Typically monitored; low risk of progression in late adolescence
Moderate	25° – 40°	Higher risk of progression; bracing commonly recommended during growth
Severe	> 40° – 45°	High likelihood of progression; reduced responsiveness to bracing; surgical consultation often considered

Table 1. AIS Severity Classification.

The patient was otherwise healthy, active in school sports, and reported no limitations in daily activities. Her family sought a conservative, non-bracing approach due to concerns about bracing tolerance and psychosocial impact. Clinical evaluations were performed every three months, and radiographs were obtained at six-month intervals to monitor curvature progression and treatment response over the three-year period.

Intervention

The patient received photobiomodulation therapy (PBM) over a three-year period from 2015 to 2017. Treatment began with twice weekly sessions for the first six months, followed by weekly maintenance sessions. A Class II therapeutic laser operating at 635 nm was used with pulsed frequency modulation ranging from 1 to 750 Hz. Treatment was directed to musculoskeletal and cranial regions selected for their relevance to postural control, neuromuscular coordination, and symptom management.

Spinal manipulation

Spinal adjustments were provided at each visit based on segmental findings and patient presentation. These included high-velocity, low-amplitude manipulations directed to regions of joint restriction identified during examination. Spinal manipulation was integrated as part of the patient's routine chiropractic care throughout the three-year period and was not delivered at every PBM site or during every PBM application. No adverse effects were reported.

Exercise-based musculoskeletal support

Exercise protocols were incorporated throughout the course of care to support mobility, postural awareness, and muscular balance. These included targeted stretching, core stabilization activities, and functional movement exercises selected based on the patient's presentation and tolerance. Exercises were adjusted over time in response to clinical findings and were used to complement the goals of PBM and chiropractic care.

Musculoskeletal application

PBM was applied along the thoracic and lumbar curvatures, including the paraspinal musculature, associated nerve roots, and regions of palpable crepitus at the concavity of the curves. Frequencies commonly used in musculoskeletal applications were incorporated, including 5—53 Hz, along with higher frequency settings based on clinical response.[6] Dosages ranged from 4 to 6 J/cm² per site. Treatment also included attention to fascial anchor points and postural trigger zones to support mobility and reduce localized discomfort.

Cranial application

Cranial PBM was delivered to the bilateral prefrontal cortex, primary motor cortex, and occipital—parietal junction.

Frequencies between 1 and 4 Hz were used, with dosages of 3 to 4 J/cm² per site. These regions were selected to support neuromuscular coordination and postural awareness, based on emerging literature describing potential influences of PBM on cortical activity and sensorimotor integration.[7]

Throughout the course of care, treatment parameters were adjusted based on clinical presentation, radiographic findings, and patient tolerance. No adverse effects were reported at any point during the intervention period.

Outcomes

Radiographs obtained at six-month intervals demonstrated progressive reductions in curvature over the three-year course of care. The thoracic Cobb angle decreased from 65° at baseline to 24° at the final evaluation, and the lumbar Cobb angle decreased from 36° to 11°. These reductions exceeded the commonly accepted 5° threshold used to distinguish true radiographic change from measurement variability in scoliosis assessment, and surpassed the 10° benchmark often considered indicative of substantial structural change in AIS.

In adolescents with curves of this magnitude, the natural history of AIS typically involves continued progression, particularly for thoracic curves exceeding 50° at or near skeletal maturity. Long-term studies show that untreated curves greater than 40—45° commonly progress at an average rate of 0.5—1.5° per year after growth, with thoracic curves more likely to worsen than lumbar curves. Without intervention, a 65° thoracic curve in a 15-year-old would be expected to remain unstable and continue increasing over time, often leading to reduced pulmonary function, cosmetic concerns, and potential candidacy for surgical correction. Standard conservative management–primarily observation or bracing–has limited effectiveness in curves over 40°, and bracing is generally not recommended once curves exceed 45—50° due to low likelihood of halting progression. Within this context, the sustained reductions observed in this case contrast with the expected natural course of severe AIS.

Clinical evaluations performed every three months documented parallel improvements in posture, mobility, and symptom burden. The patient's pain score decreased from 4/10 to 1/10, and she demonstrated full, pain-free range of motion by the end of the treatment period. Shoulder and hip symmetry improved, and the rib prominence observed on the Adams Forward Bend Test diminished over time. The patient also reported enhanced postural awareness and improved tolerance for prolonged standing and physical activity.

Functional gains were reflected in increased participation in school and sports activities, with no reported limitations. No adverse effects occurred at any point during treatment, and the patient remained active and symptom stable throughout the three-year period.

Discussion

This case describes an adolescent with severe adolescent idiopathic scoliosis who demonstrated progressive reductions in thoracic and lumbar Cobb angles over a three-year course of photobiomodulation therapy (PBM). Improvements were also observed in posture, pain, and functional mobility. Although these changes occurred during the period of PBM intervention, the observational nature of a single case does not allow conclusions about causation.

PBM has been explored in musculoskeletal rehabilitation for its potential effects on tissue recovery, pain modulation, and neuromuscular function.[2-5] Early reports combining laser-based interventions with exercise in AIS populations have described favorable changes in curvature magnitude and trunk symmetry, although published protocols vary widely.[6,7] These findings suggest that PBM may have relevance as an adjunctive modality within conservative scoliosis care, particularly when integrated with approaches that support postural control.

PBM has also been associated with improvements in muscle performance and inflammatory markers in other musculoskeletal contexts, which may be relevant to conditions involving asymmetrical loading and muscular imbalance.[2] Additional studies have reported PBM-related improvements in tissue recovery and functional outcomes, further supporting its potential role in rehabilitation settings.[3,4]

In this case, PBM was integrated within a broader conservative care plan that included spinal adjustments and exercise-based musculoskeletal support, consistent with common clinical practice in AIS management. The multimodal nature of the intervention reflects common clinical practice in conservative AIS management, although it limits the ability to isolate the specific contribution of PBM to the observed changes. Cranial PBM was selected based on emerging literature describing potential influences on cortical activity and sensorimotor integration, although these mechanisms remain theoretical and require further investigation.[8] The patient's improvements in posture, pain, and functional mobility paralleled the radiographic changes observed over time, and the absence of adverse effects is consistent with the established safety profile of PBM in pediatric and adult populations.[3,4]

Bibliometric analyses indicate growing global interest in nonsurgical AIS management and adjunctive therapies, reflecting a broader shift toward conservative, patient-

centered approaches.[13,14] This case contributes to that developing literature by documenting sustained improvements over an extended period of non-bracing care.

Several practical considerations emerged during treatment. At the time of care, no standardized PBM protocols existed for AIS, particularly regarding cranial application, requiring clinical decision-making based on available literature and patient response. Insurance coverage for PBM was inconsistent, resulting in out-of-pocket costs for the family. Additionally, interpreting radiographic changes in a non-braced adolescent patient presents inherent challenges, as standard benchmarks for progression or regression were developed primarily for bracing and surgical contexts.

Despite these limitations, this case highlights the potential value of PBM as part of a broader conservative management strategy for AIS. Further research, including controlled studies, standardized protocols, and validated functional outcome measures, is needed to clarify the role of PBM in AIS and to determine which patients may benefit most from its use.

Conclusion

This case describes an adolescent with severe adolescent idiopathic scoliosis who demonstrated reductions in thoracic and lumbar Cobb angles, along with improvements in posture, pain, and functional mobility, over a three-year course of photobiomodulation therapy. Although the observational nature of a single case does not allow causal conclusions, the sustained improvements observed during the treatment period highlight the potential value of photobiomodulation as an adjunctive, non-invasive option within conservative scoliosis management. Further research, including controlled studies and standardized protocols, is needed to clarify the role of photobiomodulation in adolescent idiopathic scoliosis and to determine which patients may benefit most from its use.

Patient Consent

Written informed consent was obtained from the patient and her legal guardian for the publication of this case report and any accompanying clinical information.

Funding Statement

The authors received no external funding for this work.

Conflict of Interest

The authors declare that they have no competing interests.

Ethics and Consent Statement

Written informed consent was obtained from the patient and legal guardian for the publication of this case report. The study protocol was conducted in accordance with ethical standards for clinical case reporting. Formal ethics committee approval was not required, as this report describes a retrospective single patient intervention without experimental procedures.

Author Contributions

Michael John Bartell, D.C.: Conceived and implemented the clinical intervention; conducted patient evaluations and radiographic assessments; contributed to clinical interpretation and manuscript review.

Sherrie Myers Bartell, Ph.D.: Structured and drafted the manuscript; conducted literature review and theoretical integration; reconciled references and formatted citations; led editorial development and submission preparation.

Both authors reviewed and approved the final manuscript. They affirm that all references cited are accurately represented, formatted in Vancouver style, and correspond directly to the claims made in the text. No fabricated or misattributed references have been included.

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Low Back Pain in Elite Adolescent Footballers: Change in Self-Reported Disability Following Four Weeks of Multimodal Chiropractic Care

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ABSTRACT

Objectives: Low back pain (LBP) is common in the pediatric population and is a frequent complaint among elite youth football players. Spinal manipulation and other chiropractic methods have evidence of benefit for LBP in adults, but published data in elite pediatric footballers are scarce. This study examined whether four weekly visits of multimodal chiropractic care were associated with change in self-reported disability in male academy players aged 12—18 years. **Methods:** A pragmatic prospective cohort study was conducted in a private clinic in England. Sixty-two male players with LBP, all of whom played at full-time elite football academies, were recruited by convenience sampling. Each player completed the Modified Oswestry Disability Questionnaire before care and after four 30-minute visits over four consecutive weeks. Care comprised spinal manipulation, mobilization, soft-tissue therapy and active release, delivered by a registered chiropractor. A paired-samples t-test compared pre- and post-care scores. Reporting follows the STROBE statement for cohort studies. **Results:** All 62 players completed both questionnaires. Mean Modified Oswestry score fell from 11.81 before care to 4.92 after four visits ($t = -10.48$, $df = 61$, $p < 0.001$). Fifty-nine players (95%) improved and three were unchanged. Thirty-eight players (62%) moved to a more favorable disability category; 24 (38%) remained in the same category. Of 248 treatment encounters, four were followed by short-lived post-treatment soreness that settled with ice. No serious adverse events were recorded. **Conclusions:** A four-week course of chiropractic care was associated with a statistically significant reduction in self-reported LBP-related disability in elite male pediatric footballers and appeared well tolerated. The observational design precludes causal inference. Larger studies with longer follow-up, a comparison arm and pediatric-specific outcome measures are warranted.

Key words: chiropractic; multimodal care; low back pain; pediatric; adolescent; football; soccer; elite athlete; Modified Oswestry Disability Questionnaire; prospective cohort.

Introduction

Low back pain is among the most common musculoskeletal conditions worldwide in both adults and children.[1] It is defined as pain and discomfort below the costal margin and above the inferior gluteal folds, with or without referred leg pain.[1] Pediatric LBP becomes more prevalent through adolescence and with competitive sport,[2] and adolescent LBP is a recognized risk factor for LBP in adult life.[3]

In adolescent athletes the incidence of LBP has been estimated at 11%, with a three-month prevalence of 42%. Risk factors include sport participation, training volume and intensity, concurrent lower-limb pain, body-mass index above 25, increasing age, female sex and a family history of LBP.[4] Young elite athletes have been reported to experience LBP three to five times more often than the general pediatric population.[5] In youth football, LBP sits alongside hamstring, quadriceps and groin strains as a leading complaint.[6] Injury audits in high-level male academy players have identified 14—16 years as a particularly vulnerable window, coinciding with rapid skeletal growth.[7]

Earlier suggestions that hyperlordosis was the principal cause of LBP in young athletes have not been sustained.[8] Current mechanistic accounts emphasize repetitive lumbar extension, restricted hip motion with compensatory lumbar extension,[9] hamstring tightness[6] and reduced trunk-muscle capacity.[10] Spondylolysis is the diagnosis most often cited in pediatric footballers with LBP[6,11-15] and is more frequent in young athletes who specialize in a single sport.[12] Across pediatric athletes more broadly, non-specific LBP remains the most common presentation (34%), followed by spondylolysis (28%), disc herniation (8%), sacroiliac pain (7%), lumbar facet pain (6%) and other diagnoses (17%).[16]

Usual care for LBP in youth footballers typically comprises

analgesia, activity restriction and exercise.[6] For lumbar spondylolysis, a three-month break from football has been recommended if a symptom-free return is the goal.[11] In the elite academy setting such a layoff is rarely acceptable: most players hold short contracts, and prolonged absence can jeopardize progression. Alternative approaches that allow earlier, safer return to training are therefore of practical importance.

Chiropractic care for LBP in pediatric athletes has received little published attention. Interdisciplinary pediatric LBP guidance emphasizes physical activity and, where needed, psychologically informed programs; a mixed-studies review has suggested that combining manual therapy with physical activity may be useful in the clinic.[17,18] No consensus guideline exists specifically for LBP in pediatric athletes.[16]

The question addressed here was: in elite male footballers aged 12—18 years with LBP, is a course of four weekly chiropractic visits associated with change in self-reported disability? The working hypothesis was that Modified Oswestry scores would be lower after four weeks of care.

Methods

Study design

This was a pragmatic prospective cohort study. That design was used because the research question asked whether self-reported disability changed after a defined course of care in a niche group already identified by their clinical presentation, and because prospective data collection allowed the findings to be applied in the same setting. Convenience sampling was used because the investigator already worked within full-time elite football academies. The study is reported in accordance with the STROBE statement for observational studies.[19]

Setting and usual care

Care was delivered in a private clinic, not at the academies. Participants were players at full-time elite football academies in England who attended the clinic for treatment. Data collection took place during the competitive academy season. Players remained full-time at their clubs throughout the four-week course. They were withheld from match play and on-pitch football training because of ongoing LBP that had not settled with first-line club physiotherapy, but they continued other gym-based conditioning sessions. To keep the process consistent, every participant followed the same pathway. After parental or guardian consent, the Modified Oswestry Disability Questionnaire was completed. The first visit comprised a case history, neurological and orthopedic examination, explanation of findings and, once consent for treatment was given, a 30-minute treatment. Treatment combined mobilizations, soft-tissue therapy, active release and spinal manipulation, provided by a registered chiropractor. Each player was then seen weekly for four consecutive weeks and completed the same questionnaire after the fourth visit.

Participants

Inclusion criteria were male sex; age 12—18 years; LBP defined as pain from the twelfth rib to the gluteal folds;[1] playing at full-time elite football academies in England; and the ability to attend weekly care for four consecutive weeks. Exclusion criteria were concurrent participation in another organized sport; pain confined to the cervical or thoracic spine; concurrent treatment of LBP by another practitioner; contraindications to manual care (hypermobility, osteoporosis, acute fracture, acute infection, malignancy, fever); and a pre-existing spinal diagnosis of malignancy, recent fracture or whiplash.

Convenience sampling was used because the investigator treated this group in private clinic practice. The target population was male footballers aged 12—18 years who played at full-time elite academies in England and were experiencing low back pain. Restricting the sample to that level was intended to capture players at the elite end of the sport in the country, where published chiropractic data are scarce. A sample of 30—60 was planned so that the size would be comparable with previous football and adolescent-athlete LBP series (34—58 participants).[11,20,21]

Outcome measure

The primary outcome was change in the Modified Oswestry Disability Questionnaire, a widely used LBP disability scale that has been applied in pediatric athletes and has acceptable reliability and responsiveness.[21-24] Each of the 10 sections is scored from 0 to 5, giving a raw total of 0—50; a higher score indicates greater disability. Disability groups followed Fairbank and Pynsent.[25] No disability: the patient can cope with most living activities and usually no treatment is indicated apart from advice on lifting, sitting and exercise. Mild disability: the patient experiences more pain and difficulty with sitting, lifting and standing; travel and social life are more difficult, and the patient can usually be managed by conservative means. Moderate disability: pain remains the main problem and activities of daily living are affected. Severe disability: pain impacts all aspects of the patient's life and intervention is required. A total score of 20 or more indicated moderate disability or worse. Secondary descriptive variables collected from the new-patient record were age, pain quality, 0—10 visual analogue scale (VAS) intensity, and mode of onset (training, match, or insidious morning pain). Adverse events were taken from contemporaneous treatment notes.

Data collection

After a briefing and written parental consent with player assent, the baseline questionnaire was completed before the

first treatment and stored with the clinical file in a locked cabinet. The same questionnaire was completed after the fourth visit. The investigator left the room during the second completion to reduce demand characteristics. Each player was assigned a random study number. Identifiable records were retained in line with General Chiropractic Council guidance, then scanned to password-protected storage. No identifiable information is presented.

Statistical analysis

Pre- and post-care scores were compared with a paired-samples t-test in Microsoft Excel, with a two-sided significance level of 0.05. The null hypothesis was that mean scores before and after care were equal. Pearson's correlation, variance and degrees of freedom were calculated. Category shifts on the Modified Oswestry scale, pain quality, VAS, onset context and adverse events were summarized descriptively. No imputation was required; there were no missing questionnaires.

Ethics

The study was approved by the AECC University College Research Ethics Committee (United Kingdom: E152/07/2021). Written informed consent was obtained from a parent or guardian and assent from each player. Both were reminded of the right to withdraw at any time, with immediate disposal of their data. A parent or guardian was present at visits. Consent for treatment was reconfirmed at each encounter. Data handling followed UK GDPR. Infection-control measures current at the time of the COVID-19 pandemic (disinfection of paperwork and surfaces, personal protective equipment, and club testing protocols) were observed.

Results

Participants

Sixty-two players met the criteria, completed four visits and returned both questionnaires. There were no drop-outs and no incomplete forms. The most frequent ages were 15 and 17 years; 14 years was the least represented age. No single age band dominated the sample.

Category	n	%
No (minimal) disability	12	19
Mild disability	26	42
Moderate disability	22	35
Severe disability	2	3
Total	62	100

No disability: most daily activities possible; advice on lifting, sitting and exercise usually sufficient. Mild: more pain and difficulty with sitting, lifting and standing; travel and social life harder; usually manageable conservatively. Moderate: pain remains the main problem and daily activities are affected. Severe: pain affects all aspects of life and intervention is required.

Table 1. Modified Oswestry disability category at baseline (n = 62). Categories follow Fairbank and Pynsent (2000).

Baseline clinical features

Before care, 12 players (19%) were classified as no disability, 26 (42%) as mild, 22 (35%) as moderate and two (3%) as severe (Table 1). Twelve players therefore scored in the "no disability" band despite symptoms sufficient to trigger academy medical referral and to affect football performance, which suggests that the instrument may under-capture sport-specific limitation in this group.

Pain was described as a dull ache in 54 players (87%) and as sharp in eight (13%) (Table 2). Six of the eight players with sharp pain scored 20 or more and therefore fell in the moderate or severe bands. VAS intensity ranged from 2/10 to 10/10 (median 3/10); the most frequent scores were 3/10, 4/10 and 7/10, and only two players rated pain at 2/10 (Table 3). Onset was during a match in 33 players (53%), during training in 27 (44%) and on waking in two (3%) (Table 4).

Character		n	%
Dull ache	54	87	
Sharp		8	13

Table 2. Character of pain at presentation (n = 62).

VAS score	n	%
2/10	2	3
3/10	10	16
4/10	12	19
5/10	7	11
6/10	7	11
7/10	12	19
8/10	5	8
9/10	5	8
10/10	2	3

Table 3. Baseline visual analogue scale intensity (n = 62).

Onset	n	%
During a match	33	53
During training	27	44
Insidious, on waking	2	3

Statistical summary (not a separate numbered table in the original dissertation output, reproduced here for completeness). Paired two-sample t-test of Modified Oswestry scores: mean after care 4.92; mean before care 11.81; Pearson correlation 0.75; hypothesized mean difference 0; df 61; t statistic -10.48; P(T≤t) one-tail 1.45 × 10-15; t critical one-tail 1.67.

Table 4. Mode of onset (n = 62).

Primary outcome
Mean Modified Oswestry score was 11.81 before care and 4.92 after four visits (variance 54.29 and 51.78 respectively; Pearson r = 0.75; t = -10.48; df = 61; one-tailed p = 1.45 × 10-15). The reduction was statistically significant at the pre-specified 0.05 level, and the one-tailed result was consistent with a lower mean after care. Fifty-nine players (95%) improved; three (5%) were unchanged.

Thirty-eight players (62%) moved to a more favorable Modified Oswestry category and 24 (38%) remained in the same category. The most common shift was mild to no disability (37% of the cohort). A further 10% moved from moderate to no disability, 13% from moderate to mild, and 2% from severe to moderate. Thus, most players improved numerically, but more than one third did not change category, so a four-visit course did not produce a categorical change in quality-of-life band for every participant.
Adverse events

Across 248 encounters the only reported adverse effect was post-treatment soreness lasting up to two days in four players, each after the first visit only. Ice was advised and was sufficient in all four. No further soreness and no serious adverse events were recorded.

Discussion
Four weekly chiropractic visits were associated with a statistically significant reduction in Modified Oswestry scores in this cohort of elite male footballers aged 12—18 years playing at full-time academies in England. Ninety-five percent of players improved, 62% changed disability category, and the adverse-event profile was limited to brief, first-visit soreness. Because this was an uncontrolled observational study, these changes cannot be attributed to chiropractic care alone. Before chiropractic care, the players had already been seen by the club physiotherapist, which is the first port of call in this setting, and had not responded adequately to that care.

Age was not clearly related to the presence of LBP in this sample, in contrast to Hall and colleagues, who reported peak academy injury between 14 and 16 years in a much larger multi-country audit,[7] and to a ten-season study at Clairefontaine that similarly found higher injury rates at 14 years of age.[31] It also contrasts with some athletic LBP series in which middle adolescence predominated.[16] The present findings are closer to those of Brito et al. in sub-elite youth football, where LBP did not rise steadily with age.[26] A longer, larger surveillance study would be needed before age could be used to target pre-emptive chiropractic input.
The direction of change differs from Fritz and Clifford, who reported a poorer disability prognosis in adolescent athletes than in non-athletes treated with physical therapy.[21] Direct comparison is limited: their sample mixed sports, the content of therapy was not fully specified, and the present cohort received a standardized chiropractic package after failed first-line care. The results are more in keeping with Manansala and colleagues, who found clinically important improvement in adolescent spinal pain with chiropractic care,[27] and with Piper and DeGraauw, who described resolution of adolescent athletic LBP within a month of conservative care, albeit without lumbar manipulation in every case and with later recurrence on return to play.[28] El Rassi et al. recommended three months away from football for spondylolysis;[11] the present players continued inside the academy program while receiving care. Diagnostic homogeneity cannot be assumed here, and the study was not designed to test spondylolysis protocols.

Match play accounted for slightly more onsets than training (53% versus 44%), which is consistent with other youth-football injury work,[29] although the difference was modest. The largest categorical gains were in players who started in the mild-disability band, 37% of the whole cohort moving from mild to no disability. That observation may be useful for academy triage: players with LBP and a mild Modified Oswestry band appear particularly likely to change category after four visits. Players who remained in the same band (38%) may need a longer course; Evans et al. found additional benefit with extended conservative schedules,[30] and Piper and DeGraauw required further visits after early recurrence.[28]

Safety is a frequent concern when manual care is discussed for adolescents. Four mild, self-limited events in 248 visits, and no serious events, provide limited but practically relevant reassurance in this tightly defined group. The figure should not be generalized to all pediatric manual-therapy contexts.

Limitations
Several limitations follow from the design. There was no comparison group, so the observed change cannot be attributed to chiropractic care. The design cannot determine how much of the change was due to the multimodal chiropractic package, natural recovery, regression to the mean, concurrent academy rehabilitation, or expectation and placebo effects. The investigator was also the treating clinician, and players knew a study was underway; they may therefore have answered as they thought was expected. The investigator left the room while the second questionnaire was completed in order to reduce that bias, but it cannot be excluded. Convenience sampling from full-time elite academies in England limits how far the findings can be applied to female players, non-elite settings and other sports. Female academy players were not included, so the findings cannot be applied to that group.

The Modified Oswestry Disability Questionnaire was not

developed for elite adolescent footballers and is not fully validated in children and adolescents. Some domains (sitting, lifting, traveling) may not capture sport-specific functional restrictions in academy football, which likely explains why 12 symptomatic players scored as "no disability" at baseline. Players were seen during the competitive season. They remained full-time at their clubs, were not participating in matches or on-pitch football training during the four treatment weeks, and continued gym-based conditioning. Concurrent gym work and time away from play are therefore alternative explanations for part of the observed change; the improvement cannot be attributed to the chiropractic package alone. Calendar timing within the season (for example pre-season versus mid-season) was not recorded; previous work has found clustering of injuries at the start of the season and after the winter break[32]. There was no follow-up after the four-week course, so it is not known whether the change lasted. If the study were repeated, a review at two months and a longer course (for example eight weekly visits with questionnaires at weeks 0, 4, 6 and 8) would address those gaps. Treatment was a multimodal package; the contribution of manipulation versus soft-tissue care cannot be separated.

Implications

Within these constraints, the findings support considering chiropractic care as one option in the academy pathway for male players aged 12—18 years whose LBP has not settled with first-line physiotherapy, particularly those in the mild-disability band. The treatment mix used here – manipulation, mobilization, soft-tissue therapy and active release – was deliverable in a 30-minute private-clinic visit and was not associated with serious harm in this series. Future work should include a comparison arm, female academies, eight- to twelve-week dose—response follow-up, a pediatric or sport-specific disability scale, and blinding of outcome assessment.

Conclusion

In 62 elite male pediatric footballers, four weekly chiropractic visits were associated with a significant reduction in Modified Oswestry disability scores, improvement in 95% of players, and only minor, transient soreness. The greatest categorical change occurred in players with mild baseline disability. These observational data do not prove effectiveness, but they provide a foundation for controlled studies and a practical starting point for academy medical teams considering manual care for this under-described group.

Acknowledgements

This work formed part of the author's Master of Science in Musculoskeletal Paediatric Health (Paeds MSc) at AECC University College (now Health Sciences University). Players and parents gave their time during a demanding season.

Funding and conflicts of interest

This work received no external funding. The author was the treating clinician in the private clinic during data collection and is the sole author. No other financial or competing interests are declared.

Informed consent and ethics

Parental written consent and player assent were obtained for all participants. The protocol was approved by AECC University College Research Ethics Committee (E152/07/2021).

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Cow's milk allergy verses cow's milk intolerance in infants

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ABSTRACT

Cow's milk allergy (CMA) and cow's milk intolerance (CMI) are common early-life feeding problems, but their overlap can obscure a crucial distinction: CMA is immune-mediated, whereas many forms of CMI are non-immune and often involve lactose malabsorption. Because eczema, vomiting, reflux-like symptoms, diarrhea, mucus in the stool, irritability, colic-like crying, and disrupted sleep can arise through more than one mechanism, management must avoid unsafe substitutions and distinguish dietary treatment from supportive care. The essay differentiates CMA from CMI, reviews diagnosis and treatment, and proposes a cautious 12-week adjunct chiropractic protocol focused on safety, interdisciplinary care, and measurable outcomes for a 12-week-old formula-fed infant with confirmed CMA and cross-reactivity to soy and goat milk.

Key words: Cow's milk allergy, cow's milk intolerance, chiropractic, probiotics, pediatric, infant, formula.

Introduction

CMA is an immune-mediated adverse reaction to cow's milk proteins. Important allergens include caseins and whey proteins such as beta-lactoglobulin and alpha-lactalbumin. It may be IgE-mediated, non-IgE-mediated, or mixed; these phenotypes differ in timing, severity, and diagnostic usefulness of tests such as specific IgE and skin prick testing.[1-3] IgE-mediated reactions are typically immediate, often appearing within minutes to two hours of exposure, and may include urticaria, angioedema, vomiting, wheeze, or anaphylaxis.

Non-IgE-mediated reactions are usually delayed, developing over several hours to days, and commonly present with gastrointestinal or skin symptoms such as proctocolitis, enteropathy-like symptoms, reflux-like distress, diarrhea, or eczema; because IgE testing is often negative, diagnosis depends more heavily on clinical history, elimination, and supervised re-challenge where appropriate. Mixed reactions involve both IgE and cellular immune mechanisms and may produce overlapping immediate and delayed features, making careful classification important for risk assessment and follow-up.[4,5]

By contrast, CMI is often used for non-immune adverse reactions to milk, most commonly lactose malabsorption due to lactase deficiency. It does not involve immune sensitization to cow's milk proteins, so management must be related to the mechanism rather than the broad label of "intolerance".[2,6] The clinical importance of this distinction is risk. IgE-mediated CMA can involve rapid systemic reactions, including urticaria, wheeze, or anaphylaxis, while non-IgE disease more often produces delayed gastrointestinal and skin symptoms.[2,3] Lactose intolerance more commonly produces gas, bloating, and diarrhea-like symptoms through osmotic and fermentative effects rather than allergy.

Recent literature confirms that milk-related symptoms should not be linked to lactose alone. Pal et al.[7] argue that A1 beta-casein may contribute to gastrointestinal symptoms, Darma et al.[8] distinguishes lactose intolerance from immune reactions to casein and beta-lactoglobulin, and Al-Beltagi et al.[9] frames cow's milk-related gastrointestinal disorders as mechanistically diverse. Together, these studies support this paper's central claim: similar digestive symptoms may arise from lactose malabsorption, immune responses to casein or whey proteins, or other protein-related mechanisms, so treatment must follow the underlying cause.

Because symptoms overlap, diagnosis should rely on structured history, elimination response, risk assessment, and medically supervised testing or food challenge where indicated. Cross-reactivity can be a central problem here, so substitution decisions must remain practitioner guided.[2,6] The updated ESPGHAN position paper reinforces short diagnostic elimination followed by challenge where appropriate and warns that over-diagnosis can also harm infants through unnecessary restriction.[10] In the case presented in this paper, a confirmed allergy and cross-reactivity move care away from trial-and-error feeding changes and toward structured risk management.

Some chiropractic frameworks describe reflex pathways between visceral input and somatic output. In this essay, gastrointestinal inflammation or discomfort may influence autonomic regulation, and lead to a viscerosomatic reflex resulting in somatic dysfunction.

METHODS

Utilized Chiro Index and Google Scholar for literature review including randomized control trials involving cow's milk allergy and cow's milk intolerance and the impact it may have on infants. Also, chiropractic pediatric textbooks were consulted. Informed consent was obtained from patient's guardian for publication.

CASE PARAMETERS AND OUTCOME MEASURES

- 12-week-old formula-fed infant with confirmed CMA and cross-reactivity to soy and goat milk.
- Primary management remains a practitioner-mediated elimination, hypoallergenic formula selection, and growth monitoring.
- Chiropractic care is typically considered adjunctive, but varies with advanced training, using gentle low-force approaches for suspected musculoskeletal discomfort and stopping if adverse responses occur.

Progress is tracked with a weekly diary covering GI symptoms, eczema, sleep, growth, handling/tummy-time tolerance, and adverse events. Outcomes should be interpreted as patterns: improved sleep matters only alongside stable feeding, normal growth, and no flare; improved positioning may reflect reduced discomfort, maturation, caregiver confidence, or manual-care effects rather than allergy improvement. The 12-week structure should therefore be understood as a pragmatic monitoring and reassessment window rather than a proven chiropractic dose-response schedule. It allows time for dietary elimination as directed by their medical physician, feeding assessment, growth review, and repeated functional observation while keeping manual care explicitly secondary to dietary and medical management as needed.

Treatment begins with strict avoidance of cow's milk protein and confirmed cross-reactive triggers, supported by hypoallergenic formula selection, growth monitoring, and attention to micronutrient adequacy. Extensively hydrolyzed formulas are common first-line options, while amino acid-based formulas are usually reserved for severe cases or intolerance of extensively hydrolyzed formulas. Goat milk cannot be assumed safe, and soy or rice-based alternatives require careful selection because allergenicity, cross-reactivity, nutritional adequacy, and regulatory suitability vary.[11]

Vanderhoof and Kleinman[12] add that infants with cow's milk protein allergy require careful iron consideration because cow's milk exposure, intestinal inflammation, and restrictive feeding patterns may increase risk for iron deficiency; therefore, formula choice, growth review, and dietary follow-up should include iron sufficiency rather than symptom control alone.

Evaluation should also include feeding mechanics: an IBCLC or feeding-trained clinician can assess oral function, bottle flow, aerophagia, tethered oral tissues, and feeding techniques that may mimic or worsen reflux-like symptoms. Restrictive tethered oral tissues can limit tongue mobility and may interfere with achieving or maintaining an effective seal and coordinated suck—swallow—breathe pattern, contributing to shallow or unstable latch, inefficient milk transfer, prolonged feeds, clicking, fatigue, and greater air intake.[13-15] Swallowed air and compensatory feeding patterns may contribute to burping, gas, abdominal discomfort, or reflux-like symptoms, although these findings are not specific to oral restriction and should not be confused with allergic gastrointestinal disease.

A 2024 systematic review and meta-analysis reported improvement in parent-reported infant reflux scores after restrictive oral-tissue release, but the evidence included predominantly observational studies and does not establish that release is appropriate for every infant with GI symptoms.[16] Current practice guidance therefore emphasizes diagnosis based on functional restriction rather than anatomy alone, multidisciplinary assessment, and individualized management with feeding support before and after any procedure.[17]

If symptoms persist after formula change, clinicians should reassess preparation technique, accidental exposure, feeding volume, stool and skin patterns, weight gain, and whether symptoms are allergic, feeding-related, or functional. In this particular case presentation, the chiropractor is also an IBCLC and an oral functional exam as well as a biomechanical evaluation is part of the initial evaluation, supporting a multidisciplinary approach to care.

Probiotics may be considered only as adjunctive, strain-specific interventions. Reviews propose mechanisms including microbiota modulation, barrier support, immune regulation, oral tolerance, and modification of allergenic epitopes.[18-21] Ezaki et al.[22] suggests probiotics may help selected high-risk neonates with dysbiosis after surgery and antibiotics, but probiotics should not replace elimination or formula management. Prebiotics remain promising but not universally established.[18]

Lactose-focused strategies require separate interpretation because they address a different mechanism from immune-mediated CMA. Kanabar, Randhawa and Clayton[23] found that lactase reduced breath hydrogen and crying time in some infants with colic, and Leis et al.[24] reported positive but heterogeneous probiotic findings in lactose intolerance. However, Pal et al.[7] and Darma et al.[8] caution that milk-related symptoms may also involve casein, beta-lactoglobulin, or other milk-protein mechanisms. Lactase or lactose reduction may help only when lactose

malabsorption is the problem; it should not be presented as treatment for confirmed CMA.

Vitamin D should be positioned as nutritional support rather than CMA treatment. Peng et al.[25] found that supplementation did not significantly prevent allergic diseases overall, including food allergy outcomes.

12-WEEK ADJUNCT CHIROPRACTIC PROTOCOL

Weeks 1—2: screen red flags, confirm medical alignment, establish baseline symptoms, and assess tolerance for positioning, head/neck movement, and gentle palpation. Low-force intervention is used only when clinically indicated and tolerated. Caregiver education is essential. The chiropractor should clarify that manual care does not desensitize the infant or replace dietary management. Parents should seek review for poor weight gain, blood in stool, persistent vomiting, lethargy, dehydration, respiratory symptoms, or signs of acute allergic reaction, if not addressed in the chiropractic office.

Weeks 3—8: provide weekly then reduced-frequency care focused on comfort, positional tolerance, gentle mobility, and caregiver-led home positioning. If GI flares or adverse responses occur, manual care is paused, dietary adherence is reviewed and referral to medical care as warranted. The middle phase remains flexible: if feeding and growth are stable, care may focus on spinal manipulation, fascial restriction, and overall well-being; if symptoms worsen, the priority is plan review, allergen-exposure assessment and medical review, not just increased chiropractic frequency.

Weeks 9—12: consolidate gains, reassess the full outcome set, and either discharge to caregiver-led strategies or coordinate further practitioner review if symptoms persist. Discharge depends on improved GI comfort, stable or reduced eczema, improved sleep or handling tolerance, acceptable growth, and no adverse events. By the final phase, success means stable improvement without dependence on practitioner-led care: confident caregiver routines, fewer distress signals during handling, and continued effectiveness of medical nutritional management. Inconsistent gains require cautious interpretation and possible medical, dietetic, feeding, or developmental reassessment.

DISCUSSION

Expected improvements in GI symptoms and eczema are most defensibly attributed to effective elimination and medical management.[2,6] When functionally restrictive tethered oral tissues or other feeding-mechanics problems are present, appropriately coordinated feeding support, in selected cases, oral-tissue release by a qualified clinician, may improve latch, seal, milk transfer, and aerophagia-related discomfort; these outcomes should be documented separately from changes in CMA.[16,17]

Chiropractic care may be used adjunctively to address identified musculoskeletal contributors to feeding position, comfort, and movement, but it should not be described as releasing oral restrictions or treating the allergic mechanism. Outcomes may also reflect diet, maturation, caregiver technique, and non-specific effects. Gentle, infant-appropriate manual care may support comfort and function. The medical team addresses the allergic mechanism, if it is not supported in the chiropractic office.

Hawk et al.[26] supports cautious pediatric chiropractic best-practice boundaries, and Bialosky et al.[27] frames manual therapy effects as neuromodulatory and functional rather than immune-curative. Chiropractic reports and pediatric texts provide clinical context, not proof of disease modification.[28-30]

CONCLUSION

In conclusion, CMA and CMI may look similar but require different clinical logic. CMA is immune-mediated and requires accurate diagnosis, cow's milk protein elimination, management of cross-reactive foods, and medical supervision. CMI is often non-immune, but it should not be reduced automatically to lactose intolerance. Evidence on A1 beta-casein, casein, and beta-lactoglobulin reinforces that similar gastrointestinal symptoms can arise from lactose malabsorption, immune milk-protein reactions, or other protein-related mechanisms.

A layered model is therefore safest: medical nutrition controls allergen exposure and protects growth; microbiome strategies remain promising but context-dependent; and lactase approaches apply only when lactose malabsorption is confirmed. Overall, the safest model is integrated care: medical nutrition often treats the disease process, while chiropractic care focuses on low-force, measurable outcomes and interdisciplinary review.

Chiropractors, with advanced training, are managing cases like the one presented in this paper, offering a more comprehensive treatment from chiropractic adjustments, oral evaluations, allergy and/or sensitivity testing, guidance on food elimination, and nutritional support for gut healing, as well as referrals to other practitioners as warranted. More research and case studies need to be completed to further evaluate the efficacy of chiropractic adjustments and specialized treatments.

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Joyce Miller BSc, DC, FACO, FCC, FEAC (Paeds); and Sue Weber Hellstenius BSc, DC, MSc (Chiro Paediatrics), Is Infant Colic An Allergic Response to Cow's Milk? What Is The Evidence? Reprinted here with permission from the *Journal of Clinical Chiropractic Pediatrics*, Volume 14, No. 1, June 2013.

Is Infant Colic An Allergic Response to Cow's Milk? What Is The Evidence?

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ABSTRACT

Background: Despite enormous effort spent in determining a cause for infant colic, the source of the problem still eludes researchers. **Objective:** To review the published evidence to establish whether infant colic is due to an allergic reaction to cow's milk. **Method:** A literature search was completed using Medline, Cochrane Clinical Review and a hand search from 1980 to March 2013. Publications were included if they were systematic reviews, RCTs with a control group, or specifically related to dietary interventions. **Results:** The majority of studies had faults due to non-randomization, non-blinding, too few participants, skewed populations and inadequate follow-ups. There appeared to be some relief of crying with change in diet in several studies, but crying time was still considered longer than normal. **Conclusion:** There is no clear evidence that infant colic is a form of cow's milk protein allergy (CMPA). Research trials have been contaminated with a subgroup of infants who have been diagnosed with colic who actually have CMPA. Future studies need to subgroup the irritable infant to better understand the etiology of colic.

Keywords: infant colic, allergy, soy, dairy and dietary interventionstic, probiotics, pediatric, infant, formula.

Introduction

Infant colic is the leading cause of patient visits to clinicians in the first six months of life with one in six families consulting from one to seven physicians in the first 16 weeks of life.[1,2] Infant colic is defined as excessive crying in an otherwise healthy infant, commonly linked to paroxysmal abdominal pains.[3] The classic Wessel definition is an infant crying more than three hours a day more than three days a week for more than three weeks.[1,2] No link to the specific source of infant nutrition, either breast milk or formula milks has been found.[4] However, several studies have given conflicting evidence as to the relationship between diet and infant colic. Three systematic reviews disagree as to the evidence-based role for hypoallergenic diet.[5-7] Other studies disagree as to whether or not the prevalence of colic is higher in infants with a family history of atopy or allergies.[8,9] However, recent management strategies have stated that crying may reduce with the elimination of cow's milk protein (CMP) in the infant who is afflicted with infant colic.[10] Considering the conflicting advice to clinicians and parents, this review aims to examine the evidence in order to answer the clinical question, "Is infant colic an allergic response to cow's milk protein?"

Cow's milk protein allergy (CMPA) is the most common food allergic disease of infancy.[11] Symptoms of CMPA are shown in 5-15% of infants,[12] with a range of prevalence between 2 and 7.5%.[12] Infant colic is said to afflict 5-40% of infants with the most common prevalence of 21%.[1-7] Soy protein is the most common substitute for milk protein. It is not only another common infant allergen,[13] but it has been found to be a cross allergen with milk protein.[14] The ESPGHAN Committee has recommended that soy protein be withheld from infants showing signs of allergy/intolerance.[13]

Methods

A literature search using the key words infant colic, allergy and dietary interventions was completed using Medline, Cochrane Clinical Review and a hand search from 1980 to March 2013. Publications were included if they were systematic reviews, RCTs with a control group, or specifically related to dietary interventions. Those

which showed any positive results were included. In all, 142 articles were sourced with 14 meeting the criteria of the search. Other general articles were used to supply background to the study.

Results

Characteristics and results of included trials are found in Table 1. Pertinent features of infant colic and pertinent features of CMPA are shown in Table 2. The NICE guidelines for infant colic are presented in Table 3.[24] A study into whether cow's milk allergy was the etiology of infant colic was undertaken by Campbell in 1989. This study followed 19 formula-fed subjects out of 41 who were referred for severe colic[15] and randomised to soy formula (SF) or cow's milk formula (CMF). If crying did not decrease, the infant was given a highly hydrolyzed formula (HF). This was a small sample in a region which produced 650 newborns annually and there would logically have been a potential sample of at least 175 infants who might have had colic during the time frame of the study. The small sample

Authors	Type of Study/Number Subjects/Intervention	Results/commentary
Campbell[15]	RCT/ 41 infants referred for study; 19 of 3-14 weeks of age (11 from atopic families) accepted; ½ given Soya Milk (Cow and Gate Formula S) and ½ given C&G Premium. Those not improving on either were given milk free of whole protein (Cow and Gate Peptalac) on unblinded basis	Crying decreased to 9 hours per week or less with soya formula/problems of study were non-random selection process (over ½ from atopic families), no blinding of CMP-free formula, age of entry into trial too old and admits bias of natural history reduction in crying; poor quality RCT which did not give method of randomisation
Estep and Kulczycki[16,17]	2 studies substituting Neocate, amino acid based infant formula v standard milk formula and breast milk, N=6 in each study	Reduction in total cry/fuss time 45% = 148 mins/sample size of 6 is too small to apply to a general population; non-blinding
Evans, et. al.[19]	RCT, infants 3-18 weeks of age, Elimination of cow's milk in breast feeding mother in cross-over trial	Elimination of cow's milk had no significant effect on colic, wide range of ages of infants may have biased natural history
Forsythe[20]	RCT/17 infants <8 weeks/4 days on CMF alternating twice with 4 days extensively hydrolysed formula	Resulted in increased crying on CMF and reduced crying on HIF, but this attenuated on second round. This is a small sample with reducing effect even within the trial time of 16 days; no known effect in longer term.
Hill, et.al.[21]	Comparison trial of effects of 2 maternal diet programs, i.e. a low-allergen diet that excluded major food allergens v control diet that included these foods (n=77). Bottle fed infants on modified CM formula (Enfalac) or hypoallergenic formula (Progestimil) (n=38)	25% reduction in crying time, not resolution of colic was used as outcome measure, but 2/3 infants still had colic by Wessel's definition at end of the 7 day trial/method of randomisation not discussed; unblinded trial may have created significant bias.
Lothe and Lindberg and Jakobsson[22]	Intervention/N=60 infants 2-12 weeks of age/32 given casein hydrolysate formula (Nutramigen) replaced CM infant formula	Crying time reported by parents reduced significantly after 5 days. Authors concluded that colicky infants turn into children afflicted with cow's milk protein allergy or intolerance.
Berseth, et al.[24]	Randomised double blind parallel group study/158 infants 1-8 weeks of age of parent-defined fussy or extremely fussy infants randomised to soy formula (SF) or partially hydrolysed formula (PHF) for 28 days	Results recorded on electronic diary including fussiness, gas, spit-up, crying time and bowel habits; no intention-to-treat analysis. Significant reductions in fussiness rating and crying times in both groups at 28 days, but crying time still >3 hours. True blinding may not have occurred due to recognisable odour. Natural history not taken into account in 28 day trial. Dropout of 28% (SF) and 18% (PHF) is high but acceptable.

Table 1. Summary of studies investigating infant colic and cow's milk protein allergy.

may have occurred because the inclusion criteria required "severe" colic. Those eliminated were due to the lack of severe symptoms. There was no evidence of randomization. It seems likely that many of those in the study didn't, in fact, have colic, but may have had CMPA. In the final analysis, 13 infants (2% of total infant population) were identified as "colic" babies, a number not inconsistent with the number expected to experience CMPA. Eleven of those 13 had a positive family history of atopy and all had crying that was more extensive and more sporadic than usually defined as common colic, seeming to an observer that these children may have responded to a change in formula because they actually were afflicted with CMPA/soy sensitivity and not colic. That said, the study's results cannot be considered reliable because of the skewed, nonrandomised sample, no blinding of the parents, the usage of a non-validated record sheet and sample size too small to trust conclusions along with no intention-to-treat analysis and a 41% drop out rate which allowed significant bias into the study.

Estep and Kulczycki reported two trials of six infants each; standard formula milk was replaced with hydrolysed formula for four days which resulted in a reduction in crying time by 45%[16] and mother's milk was replaced with hydrolysed formula also significantly reducing crying time.[17] Although the significant reduction in crying with change to a hydrolysed formula may at first seem clinically useful, a sample of six is too small to generalize to the total population. Furthermore, the fact that there was no blinding and parents knew what formula they were receiving increases the reporting bias. The crying was reduced to a minimum of 148 minutes daily, which is 23% more than two hours, which is the crying time considered normal. Some authors agree that a minimum time period needed to evaluate a change in formula is 2-4 weeks[18] as a change in formula generally has some at least short-term effect.[23]

The only trial recruiting exclusively breast fed babies was Evans.[19] This trial eliminated cow's milk in the mother's

Infant Colic	Cow's Milk Allergy
• Excessive crying, more than 3 hours a day at least 3 days a week, more than 3 weeks	• Excessive crying, more than 3 hours a day at least 3 days a week, more than 3 weeks
• Crying is inconsolable and more prominent at end of day	• Crying, wailing, irritability more prominent after feeds, but occurs throughout the day/night, with disrupted sleep
• Occurs in both breast and formula fed infants	• Occurs in both breast and formula fed infants
• Begins at 5-10 days of age	• Can begin anytime, generally 4 weeks onward or within 1 week of receiving CMP
• Flailing of arms	• Frequent regurgitation, vomiting, food refusal
• Pulling up legs	• Diarrhoea or constipation (blood in stool)
• Apparent pain, pained facies	• Atopic dermatitis, eczema, urticaria, pruritis
• Healthy infant	• One first degree relative with allergy/asthma
• Sleep is not affected	• May have some or all GI, cutaneous, respiratory symptoms, which may be progressive over time
	• Failure to thrive

Table 2. Pertinent features of infant colic and cow's milk allergy.

Colic

A baby who is crying excessively and inconsolably, most often during the evening, either drawing its knees up to |its abdomen or arching its back, should be assessed for an underlying cause, including infant colic (urgent action). Assessment of excessive and inconsolable crying should include:

- general health of the baby
- antenatal and perinatal history
- onset and length of crying
- nature of the stools
- feeding assessment
- woman's diet if breastfeeding
- family history of allergy
- parent's response to the baby's crying
- any factors which lessen or worsen the crying.

Healthcare professionals should reassure parents of babies with colic that the baby is not rejecting them and that colic is usually a phase that will pass. Parents should be advised that holding the baby through the crying episode, and accessing peer support may be helpful.

Use of hypoallergenic formula in bottle-fed babies should be considered for treating colic, but only under medical guidance.

Dicycloverine (dicyclomine) should not be used in the treatment of colic due to side effects such as breathing difficulties and coma.

Table 3. NICE guidelines for infant colic[25].

diet. Information was not provided about whether the mothers restricted soy protein from their diet as well milk protein. Since soy is the most common substitute for milk protein, the mothers most likely ate soy instead dairy. The range of ages of 3-18 weeks did not rule out natural history of the condition; however, there was no significant reduction in crying with the maternal change in diet. If soy was the substitute, no change in crying would be expected from a change in diet.

The Forsythe trial was the only one restricted to infants less than eight weeks of age, addressing the critique of the natural history confounder.[20] This trial alternated cow's milk formula with hydrolysed formula (HF) on a rotation of four days, repeating it twice. There was less crying recorded on the HF days in the first course, which attenuated on the second. A trial of 17 infants is too small to generalise to the entire colic population and the reduced effect in the second round provides scant evidence of value in dietary change. Again, the time period to test a formula should be between two and four weeks.[18]

Hill solved some of these problems with a larger trial (n=77) including both breast fed and formula fed infants.[21] The results were reported as successful with a 25% reduction in crying time. Although this was significant, two-thirds of the infants were still technically described as having colic according to the Wessell criteria. The crying time, although improved, remained higher than three hours a day. The lack of blinding added bias and with a sample size of 15, the results are too small to generalize. Lothe, Lindberg and Jakobsson randomized 60 infants to be given either CMF or SF.[22] There was no change in 53% of infants when given either, but they did have reduction in symptoms when given a HF (Nutrimagen). The authors maintained that CMP is a major cause of moderate or severe infant colic and that these same "colicky" children become allergic to cow's milk later, some at 6 or 12 months of age. Change in formula is known to produce a temporary positive effect[23] but there was no follow-up to determine if the positive results persisted. There was also no evidence of randomization. This trial highlights the fact that neither milk protein nor soy protein were well tolerated by the infants in this study.

The Berseth study was unique and elegant in its use of parent-defined fussy or extremely fussy babies (without using the more common Wessels' definition of infant colic) and set out to randomise 200 infants replacing cow's milk formula with soy formula or partially hydrolysed formula (PHF) for 28 days.[24] Only 158 entered the trial and there was a dropout rate of 28% (SF) and 18% (PHF). Because of the unique scent of the two different formulas, blinding cannot be said to be held. All infants were rated significantly lower on the fussiness rating scale at the end of the trial; however, on average, most still cried more than three hours a day (the Wessel criteria), so crying, although reduced, was maintained at higher than average levels. The authors suggest that change in formula is an appropriate first line in addressing fussiness in babies.

The NICE guidelines were proposed for routine postnatal care for infants in the UK and suggest consideration of hypoallergenic formula under a doctor's guidance.[25]

Discussion

Change in diet as a strategy in infant colic has a long history. This is probably because most authors who discuss infant colic maintain a connection to the digestive system, although the connection has never been proven.[26] There is even a systematic review of dietary management of infant colic.[27] This review calls for a universal definition of infant colic to improve application of the evidence, which is now confusing. Other systematic reviews of therapeutic trials point out that there is some evidence to support a casein hydrolysate formula in some types of infant colic.[5,7,28] When taking into account the quality of the trials, there is no convincing effect on infant colic of dietary change including changing to soy, hydrolysed, lactose-free or fibre-rich formula. Improvement is not expected if dietary change is from one common allergen to another. Therefore trials which replace milk with soy or lactose-free milk are not appropriate.[18,29] Furthermore, the ESPGHAN committee on nutrition has recommended that soy protein formula should not be used in infants with signs of food allergy/intolerance during the first 6 months of life.[13]

Another weakness in the trials where breastfeeding mothers were instructed to adopt a milk protein-free diet is that they were not also instructed to avoid soy protein. The majority of dairy-free alternatives are soy products. Others have pointed out that although some help may be perceived by parents when changing formula,[23] some experts recommend a trial of at least 2-4 weeks of allergy free diet.[18] None of the trials evaluated tested a change in formula for a long enough interval to be able to fairly evaluate the results. Moravej et al. in 2010 recommended that the only children who are likely to benefit from a formula change are those with a positive skin prick test.[30] Thus, there is little convincing evidence that infant colic is a form of cow's milk/soy protein allergy. Instead, it is likely that a subgroup of infants who have been diagnosed with colic, in fact, have CMPA. As symptoms develop and therapies do not work and the child does not outgrow colic, then the diagnosis becomes one of exclusion in those infants. In the small number of cases where change to a hypoallergenic formula has subdued symptoms, it is likely that the child's condition had been misdiagnosed as infant colic, and should have been diagnosed as CMPA.

However, the Berseth study does point out that in infants

with inconsolable crying along with digestive difficulties, there may be a place for a formula which does not address an actual CMPA but a cow's milk intolerance.[24] This study found that two different types of formulas, soy and partially hydrolysed, neither of which would be appropriate for actual CMPA, resulted in less crying along with slight reductions in reported gas and spit-up. They concluded that crying with feeding difficulties should be treated with dietary changes, identifying another subset of the excessively crying infant population in addition to simple colic and more complex CMPA. However, the strength of the evidence is weak and it is known that any change in diet may bring about a temporary report of fewer symptoms.[23]

The prevalence of infant colic is most commonly estimated at 21% of all infants.[1] The incidence of CMPA is 2-7.5% in infants in developed countries.[31] It is likely that a proportion of infants who have been diagnosed with colic actually are afflicted with CMPA. Because of broad inclusion criteria of most studies, the latter group may not have been excluded from colic trials; in fact, by including "severe" excessive crying, those suffering from CMPA may have been preferentially admitted to these trials. This may account for the small, but clear response rate in some dietary trials. Deletion of CMP/soy protein from the diet specifically helps those with CMPA and cow's milk intolerance, but not the broader range of colicky babies. This may account for the inconsistent results, depending on the trial and its inclusion criteria.

In cow's milk protein allergy, the condition should be recognized and treated without delay; these infants should not be entered into colic trials. Meticulous inclusion and exclusion criteria are required in future trials. Infants who cry all day along with symptoms of CMPA (integumentary, respiratory,[12] allergic constipation,[32] failure to thrive,[18] along with those with family history of atopy[9]) should be excluded from studies on colic. Those who appear allergic should be offered a skin prick test,[30] a trial of hypoallergenic formula or removal of dairy/soy products from the mother's diet if baby is breast fed. In agreement with Hill, the breastfeeding mother should also consider eliminating the other most common allergens including nuts, eggs, fish and wheat.[18] Colicky infants without CMPA signs or symptoms should not be managed with hypoallergenic formulas.[33,34]

Regarding the answer to the research question, is infant colic an allergic response to cow's milk protein? According to the evidence, the answer is no. However, in a small percentage of infants, allergy/sensitivity to cow's milk is likely one cause of excessive crying of infancy. Despite this, the etiology of colic remains unknown and future studies should define inclusion/exclusion criteria strictly to exclude infants afflicted with CMPA and cow's milk protein intolerance from the studies. Any role for hydrolyzed or amino acid formula is likely to be in a small group of infants who are afflicted with CMPA. Until subgrouping is effectively done in primary care practices and research trials, it is unlikely that infant colic will be fully understood.

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Bateman N, Knight M. A qualitative multiple-case study of the Qudo™ soother: Exploring parental and professional experiences of a novel infant comfort device for persistent crying. Reprinted here with permission from the *Open Journal of Clinical and Medical Case Reports,* **Volume 12 (2026) Issue 66.**

A qualitative multiple-case study of the Qudo™ soother: Exploring parental and professional experiences of a novel infant comfort device for persistent crying

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ABSTRACT

Background: Persistent infant crying and regulatory distress present significant challenges for families, often leading to acute parental exhaustion, compromised breastfeeding experiences, and systemic healthcare dissatisfaction. While manual therapies and digital intraoral comfort strategies are utilised by practitioners, accessible, device-based non-pharmacological interventions remain under-researched. This study evaluates the real-world utility, safety, and mechanical plausibility of the Qudo™ Soother–a novel finger-like infant comfort device designed by a chiropractor to combine non-nutritive sucking with gentle palatal pressure. **Methods:** This investigation employed a qualitative multiple-case study design integrated with a comprehensive literature review and scoping database search (PubMed/MEDLINE 2000—2025). Semi-structured interviews were conducted with two distinct bounded cases: Case 1 comprised mothers (n=6) of infants aged 0—12 weeks experiencing persistent crying; Case 2 practicing paediatric chiropractors (n=6) who integrated the device into clinical workflows. Data underwent a cross-case thematic synthesis. **Findings:** Literature analysis established the biological plausibility of the device through Level I evidence for non-nutritive sucking analgesic mechanisms and Level II evidence from Craniosacral Therapy (CST) randomised controlled trials showing significant crying reduction. Prior quantitative pilot data (N=80) demonstrated a consistent 72%—89% user acceptance rate and marked reductions in infant irritability (Delta -3.15) and parental distress (Delta -3.99) over 4 weeks. Cross-case qualitative synthesis revealed that Case 1 (Mothers) experienced rapid behavioural settling and preserved breastfeeding during maternal lactation distress (e.g., mastitis) or extreme multi-infant care demands (triplets). Mothers highlighted a distinct gap in primary care, noting a reliance on open-ended pharmaceutical prescriptions (e.g., Gaviscon) by General Practitioners (GPs) who failed to evaluate underlying structural birth strains due to time constraints or skill deficits. Unlike standard pacifiers, which mothers feared caused «comfort addiction», the Qudo™ was utilised transiently for objective symptom relief during colic or teething. Case 2 (Chiropractors) validated the device as an anatomically informed, hygienic alternative to manual digital palatal stimulation that successfully extended therapeutic care into the home environment, optimised tongue posture, and enhanced cranial rhythm while acting as an ergonomic clinical aid. No adverse events or instances of nipple confusion were reported. **Conclusion:** The Qudo™ Soother represents a safe, acceptable, and contextually valuable non-pharmacological intervention that bridges clinical manual therapy and home-based infant soothing, establishing a definitive rationale for a proposed multi-faceted short- and long-term research pipeline.

Introduction & Literature Review

Managing infant distress, unsettled behaviour, and persistent crying remains a dominant concern for new parents and a leading driver for seeking primary healthcare interventions.[8] Excessive, inconsolable crying affects between 1.5% and 11.9% of infants globally,[14] impacting up to 76,200 infants annually in England and Wales alone.[13] The clinical consequences extend far beyond geopolitical boundaries; prolonged crying is a potent stressor strongly correlated with sleep deprivation, diminished parental self-efficacy, and elevated risks of postpartum mental health disorders.[3] When families are left to struggle without structural or me-

chanical clarity, the resulting physical and emotional exhaustion frequently compromises maternal wellbeing and drives the premature cessation of breastfeeding.

Device concept and mechanistic plausibility

The Qudo Soother is associated with a patented therapeutic soother design intended to provide targeted oral stimulation and apply controlled pressure to the infant palate[1] (Bateman, 2016). It is described as a specialised, anatomically informed comfort device manufactured from medical-grade silicone. Unlike mass-market consumer pacifiers, it was explicitly designed by a chiropractor who understands the intricate structural anatomy, biomechanics, and cranial complexities of the newborn skull. It is engineered to combine the natural neurological benefits of Non-Nutritive Sucking (NNS) with gentle, passive palatal pressure to calm infants experiencing colic, feeding issues, or persistent distress.

To evaluate the biological plausibility, existing safety profiles, and clinical evidence surrounding these component mechanisms, a rigorous literature search strategy was completed.

Search strategy and sensitivity check

A scoping literature search was conducted on December 1, 2025, utilising the PubMed/MEDLINE database covering literature from 2000 to 2025 (restricted to English language and human subjects). The search strategy was segmented into three distinct conceptual strings to target the underlying mechanisms of the device:

- **Search 1.** (Pacifier/Non-nutritive Sucking): ((pacifier[tiab] OR soother[tiab] OR dummy[tiab] OR «nonnutritive sucking»[tiab]) AND (infant[tiab] OR neonate[tiab] OR newborn[tiab]) AND (pain[tiab] OR crying[tiab] OR colic[tiab] OR analgesia[tiab])) \ rightarrow Yield: 92 results.
- **Search 2.** A & 2B (Manual and Craniosacral Therapies): Combined strings mapping craniosacral, cranial osteopathy, chiropractic, and manual therapy against paediatric populations presenting with colic, crying, sucking, or evaluating safety/adverse events. \rightarrow Yield: 368 results.
- **Search 3.** (Device Mechanism Concept): ((pacifier[tiab] OR soother[tiab]) AND (palate[tiab] OR «oral stimulation»[tiab] OR pressure[tiab]) AND (calm[tiab] OR sooth[tiab] OR reflex[tiab])) \rightarrow Yield: 1 result.

A sensitivity check cross-referenced against six pre-identified landmark paediatric studies confirmed a 100% capture rate, including critical Randomised Controlled Trials (RCTs) on infant manual therapy,[5,6] systematic reviews on heart rate variability[7], and comprehensive manual therapy safety reviews.[12]

Synthesis of key evidence

Non-nutritive sucking (Pacifier Mechanism): Level I evidence from Cochrane systematic reviews establishes that non-nutritive sucking provides robust, innate analgesic and physiological calming effects in neonates. Mechanistically, neurophysiological down-regulation of distress, reduction of procedural pain scores, and stabilisation of heart rate elevation require a sucking frequency of >30\text{sucks/minute}.[2]

Craniosacral / palatal pressure (CST mechanism): From a structural and craniosacral paradigm, infant regulatory distress and feeding dysfunction are frequently conceptualised as consequences of mechanical, intrauterine, or intrapartum strain. Mechanical forces exerted during labour–particularly in assisted births involving forceps or ventouse–can induce structural restrictions around the flexible newborn cranium, palate, and maxilla, disrupting primary brainstem reflex organisation.[10,11] Gentle digital pressure on the hard palate is widely used by manual therapists to evaluate these tension patterns and encourage autonomic down-regulation.

While the clinical efficacy of Craniosacral Therapy (CST) remains a subject of ongoing debate within broader medicine, Level II evidence from independent, peer-reviewed RCTs demonstrates its therapeutic potential for infantile colic:

- **Castejón-Castejón et al**.[5]: An RCT (n=58) demonstrating a highly statistically significant reduction in daily infant crying duration ($p<0.0005$) with a massive clinical effect size (Cohen's $d=2.54$).
- **Castejón-Castejón et al**.[6]: A subsequent RCT (n=58) establishing an absolute reduction in daily crying time of 2.94 hours (95% CI: 2.30—3.58 hours).
- **Cook et al.**[7]: A systematic review demonstrating that gentle cranial manual interventions are associated with objective increases in parasympathetic nervous system activity, as measured via Heart Rate Variability (HRV) metrics (SMD=-0.46).

Component safety profiles

Infants represent a highly vulnerable research demographic; hence, establishing safety parameters is paramount. Standard pacifier safety is strictly governed by European manufacturing standards (EN 1400:2013+A2:2018), with which the Qudo™ Soother complies. Regarding the manual therapy component, a comprehensive systematic review of adverse events in paediatric manual care executed by Todd et al.[12] confirmed that gentle cranial and palatal techniques maintain an exemplary safety profile with zero serious adverse events reported in the literature.

The Qudo™ Soother applies passive, low-level physical pressure to the hard palate that is inherently lower and more consistent than active manual digital techniques.

Device-specific preliminary data
Prior to the current qualitative phase, preliminary quantitative data were aggregated across three exploratory pilot cohorts between 2018 and 2021 (N=80 total infants), including an initial exploratory feasibility study conducted at the University of Surrey Maternal Health Department (n=26). Across these 80 cases, user acceptability of the device remained remarkably consistent, ranging between 72% and 89%.

The 2019 University of Surrey feasibility study monitored paired 10-point Likert scale metrics (where 10 represents the highest severity/worst outcome) from baseline to week four of device utilisation:

Outcome measure	Baseline mean	Week 4 mean	Mean change (Δ)
Infant irritability	6.69	3.54	-3.15
Parental distress	6.35	2.36	-3.99
Consolability difficulty	6.23	3.70	-2.53
Sleep quality degradation	5.96	3.63	-2.33

Table 1. Outcome measure.

Demographic analysis of this pilot cohort revealed that 50% of the participating infants had experienced assisted births (forceps, ventouse, or emergency caesarean), substantially exceeding the UK national average of approximately 32%. This baseline over-representation strongly supports the mechanical hypothesis that birth-induced structural strain correlates with regulatory and consolability distress.

Study rationale and aim
Because these preliminary manufacturer and university pilot evaluations were small, unblinded, and lacked parallel control groups, they could not conclusively prove absolute clinical efficacy. Furthermore, the modern online marketplace contains a plethora of baby aids and soothing devices, highlighting the critical advantage of backing novel tools with robust, peer-reviewed qualitative and quantitative research. This multiple-case study aims to bridge this evidence gap by analysing the integrated real-world experiences of mothers and clinical chiropractors (N=12) to understand the structural, functional, and psychological profile of the device.

Methodology
This investigation utilised a qualitative multiple-case study design (Yin, 2018). Case study methodology is uniquely optimised for evaluating novel clinical protocols and supportive medical devices because it permits an intensive, holistic exploration of a contemporary phenomenon within its real-life context using multiple bounded perspectives.

Case definition and bounded units
The study was bounded into two distinct, highly integrated case units to evaluate the device from both the caregiver and the professional implementation perspectives:

- Case Unit 1 (The Parental Case): Comprising six independent mothers (P1—P6) managing an otherwise healthy infant aged 0—12 weeks presenting with persistent crying, colic-like symptoms, or feeding distress, who utilised the Qudo™ Soother at home for a minimum of two weeks.
- Case Unit 2 (The Practitioner Case): Comprising six registered, paediatric-focused chiropractors (C1—C6) who actively integrated the Qudo™ Soother into their clinical manual therapy management.

Data collection and synthesis
Primary data were gathered via individual, semi-structured interviews conducted via the Zoom videoconferencing platform. Interviews lasted approximately 45 minutes, were audio-recorded with participant permission, and were transcribed verbatim. Supplementary observational field notes were maintained by the researcher to document clinical application techniques and user-device interactions. Transcripts were processed inductively using Reflexive Thematic Analysis.[4] Within the multiple-case study framework, data were initially subjected to a within-case analysis to capture the unique internal realities of each unit, followed by a comprehensive cross-case synthesis to map overlapping themes regarding safety, practical utility, and clinical integration.

Ethical considerations & governance
In explicit alignment with exploratory, test-and-learn clinical service evaluations of non-invasive, consumer comfort devices complying with standard pacifier safety regulations (EN 1400), formal institutional Research Ethics Committee (REC) approval was not mandated. However, rigorous ethical guardrails were maintained: all participating parents and clinicians provided written informed and verbal voluntary consent, strict data protection and anonymity requirements were observed, and parents retained the absolute right to decline their data being used and discontinue device use at any stage without impact on their ongoing care.

Case Study Findings & Cross-Case Synthesis
Case study 1: The parental experience (Home-Based Management). The case analysis of the maternal case unit (n=6) revealed an overarching baseline pattern of acute psychological vulnerability. Mothers consistently recalled being completely "sleep-deprived, stressed, and simply not knowing what to do" during the challenging early postnatal weeks (typically hitting an absolute crisis point around the 6-week mark). This systemic distress frequently pushed mothers toward the brink of giving up on their feeding

goals, with one participant noting: "I tried everything early on... I was so stressed; I was tempted to stop breastfeeding". In contrast, when seeking alternative structural care, parents relied heavily on professional clinical expertise, noting: "I trusted [the chiropractor's] judgment on her knowledge of the Qudo™'' Upon introducing the device, mothers reported an immediate down-regulation of infant autonomic distress, observing: "I see an instant change when it's in use; it helped me." Crucially, the data demonstrated a complete absence of feeding disruption or negative behavioural adjustments, with a participant confirming: "It didn't affect my breastfeeding at all.'' Rather, the qualitative data indicated that the Qudo™ supports breastfeeding latching by directly addressing and alleviating the underlying structural restrictions that impede effective oral mechanics.

Furthermore, the qualitative data highlighted a vital mechanical distinction between the Qudo™ Soother and mass-market pacifiers. While mothers expressed systemic anxieties regarding conventional pacifiers–stating, "I worry the normal dummy becomes a comfort addiction''–the Qudo™ was experienced strictly as a focused, transient therapeutic tool rather than a habit-forming security object:

> "I used it on child number one. It was useful for colicky times, and then I reintroduced it when teething came back. When the pain was gone, there was no need for the Qudo™, and he didn't feel the need to use another dummy after that. I use it for relief only. I have two; it costs more, but I found it was needed less." – Parent Participant.[4]

The unique mechanical value was also contrasted against conventional alternatives:

> "Conventional dummies come in different colours to look trendy. The Qudo™ is not 'trendy'–it's a therapeutic approach to a physical problem. My general impression with normal dummies it's just lots of 'sucking,' but I don't see that behaviour with my baby and the Qudo Soother. It was a significant, instant change." – Parent Participant.[2]

The practical utility of the device was further emphasised by a mother managing extreme multi-infant care demands, who noted the device served as an essential regulatory asset: "I have used it on my triplets; I used it on them because I was informed it would help with settling them, it has helped me.''

Socially, the unique anatomical aesthetic of the device was met with curiosity rather than stigma among peer groups, with mothers noting that "other mums are interested in it when they see it–they ask, 'how does it work?'' This shifted the cultural framing of the device from a standard comfort object to a wellness product, leading participants to suggest it as a "great idea for baby showers–no medical stuff.''

Case study 2: The chiropractor experience (Clinical integration & biomechanics). The case analysis of the clinician cohort (n=6) focused intensely on the biomechanical, functional, and ergonomic utility of the device. Within paediatric manual therapy, practitioners frequently utilise manual digital intraoral stimulation (inserting a gloved finger into the infant's mouth) to evaluate palatal tension, coordinate a disorganised sucking reflex, and promote autonomic relaxation. However, clinicians noted that this technique cannot be easily or hygienically replicated by parents at home.

The clinicians reported that the Qudo™ Soother successfully replicated the precise anatomical stimulus and passive palatal pressure of a manual digital technique. Crucially, it solved a major ergonomic limitation for the solo practitioner by functioning as a clinical adjunct that frees the hands during active treatment:

> "I have used it within practice while treating because I use craniosacral technique generally on babies. Previously, I used my finger whilst doing other things. Now I can use the Qudo instead of my finger, and it gives me both my hands back to do extra stuff. When I get successful use of the Qudo, it enhances cranial rhythm, so it makes my job easier." – Chiropractor Participant.[2]

One clinician, who used the device on their own infant to manage excessive crying, highlighted its relevance to modern paediatric trends like tongue-tie rehabilitation and the establishment of proper oral posture:

> "I didn't use it in clinic; I used it on my own baby. I think there is a potential use here for things like tongue-tie rehabilitation and establishing optimal tongue posture. Because it stimulates the parasympathetic nervous system. As a dummy, I say that because the Qudo is solid–it doesn't change shape, so they can't just smash it with their mouth. I only know it works on my little one. I am not aware of any soothers like the Qudo for me, I haven't found any other soothers like it." – Chiropractor Participant.[1]

A dominant sub-theme across all six chiropractors was a frustration with the conventional primary care model's reliance on open-ended pharmaceutical prescriptions to "fix" a problem that stems from a physical, structural cause. Chiropractors noted that general practitioners (GPs) do not evaluate for these structural imbalances–a gap driven by consultation time constraints or specific training deficits regarding infant musculoskeletal and cranial anatomy.

One participant highlighted how easily infants are placed on long-term prescriptions without an evaluation of the root cause:

> "The baby is on Gaviscon. The doctor advised this on an open-ended prescription, and [the mother] plans to come off it in the next few weeks." – Chiropractor Participant.[2]

This highlights parental involvement in treatment decisions, and how prescribing practices and treatment plans are understood across healthcare roles. Participants described the Qudo™ Soother as being associated with perceived improvements in infant settling and symptom management, while prescribed treatments such as Gaviscon were discussed in terms of medical management plans rather than immediate behavioural effects.

Furthermore, practitioners noted that the device has distinct functional utilities that separate it completely from the commercial pacifier market.

Cross-case synthesis: Implementation and educational dynamics

When synthesising the data across both cases, a powerful clinical synergy emerges. The primary point of convergence between parents and chiropractors is the confirmation that the device bridges the gap between professional clinical adjustments and home-based therapeutic care.

A core element of this synthesis is the role of maternal education and health literacy. While the premium price point of the device requires parents to be financially and emotionally "invested in their child's health,'' clinicians noted that mothers are uniquely motivated to comprehend the underlying research and mechanics of the device:

> "Parents will be interested even if they don't know much about health when it comes to babies. Especially people–moms especially–they are willing to go the extra mile and look into things and understand things." – Chiropractor Participant.[1]

This willingness to look deeper allows the Qudo™ to be successfully adopted as an evidence-informed therapeutic aid for persistent crying babies, rather than being dismissed as a standard consumer pacifier.

However, the cross-case synthesis also highlighted practical anxieties and minor design limitations that warrant future modification. While the device was introduced to resolve acute crises in the early weeks (0—12 weeks), follow-up data revealed that families were frequently still utilising the device at 6 months of age, often purchasing multiple units ("still using at 6 months, have 2 Qudos in case I lose one'') to ensure continuity. This longevity induced mild parental anxiety regarding habit cessation, with one participant's response, saying they were "nervous about long-term use'' and wondering if they would eventually "struggle to take it away from him. This was not reported in the lived experiences of other parents within the study. Furthermore, economic access and structural ergonomics were highlighted as areas for development.

Participants noted that "the cost is expensive; can it be cheaper?'' suggesting that financial barriers might limit adoption among lower socio-economic demographics. A single participant with a 6-month-old infant reported that no lanyard was provided with the Qudo™ Soother, leading them to purchase an alternative attachment. The participant noted that the chosen attachment point resulted in minor friction, describing that it "did rub the face" during use. This issue was later understood to be associated with a non-compliant lanyard rather than the device itself. The observation was an isolated report within the dataset and was framed as a suggestion for a future streamlined, less intrusive clip-on attachment to improve comfort and usability. Consideration of appropriate safety-compliant soother accessories (e.g., EN 12586 standards) provides relevant context for ensuring safe attachment use.

Discussion

This qualitative multiple-case study provides deep contextualisation that illuminates the mechanisms behind the positive quantitative signals recorded in the 2019 University of Surrey pilot. By binding parental lived experiences with clinical chiropractic observations and grounding them in an extensive literature review, the findings offer a robust multidimensional validation of the Qudo™ Soother.

The observed physiological settling across both cases strongly aligns with the neurophysiological parameters of Polyvagal Theory.[9] The distinct finger-like silicone design targets palatal mechanoreceptors, stimulating sensory branches of the trigeminal (CN\ V), facial (CN\ VII), and glossopharyngeal (CN\ IX) nerves. This rhythmic, organised intraoral stimulation drives efferent vagal activity, down-regulating sympathetic arousal and mitigating the physiological hyper-reactivity characteristic of infants displaying persistent crying or colic-like symptomatology.[10]

Furthermore, the data suggests the device has utility in managing minor structural restrictions resulting from birth micro-trauma. Traditional pacifiers focus predominantly on anterior oral containment, whereas the elongated, anatomically targeted design of the Qudo™ Soother reaches deeper oral zones, mirroring the manual therapeutic pressures used to relieve compressive strain at the sphenobasilar synchondrosis and hard palate.[11] This explains the observations by the chiropractor cohort regarding rapid organisation of primitive sucking reflexes, optimal tongue posture establishment, and relaxation of paraspinal tissues.

Crucially, the findings underscore the profound psycholog-

ical impact of the device on family dynamics. By providing a safe, rapid, and non-pharmacological means of shifting an infant out of an acute distress state, the device acts as a preliminary intervention that preserves parental mental health and protects the breastfeeding dyad from premature cessation due to maternal exhaustion or stress-induced latch failure.[3] Given that current conventional medical pathways frequently default to overprescribing infant medications despite poor efficacy data, establishing the clinical validity of this low-risk, physical soothing tool is highly relevant to contemporary public health and paediatric primary care.

Future research roadmap: A two-fold approach

To generate the robust data required to establish the Qudo™ Soother within mainstream paediatric and manual therapy guidelines, the findings of this study support a multi-faceted, two-fold research framework combining short-term data collection with comprehensive, long-term developmental tracking.

1. Short-term / modified clinical assessments (Rapid data and feasibility):

- **Objective:** To gather rapid, objective clinical assessments regarding immediate post-use outcomes, user acceptability, and immediate physiological changes.
- **Methodology:** A series of short-term observational case studies or a multi-center comparative trial (comparing infants utilising the Qudo™ with a non-using or traditional pacifier cohort). Data will be collected directly from parents, health visitors, and treating chiropractors over a condensed timeframe.
- **Outcome measures:** Documented clinical assessments focusing on rapid behavioural changes, immediate ease of feeding attachment, down-regulation of acute distress scores, and immediate tracking of reduced medication reliance (e.g., successful weaning off open-ended prescriptions like Gaviscon).

2. Long-term developmental & behavioural assessments (Comprehensive efficacy):

- Objective: To examine the longitudinal impact of the device on long-term craniofacial alignment, muscle strengthening, oral behaviour evolution, and family psycho-emotional health.
- Methodology: A prospective longitudinal study tracking infants over a 6-month developmental arc. Parents will maintain a structured research journal, capturing daily or weekly qualitative logs regarding infant comfort, jaw mobility, and sucking patterns. This will be paired with parallel evaluations of maternal and family emotional wellbeing.
- Outcome measures: Long-term monitoring of structural craniofacial development, speech development precursors, swallowing coordination maturation, and long-range infant sleep-wake regulation.

Conclusion

This qualitative multiple-case study demonstrates that the Qudo™ Soother is a highly acceptable, safe, and contextually valuable non-pharmacological tool that targets palatal reflex pathways to calm distressed infants. For parents, the device provides reliable structural soothing that improves family wellbeing, enhances parental confidence, and directly supports the physical preservation of the breastfeeding relationship. For manual practitioners, it serves as a hygienic, anatomically informed clinical adjunct that extends the benefits of intraoral therapy into the home environment while optimising treatment ergonomics. These findings confirm that further short-term and long-term quantitative clinical trials are both warranted and essential.

Patent Reference: Bateman N J, European Patent Number 3755300, Title: Artificial Teat, 22 Feb 2019.

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Holistic Clinical Integration in Presentations of PANS/PANDAS: A Narrative Review of Microbiome Shifts, HPA Axis Dysregulation, and Chiropractic Care

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Quagliariello A, Del Chierico F, Russo A, Reddel S, Conte G, Lopetuso LR, Ianiro G, Dallapiccola B, Cardona F, Gasbarrini A, Putignani L. Gut Microbiota Profiling and Gut—Brain Crosstalk in Children Affected by Pediatric Acute-Onset Neuropsychiatric Syndrome and Pediatric Autoimmune Neuropsychiatric Disorders Associated With Streptococcal Infections. *Frontiers in Microbiology*. 2018;9:675. doi:10.3389/fmicb.2018.00675.

Study Objective
To investigate the relationship between pediatric acute-onset neuropsychiatric syndrome (PANS/PANDAS) and gut microbiota ecology, and to assess gut microbial composition to gain further physiological information regarding the gut-brain axis in this disorder.

Study Design
Observational case-control study utilizing 16S rRNA-based targeted metagenomics.

Study Participants
Thirty PANS/PANDAS patients (aged 4 to 16 years, average age 10.03) were recruited and compared to 70 age-matched healthy controls. Inclusion criteria required the absence of active inflammatory, infective, or chronic diseases at the time of testing. Furthermore, all antibiotic and probiotic intake was suspended for two to four months prior to the evaluation.

Study Parameters Assessed
Researchers extracted genomic DNA from stool samples collected on consecutive days to identify and classify the bacterial species present, grouping closely related organisms into standardized taxonomic categories (operational taxonomic units, or OTUs). They then assessed the overall variety and richness of gut bacteria, both within each group and between the PANS/PANDAS and control groups (alpha- and beta-diversity), alongside computational estimates of the community's likely metabolic activity based on which bacteria were present rather than direct measurement (PICRUSt-predicted functional pathways). Finally, statistical correlation testing examined the relationship between specific bacterial genera and a blood marker of recent streptococcal exposure (anti-streptolysin O titer, ASLOT; Pearson correlation).

Primary Outcome Measures
As an observational case-control study rather than a controlled trial, there was no single prespecified primary outcome measure. The principal comparisons were: the overall diversity and density of gut bacteria within and between the two groups (alpha- and beta-diversity); which specific bacterial types were more or less abundant in PANS/PANDAS patients versus controls (taxonomic composition); estimated differences in the gut community's likely metabolic activity, based on which bacteria were present rather than direct measurement (PICRUSt-predicted KEGG pathways); and the relationship between specific bacterial genera and a blood marker of recent strep exposure (anti-streptolysin O titer, ASLOT).

Key Findings
The PANS/PANDAS cohort showed a measurably narrower range of gut bacteria compared to healthy controls (lower alpha-diversity), indicating fewer distinct microbial species overall. Ecological analysis revealed two distinct age-related clusters, leading researchers to focus heavily on the younger 4-8 year cohort (y-PAN). This younger demographic exhibited a stark disequilibrium: an overgrowth of the Bacteroidetes phylum (including the genera Bacteroides and Odoribacter) alongside a reduction in beneficial Firmicutes. Computational estimates of the community's metabolic activity pointed toward an increase in inflammation-associated pathways and a decrease in pathways relevant to brain and nervous system function – specifically those involved in D-alanine, tyrosine, and dopamine metabolism. Furthermore, higher levels of a blood marker for recent streptococcal exposure (anti-streptolysin O titer, ASLOT, values greater than 500 units) were positively correlated with the presence of Odoribacter.

Practice Implications and Discussion
In the ever-evolving landscape of pediatric neuro-immune conditions, significant dialogue has turned to the impact of the gut-brain axis on presentations such as PANS and

PANDAS. The findings of this observational study highlight a critical intersection between gut dysbiosis, systemic immunity, and neurological function.

The original authors' finding of Firmicutes depletion in the younger PANS/PANDAS cohort carries more clinical weight than a simple microbiome shift. Firmicutes are the primary producers of short-chain fatty acids (SCFAs) such as butyrate, which help maintain the integrity of the gut's epithelial lining by supporting tight junction protein expression.[1] Their depletion in the y-PAN cohort raises the question of compromised barrier integrity, a state in which bacterial byproducts are more able to translocate into systemic circulation and provoke an inflammatory cytokine response.[2] This inflammatory signal is not confined to the gut; there is growing evidence that it can extend to the central nervous system, provoking neuroinflammatory activity that offers a plausible physiological bridge between the microbial disruption these authors observed and the neuropsychiatric presentation itself.[3] This same breakdown in barrier integrity has also been associated with the development of food sensitivities. When the gut lining is compromised, larger dietary proteins are able to pass through that would normally be blocked or safely tolerated – and the immune system may begin treating them as foreign antigens rather than harmless dietary proteins. As a result, children may start reacting to foods that previously caused no issue, further compounding the inflammatory and symptom burden.[4] Addressing this thread clinically often falls to an integrative provider trained in structured gut-restoration protocols such as the 5R protocol (Remove, Replace, Reinoculate, Repair, Rebalance), which offers a systematic approach to reducing gut-derived inflammatory triggers alongside the multidisciplinary medical management these children require.[5]

Beyond the gut microbiome itself, hypothalamic-pituitary-adrenal (HPA) axis dysregulation deserves its own clinical attention as both a contributor to, and consequence of, this presentation. Cortisol fluctuation associated with HPA dysregulation has documented effects on mucosal integrity, including suppression of gut secretory IgA (sIgA) and impaired synthesis of structural proteins within enterocytes. These physiologic factors compound the barrier compromise discussed above.[6] The direction of cortisol dysregulation matters clinically: a hypercortisol state has a well-documented immunosuppressive, blunting effect, while the chronic or depleted phase that often follows prolonged stress or illness is associated with impaired cortisol output and a corresponding loss of the immunomodulatory brake on inflammatory and autoimmune processes.[7] Given that PANDAS itself is hypothesized to arise through a molecular mimicry mechanism, in which streptococcal antibodies cross-react against neuronal targets,[8] this loss of immune restraint during chronic HPA exhaustion may plausibly amplify the very autoimmune process underlying the disorder. In the pediatric population specifically, this axis is rarely given the chance to rest: children are navigating a near-constant stream of developmental and psychosocial change. These stimuli are often reported as new academic pressures, shifting friendships, sibling dynamics, family stress – any of which can activate the same HPA cascade described above, and each of which has been independently associated with symptom exacerbation in pediatric neuropsychiatric and tic populations.[9]

Cortisol dysregulation also reaches beyond immune and mucosal effects into the central nervous system, where it influences several neurotransmitter systems implicated in anxiety, including serotonin and GABA.[10] Dopamine, however, warrants particular attention here, as it is the very system the reviewed authors identified as compromised in the PANS/PANDAS gut ecology. This creates a dual, compounding pathway toward reduced dopaminergic tone: the gut-derived route already discussed, in which Firmicutes depletion limits the microbiome's capacity to support dopamine precursor synthesis, and a second, centrally-mediated route, in which chronic cortisol dysregulation directly impairs dopaminergic transmission.[11] Because dopamine plays a key role in how the brain processes and calibrates threat,[12] a nervous system compromised from both directions at once is left less equipped to regulate that response appropriately, and is clinically manifesting as heightened anxiety. This matters beyond the symptom itself: in pediatric tic populations, psychosocial stress and anxiety have been shown to independently predict worsening tic severity over time,[9] suggesting that anxiety in these children is not merely a symptom to note, but an active driver that can exacerbate the broader PANS/PANDAS presentation.

For the integrative provider, this points toward the value of cortisol testing to characterize the specific phase of HPA dysregulation present. From there, a multi-pronged approach to HPA-axis support is warranted. This may include targeted adaptogenic botanicals and regulating nutrients, neuro-emotional support such as counseling or therapy, and broader lifestyle intervention addressing the child's actual stress load and ambient living environment. Together, these strategies serve as a complement to the gut-focused interventions discussed above.

Beyond addressing the biochemical and physiological drivers underlying PANS/PANDAS, the chiropractor's role in recognizing and appropriately managing this presentation cannot be overstated. The Doctor of Chiropractic is accessible to children and adolescents and may serve as an initial point of contact for pediatric patients.[13,14] Many families seek chiropractic care first, and often present with musculoskeletal complaints that are in fact secondary to non-mechanical drivers such as neurological, infectious,

inflammatory, autoimmune, or systemic disease. As such, proficiency in differential diagnosis, red-flag identification, and appropriate referral is a core component of the chiropractor's scope of practice. This is reflected in practice: an international survey found that 81.2% of chiropractors reported referring pediatric patients to other providers when appropriate.[15]

A pediatric patient may present to a chiropractic office with musculoskeletal pain or motor complaints that appear mechanical in nature. These symptoms may have a mechanical onset or be complicated by other non-mechanical issues related to previous infections, such as the streptococcal infections seen with PANS/PANDAS. Common presentations include spine or extremity symptoms, diffuse myofascial pain or tenderness, headaches, and TMJ symptoms.[16] Some children may also demonstrate gross or fine motor weakness, slouched posture, or poor coordination. Sudden changes in handwriting or the development of dysgraphia can be a particularly useful historical clue to an acute change in fine-motor function. Motor tics may be perceived initially by a parent as a musculoskeletal or behavioral issue which may alter normal activities.[16,17,19]

These findings are nonspecific and should not independently be considered evidence of PANS/PANDAS. Their clinical significance increases when a musculoskeletal or movement complaint occurs in association with the abrupt onset of obsessive-compulsive behaviors or severely altered dietary intake, accompanied by other neuropsychiatric changes such as severe anxiety, mood changes, tics, sensory disturbances, sleep disruption, urinary changes, deterioration in school performance, or sudden changes in handwriting.[17,19] In a pediatric chiropractic setting, this combination should prompt expansion of the history, consideration of appropriate neurologic, inflammatory, rheumatologic, and infectious differential diagnoses, and referral for pediatric medical evaluation when indicated.[16,17]

A useful clinical approach, summarized in Table 1, includes a focused history covering neuropsychiatric and gastrointestinal red flags, a targeted neurologic exam, a clear co-management threshold, and guidance on continuing neuromusculoskeletal care where appropriate.[16]

Per American Academy of Pediatrics guidance, suspected PANS/PANDAS should prompt medical evaluation by a multidisciplinary team – pediatric medicine, neurology, psychiatry/psychology, infectious disease, and/or immunology.[17] It is worth noting that the chiropractor's assessment of these children should not be limited to a purely musculoskeletal lens. A growing body of neurophysiological research suggests that the chiropractic adjustment stimulates paraspinal afferent input capable of altering central nervous system processing and reflex output.[18] Within this framework, chiropractic care in this population is directed not at treating PANS/PANDAS itself, but at supporting more normal neurological expression – a neuromusculoskeletal (NMS), rather than strictly musculoskeletal (MS), perspective – making it a necessary consideration alongside the gut- and HPA-focused strategies discussed above and the multidisciplinary medical management these children require.

In closing, PANS/PANDAS represents a genuinely multi-systemic presentation, and the findings of Quagliariello et al. offer a compelling, if preliminary, biological thread

Domain	Assessment points
Neuropsychiatric history	Abrupt-onset behavioral change; new vocal/motor tics; new anxiety or emotional lability; sleep disturbance; academic decline; prior infection (esp. streptococcal)
Gastrointestinal history	Abdominal pain, diarrhea, constipation, reflux; recent dietary changes; antibiotic or probiotic use
Neurologic exam	Mental status/behavior observation; cranial nerves; motor exam; reflexes; coordination; gait; involuntary movements
Co-management threshold	Suspected PANS/PANDAS -> multidisciplinary referral (pediatric medicine, neurology, psychiatry/psychology, infectious disease, immunology)
Musculoskeletal management	Continue chiropractic care for coexisting neuromusculoskeletal (NMS) presentations; clearly distinguish the mechanical presentation from the PANS/PANDAS process itself

Table 1: Clinical assessment and co-management pathway for suspected PANS/PANDAS.

connecting gut microbial disruption to the neuropsychiatric symptoms these children display. For the practicing chiropractor, the clinical takeaway is threefold: first, recognize that the Firmicutes depletion and resulting barrier compromise identified in this population is not an isolated gut finding but a plausible contributor to the systemic and neuroinflammatory burden these children carry; second, appreciate that HPA axis dysregulation is not a downstream bystander but an active driver of both mucosal integrity and immune dysregulation, meriting its own clinical attention; and third, and perhaps most critically, understand that the chiropractor's greatest value in this population may not be the adjustment itself, but the clinical vigilance to recognize red flags early, coordinate with a multidisciplinary team, and support the child's care alongside, rather than in place of, appropriate medical management. A chiropractor equipped with this working knowledge is positioned not merely as a musculoskeletal provider, but as an informed member of the care team for one of pediatrics' most complex and evolving diagnoses.

Conflicts to Disclose

The completion of this review was not dependent upon any external funding from any entity. The authors declare no financial or professional conflicts of interest.

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JOURNAL ABSTRACTS

The use of high-velocity, low-amplitude techniques in paediatric osteopathic care: two multinational cross-sectional surveys on clinical practice and educational curricula

van Dun, P.L.S., Bohlen, L., Ellwood, J. et al.

Chiropr Man Therap 34, 32 (2026).
doi.org/10.1186/s12998-026-00670-y.

Abstract

Background: Up to one osteopathic consultation out of four involve infants and children. Although the clinical effectiveness of osteopathic care in paediatric populations remains inconclusive, available evidence suggests that it is generally safe. In contrast, high velocity, low amplitude technique (HVLA) has been associated with potential adverse effects. To inform a professional position on the use of HVLA techniques in paediatric care, this study investigated (1) the use of HVLA techniques by osteopathic practitioners in the treatment of infants, children, and adolescents, and (2) the extent to which HVLA techniques are included in osteopathic training programmes for these paediatric age groups. **Methods:** Two online cross-sectional surveys were conducted. The first targeted osteopathic practitioners and consisted of seven close-ended questions. The second survey was directed at osteopathic education institutes (OEIs) in Europe, Australia, Brazil, Israel, and New Zealand and consisted of three close-ended questions. Surveys were implemented via REDCap and made available in 11 languages. Participants were recruited between October 2025 and January 2026. **Results:** Among responding practitioners (n = 2607, response rate: 10.7%), 6.5% reported using HVLA in newborns or infants, 43.5% in children, and 78.3% in adolescents. Most respondents (54%) who apply HVLA to newborns and infants reported doing so "rarely". Of the 62 responding OEIs (response rate: 30.7%), 91.4% offered osteopathic paediatric education; however, only 4.8% reported teaching HVLA for newborns and infants, 11.3% for children, and 56.4% for adolescents. Most respondents (70.2%) held an HVLA-opposed stance. Among the distinct practitioner profiles identified in the prioritisation of conditions for HVLA use in newborns and infants, the precaution-informed stance (11.2%) was the most strongly associated with paediatric practice and with the highest reported HVLA use in this age group. **Conclusions:** Most respondents did not use HVLA in newborns and infants, with utilisation increasing in older paediatric age groups, and the majority expressed opposition to paediatric HVLA. More permissive stances were associated with greater HVLA use and more training. The generalisability of the findings is limited by potential coverage and self-selection bias, possible duplicate responses, and the low and variable response rate to the survey of osteopathic practitioners. Given its continued application, an evidence-based position statement and robust research on the safety and effectiveness of HVLA in paediatrics are urgently needed.

Open Access: https://link.springer.com/article/10.1186/s12998-026-00670-y#citeas.

Smartphone Ownership and Eating Disorder Symptoms in Early Adolescence

Nagata JM, Wong JH, Talebloo J, et al.

JAMA Netw Open. 2026;9(9):e2637897.
doi:10.1001/jamanetworkopen.2026.37897.

Abstract

Importance: Adolescents have been owning smartphones at increasingly earlier ages. The associations between age of smartphone ownership and eating disorder (ED) risk among adolescents have not been examined. **Objective:** To examine cross-sectional and longitudinal associations between age of smartphone ownership and ED symptoms in adolescence. **Design, Setting, and Participants:** The Adolescent Brain Cognitive Development (ABCD) Study used a stratified, probability-based sample of schools and recruited participants from 21 study sites across the US. Schools were oversampled based on race, ethnicity, socioeconomic status, and urbanicity to minimize systematic sampling biases in recruitment. Percentages were weighted based on American Community Survey data to represent population estimates. Cross-sectional and 2-year longitudinal analyses applied generalized linear models with a Poisson distribution and log link to ABCD Study data from years 2 to 6 (2018-2024). Data were analyzed from 2025 to 2026. **Exposures:** Smartphone ownership at 12 years of age (yes or no). **Main Outcomes and Measures:** Binge-eating symptoms, inappropriate compensatory behaviors to prevent weight gain, worry about weight gain, self-worth tied to weight, and any ED symptoms were examined separately at 12 and 14 years of age (yes or no). **Results:** Of 8957 participants (4712 [51.8%] male), 6225 (69.5%) owned a smartphone at 12 years of age. Of 6225 participants, the most prevalent ED symptoms were binge-eating symptoms (315 [9.2%]) at 12 years of age and compensatory behaviors (494 [20.5%]) at 14 years of age. In covariate-adjusted analyses, owning a smartphone at 12 years of age was cross-sectionally associated with a higher prevalence of binge-eating symptoms (prevalence ratio [PR], 1.61 [95% CI, 1.17-2.23]; P = .003), tying self-worth to weight (PR, 2.21 [95% CI, 1.03-4.74]; P = .04), and any ED symptom (PR, 1.36 [95% CI, 1.09-1.70]; P = .007). In covariate-adjusted analyses, owning a smartphone at 12 years of age was longitudinally associated with a higher risk of binge-eating symptoms (risk ratio [RR], 1.67 [95% CI, 1.11-2.52]; P = .01), using inappropriate compensatory behaviors to prevent weight gain (RR, 1.50 [95% CI, 1.16-1.94]; P = .002), tying self-worth to weight (RR, 2.03 [95% CI, 1.28-3.19]; P = .002), and any ED symptom (RR, 1.49 [95% CI, 1.19-1.87]; P < .001). **Conclusions and Relevance:** In this cohort study of US adolescents, smartphone ownership was associated with a variety of ED symptoms, suggesting that the timing of smartphone ownership may be associated with ED risk. Future research is needed to characterize the mechanisms underlying these observed associations.

Evidence for Social Media Legislation Strategies
Nagata JM, Nayak S, Huang OH, et al.
JAMA Netw Open. 2026;9(9):e2626965.
doi:10.1001/jamanetworkopen.2026.26965.

Abstract
Importance: Social media use has grown rapidly, with particularly high adoption among adolescents. These patterns carry both risks, such as problematic use, and potential benefits, such as social connection, creating challenges for policymakers developing regulatory approaches. **Objective:** To synthesize existing evidence and policy approaches related to legislative efforts addressing adolescent social media use and to assess the potential risks, benefits, and evidence gaps associated with commonly proposed or implemented policy strategies. **Evidence Review:** Evidence was identified through database searches from PubMed and Web of Science focused on policies and legislative proposals from August 1, 2003, to March 22, 2026, targeting adolescent social media use. Policy categories included warning labels, age restrictions and assurance (eg, verification), parental consent and monitoring, school phone policies, platform design regulations, and legislation addressing deepfakes and nonconsensual intimate images. **Findings:** The search yielded 672 articles, of which 39 met inclusion criteria. Most publications addressed parental consent and monitoring (n = 12), deepfakes and nonconsensual intimate images (n = 8), age restrictions and assurance (n = 7), and design bills (n = 6), with fewer articles examining school phone policies (n = 4) and warning labels (n = 2). Warning labels may increase awareness of potential risks, although data largely consisted of expert opinion. Age assurance measures were commonly circumvented, and proposed biometric or artificial intelligence (AI)—based verification methods had unresolved challenges. Parental monitoring and consent were associated with lower problematic social media use and positive adolescent outcomes in survey-based publications. School phone restriction policies were widely adopted, but evidence regarding academic, social, or mental health effects was limited. Design-focused legislation, such as the Kids Online Safety Act and Age-Appropriate Design Bills, emphasized platform accountability, transparency, and safeguards for minors. Policies addressing AI-generated sexual deepfakes and nonconsensual intimate images aimed to reduce exposure to psychologically harmful material, although evaluation of their effectiveness was limited. **Conclusions and Relevance:** In this review of legislative approaches to adolescent social media, observational and expert-opinion publications provided preliminary insights into potential benefits and risks, but systematic evidence evaluating the effectiveness and unintended consequences was limited. Rapid research, including timely evaluation of newly enacted legislation, is needed to assess the effects of different policy approaches and support the iterative, collaborative development of theory-driven, child-centered policies.

Infant vertical suspension testing
Rosen MG
Asia-Pac Chiropr J. 2024 Oct-dec;5(2):6
https://www.apcj.net/papers-issue-5-2/#RosenInvertedSwingTest.
This narrative is reproduced with the permission of the publisher.

Narrative: In 2018 a Melbourne Chiropractor placed on social media a video of him safely and professionally performing an infant vertical suspension test. Leaving aside the stupidity of any Chiropractor using social media to show videos of their professional activities which are private interactions with a patient, the video of the test was used by Deep Medicine to hysterically and politically attack Chiropractors for inappropriate treatment of children. In turn this led to the Government of the State of Victoria, Australia, in 2019 commissioning an agency of its Department of Health and Human Services, Safer Care Victoria (SCV), to undertake a review of chiropractic manipulative care for children under 12 years of age. This review found Chiropractic care to be safe. However as of September 2024 the care of children in Australia by Chiropractors remains in question given the Federal Minister for Health, again under medical pressure, required the Chiropractic Board of Australia to restore its warning against Chiropractors providing spinal manipulation to children under two. The actual test in question sits within the standard protocols of safe care of infants in both medicine and chiropractic, a reality obfuscated by the medical enemies of Chiropractic in their eagerness to advance the Iowa Plan for containment of the profession. This paper by a world-renown paediatric Chiropractor and educator examines the 'infant vertical suspension test' and gives clinical meaning to the observations provided by this safe and effective, gentle clinical test.

JOURNAL ABSTRACTS

An Interpretation of the Safer Care Victoria Review into Chiropractic spinal manipulation of children under 12: Its ambiguity, internal contradictions, and inconsistencies

Rome PL. Waterhouse JD. The Vertebral Subluxation premise: Principle 5, the intent is to correct dysfunction and restore normal function. *Asia-Pacific Chiropr J.* 2026;6.4.
https://www.apcj.net/papers-issue-6-4/#RomeWaterhouseSCVInterp.

Introduction: A Safer Care Victoria (SCV) review of chiropractic manipulation of children under 12 appears to have been misinterpreted and misquoted in the media and elsewhere. (1) The Review's recommendation did not ban spinal manipulation, it did however, advise all four professions who provide the manual therapy that they should not provide spinal manipulation of the cervical spine for children under 12 years of age for a certain range of conditions as it claimed there was a lack of evidence of safety or efficacy. (Recommendations 2, 5, 6, SCV p 6, 7) There was no recommendation for a ban on Chiropractic spinal manipulation, due to the lack of evidence of harm. Although not specified in 2020 or 2023, in June 2024, the Chiropractic Board of Australia (CBA) 'reinstated' its '2020 interim policy' regarding paediatric patients of 2-years of age. (2 - 5) This followed a request of health ministers (COAG) due to 'community concerns' attributed to a misinterpretation of Chiropractic manipulative techniques. It is not known how the two years of age limit was derived in June 2024, as no evidence was cited. Board chairman Dr Wayne Minter stated 'Following a request from health ministers in June, the Board has reinstated the interim policy on the spinal manipulation of children under two years of age, pending further consultation with ministers.' (4) The authors could not locate where the 'aged 2 years' limit-advice, nor any evidence that may have been published earlier in any CBA statement. Claims in the SCV Review that there was little evidence to support the involvement of Chiropractors in the limited range of non-musculoskeletal conditions that were studied. (SCV p24) We produce examples of evidence which tend to contradict such claims of limited evidence. **Objective:** It would seem that the SCV recommendation has been misinterpreted by health authorities and reflected incorrectly by the media, that a ban on manipulating the spine of under 12-year-old children was recommended and implemented. The recommendation stated 'Spinal manipulation, as defined in Section 123 of National Law, should not be provided to children under 12 years of age'. (SCV p 2) This statement did not advocate a ban as it recommended only that treatment should not be provided 'for the management of the following conditions' (p 6), as it claimed there was 'weak' evidence to substantiate it. It was not stated that spinal manipulation should not be administered due to harm. **Method:** A critical analysis of the SCV Review was conducted. A search of The Index to Chiropractic Literature was undertaken with key words placed in the All Fields search box. A PubMed search was also undertaken with emphasis on the European medical literature and on the limited number of Chiropractic journals listed on the PubMed portal. **Review:** The SCV Review states: 'Spinal manipulation, as defined in section 123 of National Law, should not be provided to children under 12 years of age, by any practitioner, for general wellness or for the management of the following conditions: developmental and behavioural disorders, hyperactivity disorders, autism spectrum disorders, asthma, infantile colic, bedwetting, ear infections, digestive problems, headache, cerebral palsy and torticollis'. (p 6) We challenge the narrow term of reference of this study by Cochrane Australia as it denied many studies and clinical reports which would have been applicable under different terms. And we note that other manipulative techniques are available that fall outside Section 123. **Summary:** The misinterpretation of the findings of the SCV Review that manipulation of children was banned led to misconceptions being dispersed though the media and community. The recommendation was addressed to all manipulative professions, and was applicable to the treatment of certain conditions. There was no evidence of prior serious adverse events in Australia to justify the falsely claimed ban on spinal manipulation of children under 12 years of age. In additional research, the SCV Review claimed there was insufficient evidence for spinal manipulation to address certain disorders. It omitted to state that it may be appropriate for spinal manipulation to address and manage certain symptoms associated with these conditions, patient preference and patient demand, as well as the many clinical studies that were supportive of this model of care. **Conclusion:** Given the volume of other forms of evidence that are available for specified conditions, more appropriate research reporting should be implemented on such matters. Such a discrepancy raises the question as to the particular selection of evidence cited in the SCV Review. Claims that there was a ban placed on cervical spinal manipulation of children due to harm are grossly inaccurate. Claims that such a ban applied to the whole spine of children under 12 are also inaccurate. It is maintained here that the term 'should not' is not a ban. Large sections of the media have been irresponsible and misleading in the inaccurate reporting of this matter. In doing so, a false image is generated which in turn, plays into the hands of the uninformed and monopolistic critics. Claims of a lack of evidence supporting aspects of the Chiropractic model are challenged depending where and in what sources one conducts research. There is a noted absence of evidence of serious harm through spinal manipulation by Chiropractors, on children in Australia. As such, the Safer Care Victoria Review is dismissed as a misleading anomaly. The motive of the Review would seem to have been compromised by the apparent inconsistencies, contradictions, and ambiguities as well as what would appear to be an absence of neutrality of input.

Febrile Seizures and School Performance

Dreier JW, Trabjerg BB, Wimberley T, Feenstra B, Christensen J.
JAMA Netw Open. 2026;9(9):e2631273.
doi:10.1001/jamanetworkopen.2026.31273.

Abstract

Importance: Febrile seizures affect 2% to 5% of children and are associated with substantial parental distress and concerns about the child's long-term cognitive development. **Objective:** To examine the association between febrile seizures and school performance as measured by standardized tests. **Design, Setting, and Participants:** This is a nationwide register-based cohort study of children born in Denmark (1997-2009) who participated in the Danish National School Test Program from 2010 to 2019 (ages 7-17 years). Data were analyzed from March 2025 to June 2026. **Exposure:** Children with hospital contacts for febrile seizures identified through the Danish National Patient Register. **Main Outcomes and Measures:** The primary outcome was performance on norm-based standardized reading (grades 2, 4, 6, and 8) and mathematics (grades 3, 6, and 8) tests, scored as national percentiles (scale, 1-100). Adjusted differences in mean scores were estimated using linear regression. **Results:** Of 672,119 children (344,664 boys [51.3%]; 327,455 girls [48.7%]) participating in testing, 26,173 (3.9%) with a history of febrile seizures were identified. Combined test scores were marginally lower in children who experienced febrile seizures (108,265 tests; mean score, 54.7 points; 95% CI, 54.6 to 54.9 points) than in those who did not (2,684 629 tests; mean score, 55.8 points; 95% CI, 55.7 to 55.8 points), corresponding to an adjusted mean difference of -0.4 point (95% CI, -0.7 to -0.2 point). The difference was slightly more pronounced in girls (-0.7 point; 95% CI, -1.1 to -0.3 point) than in boys (-0.2 point; 95% CI, -0.5 to 0.2 point). School test performance declined with increasing number of febrile seizure—related hospital contacts, from -0.1 point (95% CI, -0.4 to 0.2 point) for those with 1 contact to -5.8 points (95% CI, -9.1 to -2.4 points) for those with 7 or more contacts. Epilepsy occurred more frequently in children with a history of febrile seizures (838 of 26,173 children [3.2%]) than in those without (5600 of 645,946 children [0.9%]), and was associated with substantially larger test score differences (children with febrile seizures and epilepsy vs children with neither, -7.2 points; 95% CI, -8.7 to -5.7 points). Test scores were also marginally lower in children with febrile seizures compared with their unaffected siblings (-0.6 point; 95% CI, -1.0 to -0.3 point). **Conclusions and Relevance:** In this cohort study of more than 26 000 children with febrile seizures, school performance was generally comparable to that of their peers, but a smaller subset (eg, children who had recurrent hospital contacts with febrile seizures or who developed epilepsy) were at risk of poorer academic outcomes and may benefit from additional educational support.

Hypertensive Disorders of Pregnancy and Incident Dementia

Seong JS, Park JY, Kim H, Kim SY.
JAMA Netw Open. 2026;9(9):e2635819.
doi:10.1001/jamanetworkopen.2026.35819.

Abstract

Importance: Hypertensive disorders of pregnancy (HDPs) are established markers of later-life cardiovascular disease, but their association with dementia remains uncertain. **Objective:** To investigate whether HDPs are associated with incident dementia in a nationwide population-based cohort with more than 2 decades of follow-up. **Design, Setting, and Participants:** This retrospective cohort study used the Korean National Health Insurance Service database to identify females aged 16 years or older who delivered between January 1, 2002, and December 31, 2005, and followed up through December 31, 2024. Statistical analyses were conducted between October 2025 and May 2026. **Exposures:** HDPs were defined as gestational hypertension, preeclampsia, HELLP (hemolysis, elevated liver enzymes, low platelet count) syndrome, or eclampsia. **Main Outcomes and Measures:** The primary outcome was incident dementia, including Alzheimer disease and vascular dementia. Cox proportional hazards regression models estimated hazard ratios (HRs) and 95% CIs. **Results:** Among 1 370 485 females (mean [SD] age, 29.2 [3.9] years), 28 747 (2.1%) experienced HDPs. The cumulative incidence of dementia was higher among females with HDPs than among those without HDPs (7.2 vs 2.8 per 10 000 females; $P < .001$), as was the incidence density of dementia (3.00 vs 1.05 per 100 000 person-years; $P < .001$). In model 1, HDPs were associated with an increased risk of incident dementia after adjustment for baseline maternal, socioeconomic, and obstetric factors (adjusted HR, 1.96; 95% CI, 1.19-3.23). In model 2, after additional adjustment for postdelivery hypertension, diabetes, myocardial infarction, and stroke, the association was attenuated and was no longer statistically significant (adjusted HR, 1.15; 95% CI, 0.70-1.91). **Conclusions and Relevance:** In this cohort study, HDPs were associated with an increased risk of incident dementia after adjustment for baseline maternal, socioeconomic, and obstetric factors. However, this association was no longer statistically significant after additional adjustment for postdelivery vascular and metabolic conditions. Given the small number of dementia events among females with HDPs, these findings should be interpreted cautiously. These findings suggest that HDPs may serve as an early-life marker of long-term neurovascular vulnerability.

Prepregnancy Diet Quality Index and Adverse Pregnancy Outcomes

Bharmal U, Saade G, Greenland P, et al.
JAMA Netw Open. 2026;9(9):e2633245.
doi:10.1001/jamanetworkopen.2026.33245.

Introduction: Adverse pregnancy outcomes (APOs) are a major cause of maternal and neonatal morbidity. Preconception diet quality is associated with APO risk, but prior pregnancy-related indices had notable limitations. We developed the Prepregnancy Dietary Quality Index (PreP-DQI) to assess its association with APOs and cardiometabolic health. **Methods:** This cohort study used data from the Nulliparous Pregnancy Outcomes Study Monitoring Mothers-to-Be (NuMoM2b) and the NuMoM2b-Heart Health Study (NuMoM2b-HHS), excluding individuals who delivered before 23 weeks of gestation, had fetal anomalies, missing dietary data, or had implausible caloric intake (below 1st percentile or above 99th percentile). All participants in the original studies provided written informed consent. This analysis was exempted from institutional review board approval at Old Dominion University as the dataset is deidentified, and followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline. Preconception diet was assessed using the Block/Bodnar 2010 food frequency questionnaire (FFQ), self-administered at 6 to 13 weeks of gestation during NuMoM2b enrollment (2010-2013). The PreP-DQI was developed using the 2020-2025 US Department of Agriculture (USDA) guidelines, which consisted of 23 adequacy and 4 moderation components, each scored from zero to 5. The final PreP-DQI was scored from zero to 100, with higher scores indicating healthier diets (eAppendix 1 in Supplement 1). The primary outcome was a composite of APOs, defined as occurrence of one or more of the following: hypertensive disorders of pregnancy (HDP), preterm births, small for gestational age (SGA), stillbirth, or gestational diabetes (eAppendix 2 in Supplement 1). Secondary outcomes included first-trimester cardiometabolic biomarkers (eTable in Supplement 1). Internal consistency of the PreP-DQI was assessed using Cronbach a. Individuals were divided into quartiles based on PreP-DQI scores (Q1 [least healthy diet] to Q4 [healthiest diet]). Energy-adjusted food group and nutrient intakes (per 1000 kcal) were assessed across quartiles using linear trend tests to evaluate diet quality and dose-response relationships. Missing outcome and covariate data were handled by multiple imputations. Adjusted relative risks (aRRs) with 95% CIs were calculated using modified Poisson regression with robust variance, with Q1 as reference, adjusting for maternal age, body mass index, race (self-identified with categories including Asian, Hispanic, non-Hispanic Black, non-Hispanic White, and other), employment, marital status, education, insurance type, energy intake per day, exercise (MET-hrs) during the first trimester, and smoking before pregnancy. E-values were calculated for statistically significant associations to quantify unmeasured confounding. In the HHS cohort, log-transformed biomarkers were modeled using linear regression, adjusting for the same covariates as the primary analysis, with adjusted P value obtained from quartile entered as an ordinal score. The threshold for significance was $P < .05$ in 2-sided tests. Statistical analyses were conducted using R version 4.4.2 (R Project for Statistical Computing). **Results:** A total of 7551 (75.2%) individuals from the nuMoM2b cohort met eligibility criteria for this analysis (mean [SD] age, 27.3 [5.5] years; 822 Black [10.9%], 1254 Hispanic [16.6%], 4795 White [63.5%]), including 3520 (46.6%) in the HHS cohort. Higher PreP-DQI quartiles were associated with significantly older age, lower BMI, White or Asian race, higher education, marriage, employment, commercial insurance, higher income, lower prevalence of smoking tobacco before pregnancy, greater total energy intake, and greater exercise during the first trimester. The mean (SD) PreP-DQI score was 66.0 (9.4). The PreP-DQI score demonstrated high internal consistency among its component measures (Cronbach a= 0.93). Across PreP-DQI quartiles, intake of adequacy components increased significantly (except dairy and vitamin D), whereas intake of most moderation components decreased significantly (except sodium). Compared with individuals in Q1, individuals in Q3 had lower risk preterm birth (aRR, 0.76; 95% CI, 0.59-0.98; E-value: 1.96) and individuals in Q4 had lower risks of APOs (aRR, 0.77; 95% CI, 0.66-0.89; E-value, 1.92), preterm birth (aRR, 0.73; 95% CI, 0.55-0.97; E-value, 2.08), and HDP (aRR, 0.77; 95%CI, 0.62-0.95; E-value, 1.92) (Figure). In complete case analysis, compared with individuals in Q1, individuals in Q4 had lower risks of APO (aRR, 0.76; 95% CI, 0.65-0.89), preterm birth (aRR, 0.74; 95% CI, 0.55-1.00), and HDP (aRR, 0.77; 95% CI, 0.62-0.95). **Discussion:** In this cohort of nulliparous individuals, higher PreP-DQI scores were associated with lower risks of APOs, particularly preterm birth and HDP, underscoring the importance of assessing the overall preconception diet quality using a composite measure that incorporates both dietary adequacy and moderation across whole foods and nutrients. Dietary intake was self-reported using a validated FFQ and may be subject to recall and reporting bias. The Block/Bodnar 2010 FFQ was the pregnancy-adapted instrument administered during nuMoM2b enrollment (2010-2013), predating the Modern Block 2014 FFQ. Also, there is a possibility of a potential selection bias, as individuals with missing dietary and biomarker data were excluded. Thus, further validation of PreP-DQI in more diverse populations is warranted. The association between higher PreP-DQI scores and a healthier first-trimester cardiometabolic profile provides a biologic plausibility for these findings, highlighting the role of preconception diet quality.

Determining undergraduate pediatric chiropractic competencies and entrustable professional activities: A mixed-method study
Aurélie M Marchand
J Chiropr Educ. 2026 Feb 13;40(1):eJCE-24-9.
doi:10.7899/JCE-24-9.

ABSTRACT
Objective: This study aimed to determine an evidence-based, common, undergraduate, pediatric competency framework specific to the chiropractic profession through competencies and entrustable professional activities (EPAs). **Methods:** A pragmatic, exploratory, mixed-methods design was implemented to specify competencies and EPAs through grounded theory. Sequentially, 3 nominal group techniques were conducted. The results of a systematic literature review led to a curriculum enrichment process. A survey instrument was methodically developed and administered to 321 participants. Thematic analysis was used to write the curriculum, which resulted from this mixed-methods process. **Results:** The undergraduate pediatric chiropractic curriculum framework consisted of 5 EPAs, 12 aggregate domains, 53 competency domains, and 393 items. The overall agreement with the curriculum was 90.0% by UK stakeholders. A total of 236 competencies emerged from the nominal group techniques, rising to 393 after curriculum enrichment. The curriculum reached data saturation, and no additional items were identified during the survey. **Conclusion:** Undergraduate chiropractic pediatric competencies and EPAs were created. They align to specify educational outcomes based on stakeholders' input and accreditation standards. This study also indicates that literature reviews could be performed during curricular design processes to reach earlier data saturation.

Birth trauma, vertebral subluxation, feeding dysfunction and early infant health challenges: A retrospective analysis of 145 infants under chiropractic care
Dorough A. Alcantara Joel
J Pediatr Matern & Fam Health - Chiropr. 2026 Jul;2026():25-45
https://vertebralsubluxationresearch.com/2026/06/03/1886-a-retrospective-file-review-of-infants-presenting-for-chiropractic-care-in-a-single-practitioner-practice/.

ABSTRACT/NOTES:
Objective: To describe the clinical characteristics of infants 0—12 months of age presenting for chiropractic care in a single-practitioner practice, with particular attention to presenting complaints, pregnancy and birth history, labor and delivery factors, and examination findings associated with birth stress, feeding dysfunction, and cervico-cranio-mandibular subluxation patterns. **Methodology:** A 1-year retrospective file review was performed of patient files of infants 0-12 months of age presenting for care at a single chiropractor practice. Patient socio-demographic information (i.e., age, gender) and clinical information (i.e., presenting complaints, maternal pregnancy and labor history, examination findings) were obtained from a retrospective file review. Statistical analysis utilized descriptive statistics and chi-square test of independence. This study was approved by the Institutional Review Board of Life University (Marietta, GA, USA). **Results:** A total of 145 infant patient files met the inclusion criteria. The infants had a mean age of 2.21 months (SD=2.34) and included 75 males and 70 females. Breastfeeding difficulty was the most common presenting complaint, reported in 113 infants (77.93%), followed by torticollis in 82 infants (56.55%), posterior tongue-tie diagnosis in 79 infants (54.48%), gassiness in 53 infants (36.55%), plagiocephaly in 40 infants (27.59%), and infantile colic in 38 infants (26.21%). Maternal and birth histories commonly included prolonged labor, extended pushing, recumbent delivery position, Pitocin use, epidural anesthesia, malpresentation, and malposition. Examination findings frequently included cervical muscle hypertonicity, cervical joint edema, head tilt and/or rotation, facial wincing with palpation, digastric muscle restriction/hyoid elevation, TMJ dysfunction, and cranial asymmetry. Taken together, the findings demonstrated a pattern of presenting complaints, birth stress indicators, and physical examination findings involving the cervico-cranio-mandibular complex. **Conclusion:** We performed a retrospective file review of infants presenting for care in a single practitioner chiropractic practice. Our findings revealed infants commonly presented with chief complaints (i.e., breastfeeding difficulties, plagiocephaly, torticollis) associated with birth stress, strain or trauma. Chiropractors should be vigilant in their examination and care approaches to address subluxations to the cervico-cranio-mandibular complex. We support continued efforts to characterize infants and children presenting for chiropractic care.

Keywords: pediatrics, pregnancy, infants, chiropractic, subluxation, birth trauma, retrospective file review.