

Manual Interventions for Musculoskeletal Factors in Infants With Suboptimal Breastfeeding: A Scoping Review.

Cheryl Hawk, DC, PhD, Amy Minkalis, DC, MS, Carol Webb, MA, MLIS, Olivia Hogan, and Sharon Vallone, DC.
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ABSTRACT

Exclusive breastfeeding for the first six months, and continuing for at least the first year of life, is strongly recommended. Suboptimal breastfeeding, which is breastfeeding that does not meet these recommendations, is a multifactorial issue. Some authorities, particularly in the nursing and lactation counseling professions, have identified musculoskeletal issues that may interfere with successful breastfeeding. The purpose of this project was to survey the literature on manual treatments to correct musculoskeletal dysfunctions in infants with suboptimal breastfeeding. Our research question, “Have manual interventions been used to correct infants’ musculoskeletal dysfunctions thought to be linked to suboptimal breastfeeding?” We searched PubMed and Index to Chiropractic Literature, from inception through July 2018, as well as relevant gray literature. We assessed quality of randomized controlled trials (RCTs) and cohort studies using modified SIGN checklists, and the overall strength of evidence using GRADE. The search yielded 461 articles, with a final inclusion of 27 articles: 7 expert commentaries, 1 high-quality RCT, 1 low-quality cohort, 1 pilot study, 2 cross-sectional surveys, 5 narrative reviews, and 10 case series or case reports. Combining the 10 case series and reports in our search with 18 discussed in narrative reviews included in our review yielded 201 infants who received manual therapy for nursing dysfunction. No serious adverse events were reported and improvement in nursing ability was observed using various outcome measures, usually maternal report. Based on the GRADE criteria, there is moderate positive evidence for the effect of manual therapy on suboptimal breastfeeding.

Keywords: spinal manipulation, breastfeeding, manual therapy, infants.

Association of Maternal Use of Folic Acid and Multivitamin Supplements in the Periods Before and During Pregnancy With the Risk of Autism Spectrum Disorder in Offspring.

Stephen Z. Levine, PhD, Arad Kodesh, MD, Alexander Viktorin, PhD, Lauren Smith, BA, Rudolf Uher, MD, PhD, Abraham Reichenberg, PhD, and Sven Sandin, PhD.

JAMA Psychiatry. 2018 Feb; 75(2): 176—184. [Published online](#) 2018 Jan 3.

ABSTRACT

Importance: The association of maternal use of folic acid and multivitamin supplements before and during pregnancy with the risk of autism spectrum disorder (ASD) in offspring is unclear. **Objective:** To examine the associations between the use of maternal folic acid and multivitamin supplements before and during pregnancy and the risk of ASD in offspring. **Design, Setting, and Participants:** A case-control cohort study of 45 300 Israeli children born between January 1, 2003, and December 31, 2007, were followed up from birth to January 26, 2015, for the risk of ASD. The cases were all children diagnosed with ASD and the controls were a random sample of 33% of all live-born children. **Exposures:** Maternal vitamin supplements were classified for folic acid (vitamin B9), multivitamin supplements (Anatomical Therapeutic Chemical A11 codes vitamins A, B, C, and D), and any combination thereof exposed in the intervals before and during pregnancy. **Main Outcomes and Measures:** The association between maternal vitamin supplementation and the risk of ASD in offspring was quantified with relative risks (RRs) and their 95% CIs fitting Cox proportional hazards regression models adjusted for confounders. Sensitivity analyses were performed to test the robustness of the results. **Results:** Of the 45 300 children in the study (22 090 girls and 23 210 boys; mean [SD] age, 10.0 [1.4] years at the end of follow-up), 572 (1.3%) received a diagnosis of ASD. Maternal exposure to folic acid and/or multivitamin supplements before pregnancy was statistically significantly associated with a lower likelihood of ASD in the offspring compared with no exposure before pregnancy (RR, 0.39; 95% CI, 0.30-0.50; $P < .001$). Maternal exposure to folic acid and/or multivitamin supplements during pregnancy was statistically significantly associated with a lower likelihood of ASD in offspring compared with no exposure during pregnancy (RR, 0.27; 95% CI, 0.22-0.33; $P < .001$). Corresponding RRs were estimated for maternal exposure to folic acid before pregnancy (RR, 0.56; 95% CI, 0.42-0.74; $P = .001$), maternal exposure to folic acid during pregnancy (RR, 0.32; 95% CI, 0.26-0.41; $P < .001$), maternal exposure to multivitamin supplements before pregnancy (RR, 0.36; 95% CI, 0.24-0.52; $P < .001$), and maternal exposure to multivitamin supplements during pregnancy (RR, 0.35; 95% CI, 0.28-0.44; $P < .001$). The results generally remained statistically significant across sensitivity analyses. **Conclusions and Relevance:** Maternal exposure to folic acid and multivitamin supplements before and during pregnancy is associated with a reduced risk of ASD in the offspring compared with the offspring of mothers without such exposure.

Early Acid Suppression Therapy Exposure and Fracture in Young Children.

Laura Malchodi, Kari Wagner, Apryl Susi, Gregory Gorman, and Elizabeth Hisle-Gorman.

Am J Phys Anthropol. 2018 Nov;167(3):628-643. doi: 10.1002/ajpa.23690. Epub 2018 Aug 29. [PubMed.gov](#)

Pediatrics July 2019, [Vol. 144 / Issue 1](#)

ABSTRACT

BACKGROUND: Acid suppression therapy (AST), including proton pump inhibitors (PPIs) and histamine H2-receptor antagonists (H2RAs), is frequently prescribed to treat symptomatic gastroesophageal reflux in otherwise healthy infants. PPI use has been associated with increased fracture risk in older adults; 2 preliminary studies in children have conflicting results. **METHODS:** A retrospective cohort of children born 2001 to 2013 who were followed for ≥ 2 years was formed. Those with osteogenesis imperfecta, cholestasis, or child maltreatment were excluded. Prescription data were used to identify AST prescription before age 1 year. International Classification of Diseases, Ninth Revision, Clinical Modification codes identified fractures after age 1 year. A Cox proportional hazard analysis assessed fracture hazard and was adjusted for sex, prematurity, low birth weight, previous fracture, anti-epileptics, and overweight or obesity. **RESULTS:** Of 851 631 included children, 97286 (11%) were prescribed AST in the first year of life; 7998 (0.9%) children were prescribed PPI, 71578 (8%) were prescribed H2RA, and 17710 (2%) were prescribed both a PPI and H2RA. Infants prescribed AST had an earlier median first fracture age (3.9 vs 4.5 years). After adjustment, increased fracture hazard was associated with PPI use (21%) and PPI and H2RA use (30%), but not H2RA use alone. Longer duration of AST treatment and earlier age of first AST use was associated with increased fracture hazard. **CONCLUSIONS:** Infant PPI use alone and together with H2RAs is associated with an increased childhood fracture hazard, which appears amplified by days of use and earlier initiation of ASTs. Use of AST in infants should be weighed carefully against possible fracture.

Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents.

Mark L. Wolraich, MD, FAAP, Joseph F. Hagan, Jr., MD, FAAP, Carla Allan, PhD, Eugenia Chan, MD, MPH, FAAP, Dale Davison, MSpEd, PCC, Marian Earls, MD, MTS, FAAP, Steven W. Evans, PhD, Susan K. Flinn, MA, Tanya Froehlich, MD, MS, FAAP, Jennifer Frost, MD, FAAP, Joseph R. Holbrook, PhD, MPH, Christoph Ulrich Lehmann, MD, FAAP, Herschel Robert Lessin, MD, FAAP, Kymika Okechukwu, MPA, Karen L. Pierce, MD, DFAACAP, Jonathan D. Winner, MD, FAAP, and William Zurhellen, MD, FAAP.

SUBCOMMITTEE ON CHILDREN AND ADOLESCENTS WITH ATTENTION-DEFICIT/HYPERACTIVE DISORDER, *PEDIATRICS* Volume 144, number 4, October 2019. [Available online.](#)

ABSTRACT

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neurobehavioral disorders of childhood and can profoundly affect children's academic achievement, well-being, and social interactions. The American Academy of Pediatrics first published clinical recommendations for evaluation and diagnosis of pediatric ADHD in 2000; recommendations for treatment followed in 2001. The guidelines were revised in 2011 and published with an accompanying process of care algorithm (PoCA) providing discrete and manageable steps by which clinicians could fulfill the clinical guideline's recommendations. Since the release of the 2011 guideline, the Diagnostic and Statistical Manual of Mental Disorders has been revised to the fifth edition, and new ADHD-related research has been published. These publications do not support dramatic changes to the previous recommendations. Therefore, only incremental updates have been made in this guideline revision, including the addition of a key action statement related to diagnosis and treatment of comorbid conditions in children and adolescents with ADHD. The accompanying process of care algorithm has also been updated to assist in implementing the guideline recommendations. Throughout the process of revising the guideline and algorithm, numerous systemic barriers were identified that restrict and/or hamper pediatric clinicians' ability to adopt their recommendations. Therefore, the subcommittee created a companion article (available in the Supplemental Information) on systemic barriers to the care of children and adolescents with ADHD, which identifies the major systemic-level barriers and presents recommendations to address those barriers; in this article, we support the recommendations of the clinical practice guideline and accompanying process of care algorithm.

Is cesarean section delivery associated with autism spectrum disorder?

Al-Zalabani AH1, Al-Jabree AH, Zeidan ZA.

Neurosciences (Riyadh). 2019 Jan;24(1):11-15. doi: [10.17712/nsj.2019.1.20180303](https://doi.org/10.17712/nsj.2019.1.20180303).

ABSTRACT

OBJECTIVE: To investigate a correlation between birth by caesarean section and autism spectrum disorder (ASD). **METHODS:** A case-control study with a case to control ratio of 1:2 was performed in Al-Madina Al-Munawarah city, Kingdom of Saudi Arabia during the year 2016. The cases were selected according to the eligibility criteria and children attending a well-baby clinic in the same hospital, were chosen as the control group subjects. Data was collected from the medical records and an interview-based questionnaire was administered to the mothers. The chi-square test was used for bivariate analysis and logistic regression to estimate the crude and adjusted odds ratios (ORs). **RESULTS:** Eighty-seven cases of ASD and 174 control group subjects were included in the current study. Approximately 39% (n=34) of the 87 children with ASD were delivered by cesarean section compared to 21% (n=36) of the 174 children in the control group. After adjusting for potentially confounding factors, the adjusted OR was 2.9 (95% confidence interval [CI]: 1.57-5.35). **CONCLUSION:** An association between delivery by cesarean section and ASD was found in this study, in support of the findings of other studies. It is recommended that preventive measures are adopted to avoid unnecessary cesarean sections.

Association of Cesarean Delivery With Risk of Neurodevelopmental and Psychiatric Disorders in the Offspring: A Systematic Review and Meta-analysis.

Zhang T, Sidorchuk A, Sevilla-Cermeño L, Vilaplana-Pérez A, Chang Z, Larsson H, Mataix-Cols D, and Fernández de la Cruz L.

JAMA Netw Open. 2019 Aug 2;2(8):e1910236.

ABSTRACT

Importance: Birth by cesarean delivery is increasing globally, particularly cesarean deliveries without medical indication. Children born via cesarean delivery may have an increased risk of negative health outcomes, but the evidence for psychiatric disorders is incomplete. **Objective:** To evaluate the association between cesarean delivery and risk of neurodevelopmental and psychiatric disorders in the offspring. **Data Sources:** Ovid MEDLINE, Embase, Web of Science, and PsycINFO were searched from inception to December 19, 2018. Search terms included all main mental disorders in the Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition). **Study Selection:** Two researchers independently selected observational studies that examined the association between cesarean delivery and neurodevelopmental and psychiatric disorders in the offspring. **Data Extraction and Synthesis:** Two researchers independently extracted data according to Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) and Meta-analysis of Observational Studies in Epidemiology (MOOSE) reporting guidelines and assessed study quality using the Newcastle-Ottawa Scale. Random-effects meta-analyses were used to pool odds ratios (ORs) with 95% CIs for each outcome. Sensitivity and influence analyses tested the robustness of the results. **Main Outcomes and Measures:** The ORs for the offspring with any neurodevelopmental or psychiatric disorder who were born via cesarean delivery compared with those were born via vaginal delivery. **Results:** A total of 6953 articles were identified, of which 61 studies comprising 67 independent samples were included, totaling 20 607 935 deliveries. Compared with offspring born by vaginal delivery, offspring born via cesarean delivery had increased odds of autism spectrum disorders (OR, 1.33; 95% CI, 1.25-1.41; I² = 69.5%) and attention-deficit/hyperactivity disorder (OR, 1.17; 95% CI, 1.07-1.26; I² = 79.2%). Estimates were less precise for intellectual disabilities (OR, 1.83; 95% CI, 0.90-3.70; I² = 88.2%), obsessive-compulsive disorder (OR, 1.49; 95% CI, 0.87-2.56; I² = 67.3%), tic disorders (OR, 1.31; 95% CI, 0.98-1.76; I² = 75.6%), and eating disorders (OR, 1.18; 95% CI, 0.96-1.47; I² = 92.7%). No significant associations were found with depression/affective psychoses or nonaffective psychoses. Estimates were comparable for emergency and elective cesarean delivery. Study quality was high for 82% of the cohort studies and 50% of the case-control studies. **Conclusions and Relevance:** The findings suggest that cesarean delivery births are associated with an increased risk of autism spectrum disorder and attention-deficit/hyperactivity disorder, irrespective of cesarean delivery modality, compared with vaginal delivery. Future studies on the mechanisms behind these associations appear to be warranted.

Proton Pump Inhibitors and Fracture Risk: A Review of Current Evidence and Mechanisms Involved.

Benjamin Ka Seng Thong, Soelaiman Ima-Nirwana, and Kok-Yong Chin.

Int J Environ Res Public Health. 2019 May; 16(9): 1571. [Published online](#) 2019 May 5.

ABSTRACT

The number of patients with gastroesophageal problems taking proton pump inhibitors (PPIs) is increasing. Several studies suggested a possible association between PPIs and fracture risk, especially hip fractures, but the relationship remains contentious. This review aimed to investigate the longitudinal studies published in the last five years on the relationship between PPIs and fracture risk. The mechanism underlying this relationship was also explored. Overall, PPIs were positively associated with elevated fracture risk in multiple studies ($n = 14$), although some studies reported no significant relationship ($n = 4$). Increased gastrin production and hypochlorhydria are the two main mechanisms that affect bone remodeling, mineral absorption, and muscle strength, contributing to increased fracture risk among PPI users. As a conclusion, there is a potential relationship between PPIs and fracture risks. Therefore, patients on long-term PPI treatment should pay attention to bone health status and consider prophylaxis to decrease fracture risk.

Keywords: bone, compression, omeprazole, osteoporosis, pantoprazole

Spinal manual therapy in infants, children and adolescents: A systematic review and meta-analysis on treatment indication, technique and outcomes.

Driehuis F, Hoogeboom TJ, Nijhuis-van der Sanden MWG, de Bie RA, and Staal JB.

PLoS One. 2019 Jun 25;14(6):e0218940. [doi: 10.1371/journal.pone.0218940](#). eCollection 2019.

ABSTRACT

BACKGROUND: Studies on effectiveness and safety of specific spinal manual therapy (SMT) techniques in children, which distinguish between age groups, are lacking. **OBJECTIVE:** To conduct a systematic review of the evidence for effectiveness and harms of specific SMT techniques for infants, children and adolescents. **METHODS:** PubMed, Index to Chiropractic Literature, Embase, CINAHL and Cochrane Library were searched up to December 2017. Controlled studies, describing primary SMT treatment in infants (<1 year) and children/adolescents (1-18 years), were included to determine effectiveness. Controlled and observational studies and case reports were included to examine harms. One author screened titles and abstracts and two authors independently screened the full text of potentially eligible studies for inclusion. Two authors assessed risk of bias of included studies and quality of the body of evidence using the GRADE methodology. Data were described according to PRISMA guidelines and CONSORT and TIDieR checklists. If appropriate, random-effects meta-analysis was performed. **RESULTS:** Of the 1,236 identified studies, 26 studies were eligible. Infants and children/adolescents were treated for various (non-)musculoskeletal indications, hypothesized to be related to spinal joint dysfunction. Studies examining the same population, indication and treatment comparison were scarce. Due to very low quality evidence, it is uncertain whether gentle, low-velocity mobilizations reduce complaints in infants with colic or torticollis, and whether high-velocity, low-amplitude manipulations reduce complaints in children/adolescents with autism, asthma, nocturnal enuresis, headache or idiopathic scoliosis. Five case reports described severe harms after HVLA manipulations in four infants and one child. Mild, transient harms were reported after gentle spinal mobilizations in infants and children, and could be interpreted as side effect of treatment. **CONCLUSIONS:** Based on GRADE methodology, we found the evidence was of very low quality; this prevented us from drawing conclusions about the effectiveness of specific SMT techniques in infants, children and adolescents. Outcomes in the included studies were mostly parent or patient-reported; studies did not report on intermediate outcomes to assess the effectiveness of SMT techniques in relation to the hypothesized spinal dysfunction. Severe harms were relatively scarce, poorly described and likely to be associated with underlying missed pathology. Gentle, low-velocity spinal mobilizations seem to be a safe treatment technique in infants, children and adolescents. We encourage future research to describe effectiveness and safety of specific SMT techniques instead of SMT as a general treatment approach.

Treatment of Glenohumeral Subluxation: A Review of the Literature and Considerations for Pediatric Population.

Cole A, and Cox T.

Am J Phys Med Rehabil. 2019 Aug;98(8):706-714. [Available online](#) at PubMed.

ABSTRACT

OBJECTIVE: The aim of this review was to identify treatment strategies in the research literature to inform all health professionals on best practice strategies when addressing glenohumeral subluxation. **DESIGN:** Articles were identified by searching electronic databases. Two reviewers independently appraised the methodological quality of the selected studies. Discrepancies were resolved after corroboration of results. **RESULTS:** Research literature pertaining to five major treatment strategies was found (n = 40 peer-reviewed publications), spanning evidence levels I-V. The greatest number of studies concerned neuromuscular electrical stimulation (n = 19), five of which were level I studies, followed by manual preventive strategies, such as slings (n = 20), three of which were level I studies. **CONCLUSIONS:** These findings indicate that the most high-quality research supports using neuromuscular electrical stimulation or manual preventive studies, although no studies used direct comparison methods to ascertain relative merits of each type of intervention when compared with others. No evidence suggested that harm was done by using neuromuscular electrical stimulation or manual preventive methods. This literature review suggests that the identified treatment strategies should be considered by clinicians as the treatment of choice for GHS. No literature was identified that reviewed treatment strategies in a pediatric population; however, the authors considerations for treatment in the pediatric population were included.

Prevalence of Gastroesophageal Reflux Disease Symptoms in Infants and Children: A Systematic Review.

Singendonk M, Goudswaard E, Langendam M, van Wijk M, van Etten-Jamaludin F, Benninga M, and Tabbers M.

J Pediatr Gastroenterol Nutr. 2019 Jun;68(6):811-817. [Available online](#) at PubMed.

ABSTRACT

OBJECTIVE: Gastroesophageal reflux disease (GERD) is defined as gastroesophageal reflux causing troublesome symptoms or complications. In this study we reviewed the literature regarding the prevalence of GERD symptoms in infants and children. **METHODS:** Databases of PubMed, EMBASE, and Cochrane were systematically searched from inception to June 26, 2018. English-written studies based on birth cohort, school-based, or general population samples of ≥ 50 children aged 0 to 21 years were included. Convenience samples were excluded. **RESULTS:** In total, 3581 unique studies were found, of which 25 studies (11 in infants and 14 in children) were included with data on the prevalence of GERD symptoms comprising a total population of 487,969 children. In infants (0-18 months), GERD symptoms are present in more than a quarter of infants on a daily basis and show a steady decline in frequency with almost complete disappearance of symptoms at the age of 12 months. In children older than 18 months, GERD symptoms show large variation in prevalence between studies (range 0%-38% of study population) and overall, are present in >10% and in 25% on respectively a weekly and monthly basis. Of the risk factors assessed, higher body mass index and the use of alcohol and tobacco were associated with higher GERD symptom prevalence. **CONCLUSIONS:** This systematic review demonstrates that the reported prevalence of GERD symptoms varies considerably, depending on method of data collection and criteria used to define symptoms. Nevertheless, the high reported prevalence rates support better investment of resources and educational campaigns focused on prevention.

Planning Well-Balanced Vegetarian Diets in Infants, Children, and Adolescents: The VegPlate Junior.

Baroni L, Goggi S, Battino M.

J Acad Nutr Diet. 2019 Jul;119(7):1067-1074. DOI: <https://doi.org/10.1016/j.jand.2018.06.008>

ABSTRACT

Vegetarian diets, defined as being devoid of flesh foods (such as meat, poultry, wild game, seafood, and their products), are followed by a growing number of people worldwide because of ethical, health, and environmental reasons. Vegetarian diets include a variety of plant-based foods such as grains, legumes, nuts and seeds, fruits, and vegetables, and may or may not include dairy products and eggs. Vegan diets exclude all animal foods. Although for over 30 years we have known that well-planned vegetarian diets, including vegan, are nutritionally adequate and promote regular growth from the early years of human development on, some researchers still discourage parents from raising vegetarian children.

Musculoskeletal Injury Risk After Sport-Related Concussion: A Systematic Review and Meta-analysis.

McPherson AL, Nagai T, Webster KE, and Hewett TE.

Am J Sports Med. 2019 Jun;47(7):1754-1762. doi: [10.1177/0363546518785901](https://doi.org/10.1177/0363546518785901). Epub 2018 Aug 3.

ABSTRACT

BACKGROUND: Clinical management of sport-related concussion typically involves a symptom checklist, clinical examination of mental status, and neurocognitive testing. However, recent studies have identified unresolved, impaired sensorimotor function after athletes return to sport. A review and meta-analysis of all current literature regarding risk of subsequent musculoskeletal (MSK) injury after concussion has yet to be published in the medical literature. **PURPOSE/HYPOTHESIS:** To determine the odds that athletes will sustain MSK injury after concussion. It was hypothesized a priori that concussion would increase the risk for MSK injury. **STUDY DESIGN:** Systematic review and meta-analysis. **METHODS:** PubMed and Google Scholar were searched from January 2000 to November 2017. Reference lists of the included studies were manually searched. Two reviewers independently searched the literature for studies published in English that reported MSK injury after athletes returned to play following a concussion. Two independent reviewers completed data extraction using PRISMA guidelines and assessed study quality using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies from the National Institutes of Health. Random effects meta-analyses were used to calculate odds ratio (OR) and incidence rate ratio (IRR) of MSK injury after concussion. The primary study outcome of interest was the number of athletes who sustained MSK injury after concussion. **RESULTS:** Eight studies met inclusion criteria for meta-analysis. Meta-analysis results indicated that athletes who had a concussion had 2 times greater odds of sustaining a MSK injury than athletes without concussion (OR, 2.11; 95% CI, 1.46-3.06). In addition, athletes with concussion demonstrated a higher incidence of MSK injury after return to sport compared with nonconcussed athletes (IRR, 1.67; 95% CI, 1.42-1.96). Further analysis showed that both male and female athletes with concussion were at an increased risk of MSK injury compared with their respective same-sex, nonconcussed controls (OR > 1.56, P < .01). **CONCLUSION:** Based on the evidence of higher risk of MSK injuries after concussion, standard clinical assessments for athletes with concussion should include not only physical symptoms and cognitive function before return to sport but also neuromuscular risk factors associated with increased risk for MSK injuries.

KEYWORDS: lower extremity; musculoskeletal injury risk; sport-related concussion.

A histocytological and radiological overview of the natural history of intervertebral disk: from embryonic formation to age-related degeneration.

Wang F, Zhang C, Sinkemani A, Shi R, Xie ZY, Chen L, Mao L, and Wu XT.

Eur Spine J. 2019 Apr;28(4):633-648. [Available online](#) at PubMed.

ABSTRACT

PURPOSE: To elucidate the natural history of intervertebral disk (IVD) and characterize its embryonic beginnings and age-related degeneration. **METHODS:** Coronal sections of embryonic (E13.5-neonatal) and postnatal (4-60-week-old) Sprague-Dawley rat IVD were stained by a series of histological stainings (hematoxylin and eosin, Alcian blue, Picrosirius red, Masson, Periodic acid-Schiff). Growth kinetics within embryonic IVD were evaluated by immunohistochemical staining of Ki67 and proliferating cell nuclear antigen. Postnatal maturation and degeneration of IVD were visualized on radiology by X-ray, CT, and MR imaging. **RESULTS:** During the formation of rat IVD, inner annulus fibrosus (AF) and cartilaginous endplate (CEP) shared similar cell density, extracellular matrix, and potential of growth kinetics; notochord provided increased and enlarged cytoplasmic vacuoles to generate nucleus pulposus (NP), part of which was retained within CEP. Postnatally, vacuolated notochord cells were reduced by devacuolation, while chondrocytic NP cells increased; cartilaginous layers of CEP were narrowed by vertebrae growth and secondary ossification; fibrotic portion of AF decreased as cartilaginous matrix accumulated and infiltrated outward. In aged and degenerated IVD, large longitudinal fissures were detected near the boundaries between inner and outer AF, whereas both reduced cellularity and accumulated cell clusters were evident within the dehydrated NP; only part of these histocytological changes could be reported on radiology. **CONCLUSIONS:** By showing that the natural history of IVD is orchestrated by a dynamic histocytological regulation, our study may facilitate better understanding of the developmental defects, cellular heterogeneity, age-related degenerative mechanisms, and biological regeneration of IVD. These slides can be retrieved under Electronic Supplementary Material.

KEYWORDS: Cytoplasmic Vacuole; Embryogenesis; Intervertebral Disk; Notochord; Sclerotome.

Palm Oil and Beta-palmitate in Infant Formula: A Position Paper by the European Society for Paediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) Committee on Nutrition.

Bronsky J, Campoy C, Embleton N, Fewtrell M, Mis NF, Gerasimidis K, Hojsak I, Hulst J, Indrio F, Lapillonne A, Molgaard C, Moltu SJ, Verduci E, Vora R, Domellöf M; and the ESPGHAN Committee on Nutrition.

J Pediatr Gastroenterol Nutr. 2019 May;68(5):742-760. [Available online](#) at PubMed.

ABSTRACT

BACKGROUND: Palm oil (PO) is used in infant formulas in order to achieve palmitic acid (PA) levels similar to those in human milk. PA in PO is esterified predominantly at the SN-1,3 position of triacylglycerol (TAG), and infant formulas are now available in which a greater proportion of PA is in the SN-2 position (typical configuration in human milk). As there are some concerns about the use of PO, we aimed to review literature on health effects of PO and SN-2-palmitate in infant formulas. **METHODS:** PubMed and Cochrane Database of Systematic Reviews were systematically searched for relevant studies on possible beneficial effects or harms of either PO or SN-2-palmitate in infant formula on various health outcomes. **RESULTS:** We identified 12 relevant studies using PO and 21 studies using SN-2-palmitate. Published studies have variable methodology, subject characteristics, and some are underpowered for the key outcomes. PO is associated with harder stools and SN-2-palmitate use may lead to softer stool consistency. Bone effects seem to be short-lasting. For some outcomes (infant colic, faecal microbiota, lipid metabolism), the number of studies is very limited and summary evidence inconclusive. Growth of infants is not influenced. There are no studies published on the effect on markers of later diseases. **CONCLUSIONS:** There is insufficient evidence to suggest that PO should be avoided as a source of fat in infant formulas for health reasons. Inclusion of high SN-2-palmitate fat blend in infant formulas may have short-term effects on stool consistency but cannot be considered essential.

Practice-based interpretation of ultrasound studies leads the way to more effective clinical support and less pharmaceutical and surgical intervention for breastfeeding infants.

Pamela Douglas, MBBS, FRACGP, IBCLC, PhD (Medical Director, Adjunct Associate Professor, Senior Lecturer), Donna Geddes, DMU PGDipSc PhD (Director, Associate Professor).

Midwifery. 58 (2018) 145—155. [Available online](#).

ABSTRACT

Background: Parents resort to infant formula because of unsettled behaviour, breast and nipple pain, and growth concerns. Although 96% of Australian women want to breastfeed, by the end of three months only 39% are able to do so exclusively (Australian Institute of Health and Welfare, 2011). The most common reasons parents give for introducing infant formula are perceptions of low supply (usually because of unsettled infant behaviour), breast and nipple pain, difficulty with latching and sucking, unsettled infant behaviour, and infant weight concerns (Brown et al., 2014; Li et al., 2008; Odom et al., 2013; Redsell et al., 2010). Unsettled infant behaviour, breastfeeding difficulties, and lactation-related breast pain. **Background:** breastfeeding optimizes health outcomes for both mothers and infants. Although most women want to breastfeed, they report commencing infant formula because of nipple pain, unsettled infant behaviour, and infant growth concerns. To date, existing approaches to fit and hold ('latch and positioning') have been demonstrated not to help breastfeeding outcomes, and women report widespread dissatisfaction with the quality of support and conflicting advice they receive. Breast and nipple pain, difficulty with latching and sucking, fussing at the breast, back-arching, marathon feeds, excessively frequent feeds, poor weight gain, breast refusal, and crying due to poor satiety often signal suboptimal positional instability and impaired milk transfer, but may be misdiagnosed as medical conditions. Over the past two decades, there has been an exponential increase in numbers of infants being treated with medications, laser or scissors frenotomy, and manual therapy for unsettled behaviour and breastfeeding difficulty. New approaches to clinical breastfeeding support are urgently required. **Method and results:** we analyzed the findings of a literature search of PubMed and MEDLINE databases for ultrasound studies measuring sucking in term and preterm infants. The findings demonstrate that the Stripping Action Model of infant suck during breastfeeding, and the resultant Structural Model of infant suck dysfunction, are inaccurate. Instead, ultrasound data demonstrates the critical role of intra-oral vacuum for milk transfer. We integrate these two-dimensional ultrasound results with clinical experience of the third dimension, volume, to propose a Gestalt Model of the biomechanics of healthy infant suck during breastfeeding. The Gestalt Model hypothesizes that optimal intra-oral vacuums and breast tissue volumes are achieved when mother-infant positional stability eliminates conflicting intra-oral vectors, resulting in pain-free, effective milk transfer. **Conclusion:** the Gestalt Model of the biomechanics of healthy infant suck during breastfeeding opens up the possibility of a new clinical method which may prevent unnecessary medical treatments for breastfeeding problems and related unsettled infant behaviour in early life.

Keywords: Breastfeeding Infant suck, Tongue-tie, Nipple pain, Unsettled infant behavior, Breastfeeding problem, Infant crying, Upper lip tie.

Cognitive and Behavioral Consequences of Sleep Disordered Breathing in Children.

Irina Trosman and Samuel J. Trosman.

Med Sci (Basel). 2017 Dec; 5(4): 30. Published online 2017 Dec 1. doi: [10.3390/medsci5040030](https://doi.org/10.3390/medsci5040030).

ABSTRACT

There is now a plethora of evidence that children with sleep disordered breathing (SDB) show deficits in neurocognitive performance, behavioral impairments, and school performance. The following review will focus on the neurobehavioral impacts of SDB, pediatric sleep investigation challenges, potential mechanisms of behavioral and cognitive deficits in children with SDB, and the impact of SDB treatment.

Keywords: sleep disordered breathing, obstructive sleep apnea, children, attention, learning, behavior.

Altered Regional Brain Cortical Thickness in Pediatric Obstructive Sleep Apnea.

Paul M. Macey, Leila Kheirandish-Gozal, Janani P. Prasad, Richard A. Ma, Rajesh Kumar, Mona F. Philby, and David Gozal.

Front Neurol. 2018; 9: 4. Published online 2018 Jan 22. doi: [10.3389/fneur.2018.00004](https://doi.org/10.3389/fneur.2018.00004).

ABSTRACT

Rationale: Obstructive sleep apnea (OSA) affects 2–5% of all children and is associated with cognitive and behavioral deficits, resulting in poor school performance. These psychological deficits may arise from brain injury, as seen in preliminary findings of lower gray matter volume among pediatric OSA patients. However, the psychological deficits in OSA are closely related to functions in the cortex, and such brain areas have not been specifically assessed. The objective was to determine whether cortical thickness, a marker of possible brain injury, is altered in children with OSA. **Methods:** We examined regional brain cortical thicknesses using high-resolution T1-weighted magnetic resonance images in 16 pediatric OSA patients (8 males; mean age \pm SD = 8.4 \pm 1.2 years; mean apnea/hypopnea index \pm SD = 11 \pm 6 events/h) and 138 controls (8.3 \pm 1.1 years; 62 male; 138 subjects from the NIH Pediatric MRI database) to identify cortical thickness differences in pediatric OSA subjects. **Results:** Cortical thinning occurred in multiple regions including the superior frontal, ventral medial prefrontal, and superior parietal cortices. The left side showed greater thinning in the superior frontal cortex. Cortical thickening was observed in bilateral precentral gyrus, mid-to-posterior insular cortices, and left central gyrus, as well as right anterior insula cortex. **Conclusion:** Changes in cortical thickness are present in children with OSA and likely indicate disruption to neural developmental processes, including maturational patterns of cortical volume increases and synaptic pruning. Regions with thicker cortices may reflect inflammation or astrocyte activation. Both the thinning and thickening associated with OSA in children may contribute to the cognitive and behavioral dysfunction frequently found in the condition.

Keywords: sleep disordered breathing, cortex, intermittent hypoxia, atrophy, obstructive sleep apnea, cognitive deficits.

Obstructive Sleep-Disordered Breathing in Children: Impact on the Developing Brain.

Walter LM, C Horne RS.

Pediatr Respirol Crit Care Med. 2018;2:58-64. [Available online](#).

ABSTRACT

Obstructive sleep-disordered breathing (SDB) affects up to 11% of children and forms a continuum of severity ranging from primary snoring to obstructive sleep apnea. Children with SDB exhibit significant neurocognitive and cardiovascular dysfunction, which is associated with repetitive hypoxia and sleep fragmentation that characterize the condition. We reviewed the recent literature pertaining to the effect of SDB on the brain in children. These include studies that utilized near-infrared spectroscopy to determine cerebral oxygenation and structural and functional magnetic resonance imaging (MRI) of the brain. Studies have identified that the effect of SDB on cerebral oxygenation in children is minimal and not clinically significant. There are conflicting reports on the association between the measures of cerebral oxygenation and peripheral arterial oxygen saturation (SpO₂), and further research needs to be conducted to elucidate the relationship between peripheral SpO₂, cerebral oxygenation, and SDB in children. MRI studies have reported significant structural and functional changes to the brains of children with SDB, in brain regions associated with neurocognition, behavior, and autonomic function. These include reduced white and gray matter and structural changes to a multitude of brain areas including, but not limited to, the hippocampus, cortex, amygdala, insula, thalamus, cerebellum, and basal ganglia. These studies utilize a variety of MRI techniques to address different research questions, but contribute to the gradually developing picture of the adverse effects of SDB on the brain in children.

Keywords: Cerebral oxygenation, MRI, obstructive sleep apnea, pediatric

Decreased Fecal Bacterial Diversity and Altered Microbiome in Children Colonized With *Clostridium difficile*.

Chen LA, Hourigan SK, Grigoryan Z, Gao Z, Clemente JC, Rideout JR, Chirumamilla S, Rabidazeh S, Saeed S8, Elson CO, Oliva-Hemker M, Blaser MJ, and Sears CL.

J Pediatr Gastroenterol Nutr. 2019 Apr;68(4):502-508. [Available online](#) at PubMed.

ABSTRACT

OBJECTIVES: The gut microbiome is believed to play a role in the susceptibility to and treatment of *Clostridium difficile* infections (CDIs). It is, however, unknown whether the gut microbiome is also affected by asymptomatic *C difficile* colonization. Our study aimed to evaluate the fecal microbiome of children based on *C difficile* colonization, and CDI risk factors, including antibiotic use and comorbid inflammatory bowel disease (IBD). **METHODS:** Subjects with IBD and non-IBD controls were prospectively enrolled from pediatric clinics for a biobanking project (n=113). A fecal sample was collected from each subject for research purposes only and was evaluated for asymptomatic toxigenic *C difficile* colonization. Fecal microbiome composition was determined by 16S rRNA sequencing. **RESULTS:** We found reduced bacterial diversity and altered microbiome composition in subjects with *C difficile* colonization, concurrent antibiotic use, and/or concomitant IBD (all $P < 0.05$). Accounting for antibiotic use and IBD status, children colonized with *C difficile* had significant enrichment in taxa from the genera *Ruminococcus*, *Eggerthella*, and *Clostridium*. Children without *C difficile* had increased relative abundances of *Faecalibacterium* and *Rikenellaceae*. Imputed metagenomic functions of those colonized were enriched for genes in oxidative phosphorylation and beta-lactam resistance, whereas in the subjects without *C difficile*, several functions in translation and metabolism were over-represented. **CONCLUSIONS:** In children, *C difficile* colonization, or factors that predispose to colonization such as antibiotic use and IBD status were associated with decreased gut bacterial diversity and altered microbiome composition. Averting such microbiome alterations may be a method to prevent or treat CDI.

24-Hour Movement Behaviors and Impulsivity.

Michelle D. Guerrero, Joel D. Barnes, Jeremy J. Walsh, Jean-Philippe Chaput, Mark S. Tremblay and Gary S. Goldfield.

Pediatrics September 2019, 144 (3) e20190187; DOI: <https://doi.org/10.1542/peds.2019-0187>.

ABSTRACT

BACKGROUND: The objective of this study was to examine individual and concurrent associations between meeting the Canadian 24-Hour Movement Guidelines for Children and Youth (9–11 hours of sleep per night, ≤ 2 hours of recreational screen time (ST) per day, and at least 60 minutes of moderate to vigorous physical activity per day) and dimensions of impulsivity. **METHODS:** Data from this cross-sectional observational study were part of the first annual curated release of the Adolescent Brain Cognitive Development Study. Participants included 4524 children between the ages of 8 and 11 years. **RESULTS:** In analyses, it was shown that adherence to individual movement behavior recommendations as well as combinations of adherence to movement behavior recommendations were associated with each dimension of impulsivity. Meeting all 3 movement behavior recommendations was associated with lower positive urgency (95% confidence interval [CI]: -0.12 to -0.05), negative urgency (95% CI: -0.04 to -0.08), Behavioral Inhibition System (95% CI: -0.08 to -0.01), greater perseverance (95% CI: 0.09 to 0.15), and better scores on delay-discounting (95% CI: 0.57 to 0.94). Meeting the ST and sleep recommendations was associated with less impulsive behaviors on all dimensions of impulsivity: negative urgency (95% CI: -0.20 to -0.10), positive urgency (95% CI: -0.16 to -0.08), perseverance (95% CI: 0.06 to 0.15), Behavioral Inhibition System (95% CI: -0.15 to -0.03), Behavioral Activation System (BAS) reward responsiveness (95% CI: -0.04 to -0.05), BAS drive (95% CI: -0.14 to -0.06), BAS fun-seeking (95% CI: -0.15 to -0.17), and delay-discounting task (95% CI: 0.68 to 0.97). **CONCLUSIONS:** Findings support efforts to determine if limiting recreational ST while promoting adequate sleep enhances the treatment and prevention of impulsivity-related disorders.

Early Subthreshold Aerobic Exercise for Sport-Related Concussion: A Randomized Clinical Trial.

John J. Leddy, MD; Mohammad N. Haider, MD; Michael J. Ellis, MD et al; Rebekah Mannix, MD; Scott R. Darling, MD; Michael S. Freitas, MD; Heidi N. Suffoletto, MD; Jeff Leiter, PhD; Dean M. Cordingley, MSc; and Barry Willer, PhD.

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ABSTRACT

Question: What is the effectiveness of subsymptom threshold aerobic exercise vs a placebo-like stretching program prescribed to adolescents in the short term after sport-related concussion? **Findings:** In this randomized clinical trial of 103 adolescents, those assigned to aerobic exercise recovered faster (13 days) than those assigned to placebo-like stretching (17 days), a significant difference. **Meaning:** Early subthreshold aerobic exercise appears to be an effective treatment for adolescents after sport-related concussion. **Abstract:** Importance Sport-related concussion (SRC) is a significant public health problem without an effective treatment. **Objective:** To assess the effectiveness of subsymptom threshold aerobic exercise vs a placebo-like stretching program prescribed to adolescents in the acute phase of recovery from SRC. **Design, Setting, and Participants:** This multicenter prospective randomized clinical trial was conducted at university concussion centers. Male and female adolescent athletes (age 13-18 years) presenting within 10 days of SRC were randomly assigned to aerobic exercise or a placebo-like stretching regimen. **Interventions:** After systematic determination of treadmill exercise tolerance on the first visit, participants were randomly assigned to a progressive subsymptom threshold aerobic exercise or a progressive placebo-like stretching program (that would not substantially elevate heart rate). Both forms of exercise were performed approximately 20 minutes per day, and participants reported daily symptoms and compliance with exercise prescription via a website. **Main Outcomes and Measures:** Days from injury to recovery; recovery was defined as being asymptomatic, having recovery confirmed through an assessment by a physician blinded to treatment group, and returning to normal exercise tolerance on treadmill testing. Participants were also classified as having normal (<30 days) or delayed (≥30 days) recovery. **Results:** A total of 103 participants were included (aerobic exercise: n = 52; 24 female [46%]; stretching, n = 51; 24 female [47%]). Participants in the aerobic exercise group were seen a mean (SD) of 4.9 (2.2) days after the SRC, and those in the stretching group were seen a mean (SD) of 4.8 (2.4) days after the SRC. There were no differences in age, sex, previous concussions, time from injury, initial symptom severity score, or initial exercise treadmill test and physical examination results. Aerobic exercise participants recovered in a median of 13 (interquartile range [IQR], 10-18.5) days, whereas stretching participants recovered in 17 (IQR, 13-23) days (P = .009 by Mann-Whitney test). There was a nonsignificant lower incidence of delayed recovery in the aerobic exercise group (2 participants [4%] in the aerobic group vs 7 [14%] in the placebo group; P = .08). **Conclusions and Relevance:** This is, to our knowledge, the first RCT to show that individualized subsymptom threshold aerobic exercise treatment prescribed to adolescents with concussion symptoms during the first week after SRC speeds recovery and may reduce the incidence of delayed recovery.