Clinical Practice Guideline for Best Practice Management of Pediatric Patients by Chiropractors: Results of a Delphi Consensus Process

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Abstract

Objective: To build upon existing recommendations on best practices for chiropractic management of children by conducting a formal consensus process and best evidence synthesis. **Design:** Best practice guide based on recommendations from current best available evidence and formal consensus of a panel of experienced practitioners, consumers, and experts for chiropractic management of pediatric patients. **Methods:** Synthesis of results of a literature search to inform the development of recommendations from a multidisciplinary steering committee, including experts in pediatrics, followed by a formal Delphi panel consensus process. **Results:** The consensus process was conducted June to August 2022. All 60 panelists completed the process and reached at least 80% consensus on all recommendations after three Delphi rounds. Recommendations for best practices for chiropractic care for children addressed these aspects of the clinical encounter: patient communication, including informed consent; appropriate clinical history, including health habits; appropriate physical examination procedures; red flags/contraindications to chiropractic care and/or spinal manipulation; aspects of chiropractic management of pediatric patients, including infants; modifications of spinal manipulation and other manual procedures for pediatric patients; appropriate referral and co-management; and appropriate health promotion and disease prevention practices. **Conclusion:** This set of recommendations represents a general framework for an evidence-informed and reasonable approach to the management of pediatric patients by chiropractors.

Keywords: adolescent, chiropractic, child, infant, spine, spinal, manipulation, mobilization, pediatrics.

Fetal Fascial Reinforcement Development: From "a White Tablet" to a Sculpted Precise Organization by Movement

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From "a White Tablet" to a Sculpted Precise Organization by Movement. *Biology* 2022, 11, 735.
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Abstract

Fasciae have received much attention in recent years due to their important role in proprioception and muscular force transmission, but few studies have focused on fetal fasciae development and there is no study on the retinacula. The latter are fascial reinforcements that play a key role in proprioception and motor coordination. Furthermore, it is still unclear if they are genetically determined or if they are defined by movements, and if they are present during gestation or if they appear only later in the childhood. We aim to identify their structural organization by qualitative and quantitative assessments to establish their role the myofascial development, highlighting their appearance and organization. Samples from the wrist retinacula, posterior forearm, ankle retinacula, anterior leg, iliotibial tract and anterior thigh of six fetus body donors (from 24th to 40th week of gestation) and histological sections were obtained and a gross anatomy dissection was performed. Sections were stained with hematoxylin-eosin to observe their overall structure and measure their thicknesses. Using Weigert Van Gieson, Alcian blue and immunostaining to detect Hyaluronic Acid Binding Protein (HABP), Collagens I and III (Col I and III) were realized to assess the presence of elastic fibers and hyaluronan. This study confirms that the deep fasciae initially do not have organized layers and it is not possible to highlight any reinforcement. The fascial development is different according to the various area: while the deep fascia and the iliotibial tract is already evident by the 27th week, the retinacula begin to be defined only at the end of pregnancy, and their complete maturation will probably be reached only after birth. These findings suggest that the movement models the retinacula, structuring the fascial system, in particular at the end of pregnancy and in the first months of life. The fasciae can be imagined, initially, as "white tablets" composed of few elastic fibers, abundant collagens and HA, on which various forces, movements, loads and gravity "write their history."

Keywords: fetus; fascia development; retinacula; gross functional movements.

JOURNAL ABSTRACTS

Chiropractic care and research priorities for the pediatric population: A cross-sectional survey of Quebec chiropractors
Rebecca Hayes; Camille Imbeau; Katherine A Pohlman; Marc-André Blanchette and Chantale Doucet
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Abstract
Background: Chiropractors commonly treat pediatric patients within their private practices. The objectives of this study were (1) to identify the treatment techniques and health advice used by Quebec chiropractors with pediatric patients; (2) to explore the research priorities of Quebec chiropractors for the pediatric population; and (3) to identify Quebec chiropractors' training in the field of pediatric chiropractics. **Methods:** A web-based cross-sectional survey was conducted among all licensed Quebec chiropractors (Qc, Canada). Descriptive statistics were used to analyze all quantitative variables. **Results:** The results showed that among the 245 respondents (22.8% response rate), practitioners adapted their treatment techniques based on their patients' age group, thus using softer techniques with younger pediatric patients and slowly gravitating toward techniques used with adults when patients reached the age of six. In terms of continuing education, chiropractors reported an average of 7.87 h of training on the subject per year, which mostly came from either Quebec's College of Chiropractors (OCQ) (54.7%), written articles (46.9%) or seminars and conferences (43.7%). Both musculoskeletal (MSK) and viscerosomatic conditions were identified as high research priorities by the clinicians. **Conclusions:** Quebec chiropractors adapt their treatment techniques to pediatric patients. In light of limited sources of continuing education in the field of pediatric chiropractics, practitioners mostly rely on the training provided by their provincial college and scientific publications. According to practitioners, future research priorities for pediatric care should focus on both MSK conditions and non-MSK conditions.

Keywords: Research, Pediatric care, Treatment modalities.

A commentary on the 2019 Safer Care Victoria review
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https://www.cjaonline.com.au/index.php/cja/article/view/312.

Abstract
In 2019, Safer Care Victoria (SCV) conducted a government-funded inquiry into the practice of spinal manipulation (SMT) of children under 12 years of age by chiropractors. SCV assembled an advisory panel, commissioned a Cochrane Collaboration Review, and invited submissions from consumers, health practitioners, insurers, education institutions, professional organizations, and interested stakeholders. The report's principal findings were that while spinal manipulation of children results in very rare instances of harm, since evidence of the effectiveness of SMT is lacking, SMT cannot be recommended for children under 12 for a list of conditions or for general wellness. **Critique and Discussion:** Five reviewers evaluated the Cochrane Review that formed a part of the inquiry using the Scottish Intercollegiate Guideline Network (SIGN) instrument. Two reviewers also evaluated the SCV report in its entirety. A strength of the report is the safety review and the information in the detailed responses from consumers. There were 29,599 online submissions received from across Australia, making it the largest survey of this kind. There were no reports of physical, mental, or financial harm to a child derived from this robust process. However, the report and the Cochrane Review contain weaknesses. 1) An internal contradiction erroneously reported a cerebrovascular incident (CVI) rate of 1:20,000 with SMT among children in the main text. 2) There was a departure from the inclusion/exclusion criteria for effectiveness studies. 3) The final recommendations disregard the submissions from consumers, the public, and practitioners. **Conclusion:** While it has strengths, the SCV report is also flawed, and its final recommendations should be viewed with caution. The Cochrane Review within the report adds little to the body of knowledge or clinical practice for chiropractors managing children under 12.

Keywords: Child, Children, Infant, Chiropractic, Government, Manipulation, Safety, Spinal, Risk Assessment, Parents.

A new paradigm for depression in new mothers: the central role of inflammation and how breastfeeding and anti-inflammatory treatments protect maternal mental health

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Int Breastfeed J. 2007 Mar 30:2:6.
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Abstract

Background: Research in the field of psychoneuroimmunology (PNI) has revealed that depression is associated with inflammation manifested by increased levels of proinflammatory cytokines. **Discussion:** The old paradigm described inflammation as simply one of many risk factors for depression. The new paradigm is based on more recent research that has indicated that physical and psychological stressors increase inflammation. These recent studies constitute an important shift in the depression paradigm: inflammation is not simply a risk factor; it is the risk factor that underlies all the others. Moreover, inflammation explains why psychosocial, behavioral and physical risk factors increase the risk of depression. This is true for depression in general and for postpartum depression in particular. Puerperal women are especially vulnerable to these effects because their levels of proinflammatory cytokines significantly increase during the last trimester of pregnancy--a time when they are also at high risk for depression. Moreover, common experiences of new motherhood, such as sleep disturbance, postpartum pain, and past or current psychological trauma, act as stressors that cause proinflammatory cytokine levels to rise. Breastfeeding has a protective effect on maternal mental health because it attenuates stress and modulates the inflammatory response. However, breastfeeding difficulties, such as nipple pain, can increase the risk of depression and must be addressed promptly. **Conclusion:** PNI research suggests two goals for the prevention and treatment of postpartum depression: reducing maternal stress and reducing inflammation. Breastfeeding and exercise reduce maternal stress and are protective of maternal mood. In addition, most current treatments for depression are anti-inflammatory. These include long-chain omega-3 fatty acids, cognitive therapy, St. John's wort, and conventional antidepressants.

Identification of women at high risk of postpartum psychiatric episodes: A population-based study quantifying relative and absolute risks following exposure to selected risk factors and genetic liability

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Abstract

Background: We quantified relative and absolute risks of postpartum psychiatric episodes (PPE) following risk factors: Young age, past personal or family history of psychiatric disorders, and genetic liability. **Methods:** We conducted a register-based study using the iPSYCH2012 case-cohort sample. **Exposures:** were personal history of psychiatric episodes prior to childbirth, being a young mother (giving birth before the age of 21.5 years), having a family history of psychiatric disorders, and a high (highest quartile) polygenic score (PGS) for major depression. PPE was defined within 12 months postpartum by prescription of psychotropic medication or in- and outpatient contact to a psychiatric facility. We included primiparous women born 1981—1999, giving birth before January 1st, 2016. We conducted Cox regression to calculate hazard ratios (HRs) of PPE, absolute risks were calculated using cumulative incidence functions. **Results:** We included 8174 primiparous women, and the estimated baseline PPE risk was 6.9% (95% CI 6.0%—7.8%, number of PPE cases: 2169). For young mothers with a personal and family history of psychiatric disorders, the absolute risk of PPE was 21.6% (95% CI 15.9%—27.8%). Adding information on high genetic liability to depression, the risk increased to 29.2% (95% CI 21.3%—38.4%) for PPE. **Conclusions:** Information on prior personal and family psychiatric episodes as well as age may assist in estimating a personalized risk of PPE. Furthermore, additional information on genetic liability could add even further to this risk assessment.

JOURNAL ABSTRACTS

The incidence of depressive episodes is different before, during, and after pregnancy: A population-based study

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Abstract

Background: Depressive episodes during pregnancy are widely investigated but it is still unknown whether pregnancy is a high-risk period compared to the pre-pregnancy period. Therefore, we aimed to investigate the incidence and recurrence of depressive episodes before, during, and after pregnancy. **Methods:** In the current population-based registry study, we calculated monthly incidence and recurrence of psychiatric inpatient admissions and outpatient psychiatric contact for depressive episodes. We identified a population consisting of all first childbirths in Denmark from 1999 through 2015 (N = 392,287). **Results:** Incidence of inpatient admission during pregnancy was lower than before pregnancy. After childbirth, a significant increase in first-time and recurrent psychiatric inpatient admissions was observed, especially in the first months. In contrast, outpatient psychiatric treatment incidence and recurrence were increased both during pregnancy as well as in the postpartum period, as compared to pre-pregnancy. **Limitations:** Analyses were performed on depressive episodes representing the severe end of the spectrum, questioning generalizability to milder forms of depression treated outside psychiatric specialist treatment facilities. **Conclusion:** We found a different pattern of severe episodes of depression compared to moderate episodes before, during, and after pregnancy. In light of our findings and those of others, we suggest distinguishing between timing of onset in the classification of depression in the perinatal period: Depression with pregnancy onset OR with postpartum onset (instead of the current DSM classifier "with perinatal onset"), as well as severity of depression, which is important for both clinical and future research endeavors.

Maternal vaginal microbiome composition does not affect development of the infant gut microbiome in early life

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Abstract

Birth mode has been implicated as a major factor influencing neonatal gut microbiome development, and it has been assumed that lack of exposure to the maternal vaginal microbiome is responsible for gut dysbiosis among caesarean-delivered infants. Consequently, practices to correct dysbiotic gut microbiomes, such as vaginal seeding, have arisen while the effect of the maternal vaginal microbiome on that of the infant gut remains unknown. We conducted a longitudinal, prospective cohort study of 621 Canadian pregnant women and their newborn infants and collected pre-delivery maternal vaginal swabs and infant stool samples at 10-days and 3-months of life. Using cpn60-based amplicon sequencing, we defined vaginal and stool microbiome profiles and evaluated the effect of maternal vaginal microbiome composition and various clinical variables on the development of the infant stool microbiome. Infant stool microbiomes showed significant differences in composition by delivery mode at 10-days postpartum; however, this effect could not be explained by maternal vaginal microbiome composition and was vastly reduced by 3 months. Vaginal microbiome clusters were distributed across infant stool clusters in proportion to their frequency in the overall maternal population, indicating independence of the two communities. Intrapartum antibiotic administration was identified as a confounder of infant stool microbiome differences and was associated with lower abundances of Escherichia coli, Bacteroides vulgatus, Bifidobacterium longum and Parabacteroides distasonis. Our findings demonstrate that maternal vaginal microbiome composition at delivery does not affect infant stool microbiome composition and development, suggesting that practices to amend infant stool microbiome composition focus factors other than maternal vaginal microbes.

Key Words: vaginal microbiome, infant stool microbiome, infant gut, Cpn60, vaginal seeding, birth mode, microbiome.

Prepregnancy plant-based diets and risk of hypertensive disorders of pregnancy

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Abstract

Objective: This study aimed to evaluate the prospective association between adherence to plant-based diets before pregnancy and the risk for hypertensive disorders of pregnancy. We hypothesized that women with higher adherence to plant-based diets would have a lower risk for hypertensive disorders of pregnancy. **Study design:** We followed 11,459 parous women (16,780 singleton pregnancies) without chronic diseases, a history of preeclampsia, and cancers who participated in the Nurses' Health Study II (1991-2009), which was a prospective cohort study. Diet was assessed every 4 years using a validated food frequency questionnaire from which we calculated the plant-based diet index (higher score indicates higher adherence) to evaluate the health associations of plant-based diets among participants while accounting for the quality of plant-based foods. Participants self-reported hypertensive disorders of pregnancy, including preeclampsia and gestational hypertension. We estimated the relative risk of hypertensive disorders of pregnancy in relation to plant-based diet index adherence in quintiles using generalized estimating equations log-binomial regression while adjusting for potential confounders and accounting for repeated pregnancies for the same woman. **Results:** The mean (standard deviation) age at first in-study pregnancy was 35 (4) years. A total of 1033 cases of hypertensive disorders of pregnancy, including 482 cases of preeclampsia (2.9%) and 551 cases of gestational hypertension (3.3%) were reported. Women in the highest quintile of plant-based diet index were significantly associated with a lower risk for hypertensive disorders of pregnancy than women in the lowest quintile (relative risk, 0.76; 95% confidence interval, 0.62-0.93). There was an inverse dose-response relationship between plant-based diet index and risk for hypertensive disorders of pregnancy. The multivariable-adjusted relative risk (95% confidence interval) of hypertensive disorders of pregnancy for women in increasing quintiles of plant-based diet index were 1 (ref), 0.93 (0.78-1.12), 0.86 (0.72-1.03), 0.84 (0.69-1.03), and 0.76 (0.62-0.93) with a significant linear trend across quintiles (P trend=.005). This association was slightly stronger for gestational hypertension (relative risk, 0.77; 95% confidence interval, 0.60-0.99) than for preeclampsia (relative risk, 0.80; 95% confidence interval, 0.61-1.04). Mediation analysis suggested that body mass index evaluation for dietary assessment and pregnancy explained 39% (95% confidence interval, 15%-70%]) of the relation between plant-based diet index and hypertensive disorders of pregnancy and 48% (95% confidence interval, 12%-86%]) of the relation between plant-based diet index and gestational hypertension. **Conclusion:** Higher adherence to plant-based diets was associated with a lower risk of developing hypertensive disorders of pregnancy. Much of the benefit seems to be related to improved weight control.

Keywords: Craniosacral therapy; Crying; Infantile colic; Manual therapy; Osteopathy; Sleep; gestational hypertension; hypertensive disorders of pregnancy; plant-based diet; preconceptual care; preeclampsia.

Adverse infant outcomes among women with sleep apnea or insomnia during pregnancy: A retrospective cohort study

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Abstract

Objective: To evaluate whether sleep apnea or insomnia among pregnant people is associated with increased risk for adverse infant outcomes. **Design:** Retrospective cohort study. **Setting:** California. **Participants:** The sample included singleton live births. Sleep apnea and insomnia were defined based on ICD-9 and -10 codes. A referent group was selected using exact propensity score matching on maternal characteristics, obstetric factors, and infant factors among individuals without a sleep disorder. **Measurements:** Adverse infant outcomes were obtained from birth certificate, hospital discharge, and death records (eg, Apgar scores, neonatal intensive care unit (NICU) stay, infant death, long birth stay, etc.). Logistic regression was used to calculate odds of an adverse infant outcome by sleep disorder type. **Results:** Propensity-score matched controls were identified for 69.9% of the 3371 sleep apnea cases and 68.8% of the 3213 insomnia cases. Compared to the propensity-matched referent group, individuals with a diagnosis of sleep apnea (n = 2357) had infants who were more likely to have any adverse outcome, low 1-min Apgar scores, NICU stay, and an emergency room visit in the first year of life. Infants born to mothers with a diagnosis of insomnia (n = 2212) were at increased risk of few negative outcomes relative to the propensity matched referent group, with the exception of an emergency room visit. **Conclusions:** In unadjusted analyses, infants born to individuals with a diagnosis of sleep apnea or insomnia were at increased risk of several adverse outcomes. These were attenuated when using propensity score matching, suggesting these associations were driven by other comorbidities.

Association of Antepartum and Postpartum Air Pollution Exposure With Postpartum Depression in Southern California

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Abstract

Importance: Women are especially vulnerable to mental health matters post partum because of biological, emotional, and social changes during this period. However, epidemiologic evidence of an association between air pollution exposure and postpartum depression (PPD) is limited. **Objective:** To examine the associations between antepartum and postpartum maternal air pollution exposure and PPD. **Design, setting, and participants:** This retrospective cohort study used data from Kaiser Permanente Southern California (KPSC) electronic health records and included women who had singleton live births at KPSC facilities between January 1, 2008, and December 31, 2016. Data were analyzed between January 1 and May 10, 2023. **Exposures:** Ambient air pollution exposures were assessed based on maternal residential addresses using monthly averages of particulate matter less than or equal to 2.5 µm (PM2.5), particulate matter less than or equal to 10 µm (PM10), nitrogen dioxide (NO2), and ozone (O3) from spatial interpolation of monitoring station measurements. Constituents of PM2.5 (sulfate, nitrate, ammonium, organic matter, and black carbon) were obtained from fine-resolution geoscience-derived models based on satellite, ground-based monitor, and chemical transport modeling data. **Main outcomes and measures:** Participants with an Edinburgh Postnatal Depression Scale score of 10 or higher during the 6 months after giving birth were referred to a clinical interview for further assessment and diagnosis. Ascertainment of PPD was defined using a combination of diagnostic codes and prescription medications. **Results:** The study included 340 679 participants (mean [SD] age, 30.05 [5.81] years), with 25 674 having PPD (7.54%). Increased risks for PPD were observed to be associated with per-IQR increases in antepartum and postpartum exposures to O3 (adjusted odds ratio [AOR], 1.09; 95% CI, 1.06-1.12), PM10 (AOR, 1.02; 95% CI, 1.00-1.04), and PM2.5 (AOR, 1.02; 95% CI, 1. 00-1.03) but not with NO2; PPD risks were mainly associated with PM2.5 organic matter and black carbon. Overall, a higher risk of PPD was associated with O3 during the entire pregnancy and postpartum periods and with PM exposure during the late pregnancy and postpartum periods. **Conclusions and relevance:** The study findings suggest that long-term exposure to antepartum and postpartum air pollution was associated with higher PPD risks. Identifying the modifiable environmental risk factors and developing interventions are important public health issues to improve maternal mental health and alleviate the disease burden of PPD.

Persistence of Autism Spectrum Disorder From Early Childhood Through School Age

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Abstract

Importance: While the prevalence of autism spectrum disorder (ASD) continues to increase and early diagnosis is emphasized, there is limited information on outcomes for children diagnosed with ASD in early childhood using contemporary diagnostic criteria. **Objectives:** To determine the frequency with which children who are clinically diagnosed with ASD at 12 to 36 months of age continue to meet diagnostic criteria for ASD at 5 to 7 years of age and to evaluate whether baseline child-specific and demographic characteristics and receipt of interventions are associated with ASD persistence. **Design, setting, and participants:** In this natural history cohort study, children who received a clinical ASD diagnosis at 12 to 36 months of age underwent a research diagnostic assessment at 5 to 7 years of age. Research assessments occurred from August 14, 2018, to January 8, 2022. **Intervention:** Children received community-based interventions, and parents provided details about interventions received. **Main outcomes and measures:** The main outcome was persistence of ASD diagnosis based on current functioning. An experienced research psychologist assigned an ASD diagnosis (present or absent) according to criteria from the Diagnostic and Statistical Manual of Mental Disorders (Fifth Edition) after the research assessment. The research assessment included administration of the Autism Diagnostic Observation Schedule-2, Autism Diagnostic Interview-Research, and a cognitive measure. **Results:** Of the 213 participants diagnosed with ASD at initial clinical assessment (mean [SD] age, 24.6 [3.9] months; 177 boys [83.1%]), 79 (37.1%) did not continue to meet diagnostic criteria for ASD (nonpersistent ASD) at research assessment (mean [SD] age, 74.3 [7.1] months). All children with nonpersistent ASD had IQ of at least 70, while there was a bimodal distribution of IQ for those with persistent ASD (46 with IQ <70 and 88 with IQ ≥70). All children received some interventions, and 201 (94.4%) received ASD-specific intervention, mostly applied behavioral analysis. In a multilevel logistic regression model, the only variables associated with increased odds of being in the nonpersistent ASD group at 6 years of age were higher baseline adaptive skills (b coefficient = -0.287 [SE, 0.108]) and female sex (b = 0.239 [SE, 0.064]). **Conclusions and relevance:** The findings of this cohort study suggest that among toddlers diagnosed with ASD, baseline adaptive function and sex may be associated with persistence of ASD.

Association Between the COVID-19 Pandemic and Early Childhood Development

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Abstract

Importance: Although a growing number of studies have reported negative associations of the COVID-19 pandemic with academic performance among school-aged children, less is known about the pandemic's association with early childhood development. **Objective:** To examine the association between the COVID-19 pandemic and early childhood development. **Design, setting, and participants:** In this cohort study conducted in all accredited nursery centers in a Japanese municipality, baseline surveys of children aged 1 and 3 years (1000 and 922, respectively) were conducted between 2017 and 2019, and participants were followed up for 2 years. **Exposure:** Children's development was compared at age 3 or 5 years between cohorts that were exposed to the pandemic during the follow-up and a cohort that was not. **Main outcomes and measures:** Children's developmental age was measured by nursery teachers using the Kinder Infant Development Scale (KIDS). Data were analyzed between December 8, 2022, and May 6, 2023. **Results:** A total of 447 children (201 girls [45.0%] and 246 boys [55.0%]) aged 1 year at baseline were followed up to age 3 years, and 440 children (200 girls [45.5%] and 240 boys [54.5%]) aged 3 years at baseline were followed up to age 5 years. During the follow-up, the cohorts that were exposed to the pandemic were 4.39 months behind in development at age 5 compared with the cohort that was not (coefficient, -4.39; 95% credible interval, -7.66 to -1.27). Such a negative association was not observed in development at age 3 years (coefficient, 1.32; 95% credible interval, -0.44 to 3.01). Variations in development were greater during the pandemic than before the pandemic regardless of age. Additionally, the quality of care at nursery centers was positively associated with development at age 3 years during the pandemic (coefficient, 2.01; 95% credible interval, 0.58-3.44), while parental depression appeared to amplify the association between the pandemic and delayed development at age 5 (coefficient of interaction, -2.62; 95% credible interval, -4.80 to -0.49; P = .009). **Conclusions and relevance:** The findings of this study showed an association between exposure to the pandemic and delayed childhood development at age 5 years. Variations in development widened during the pandemic regardless of age. It is important to identify children with developmental delays associated with the pandemic and provide them with support for learning, socialization, physical and mental health, and family support.

Maternal and Infant Antibiotic and Acid Suppressant Use and Risk of Eosinophilic Esophagitis

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https://jamanetwork.com/journals/jamapediatrics/article-abstract/2811153.

Abstract

Importance: Eosinophilic esophagitis (EoE), a chronic disease with significant patient and health care burden, has increased rapidly in incidence across many countries. Elucidating risk factors for disease development is a priority for health care practitioners and patients. **Objective:** To evaluate the association of maternal and infant use of antibiotics and acid suppressants with the development of EoE. **Design, Setting, and Participants:** This was a population-based, case-control study of pediatric EoE (1996-2019) in Denmark using pathology, prescription, birth, inpatient, and outpatient health registry data and with complete ascertainment of all EoE cases among Danish residents born between 1997 and 2018. Study data were analyzed from September 2020 to August 2023. **Exposures:** Maternal and infant use of antibiotics and acid suppressants, examining medication class, timing, and frequency of use. **Main Outcome and Measure:** Development of EoE. **Results:** Included in the study was a total of 392 cases and 3637 sex- and year of birth—matched controls with a median (IQR) age of 11.0 (6.0-15.0) years, 2772 male individuals (68.8%), and 1257 female individuals (31.2%). Compared with children with no antibiotic prescriptions filled during infancy, those with any use of an antibiotic had an associated 40% increase in risk of EoE (adjusted odds ratio [aOR], 1.4; 95% CI, 1.1-1.7). Those with 3 or more prescriptions had an associated 80% increase in risk of EoE (aOR, 1.8; 95% CI, 1.3-2.5). Frequency of maternal antibiotic use was associated with an increased risk (1 prescription: aOR, 1.4; 95% CI, 1.0-1.8; 3≤ prescriptions: aOR, 2.1; 95% CI, 1.4-3.2). Risk was highest for use in the third trimester and in the first 6 months from birth. Any acid suppressant use in infancy was associated with increased risk of EoE (aOR, 15.9; 95% CI, 9.1-27.7). Restriction of cases to those diagnosed at 5 years or older yielded similar results (aOR, 11.6; 95% CI, 5.5-24.8). For maternal use, 3 or more prescriptions were associated with an increased risk of EoE for her offspring (aOR, 5.1; 95% CI, 1.8-14.8). **Conclusions and Relevance:** Maternal and infant antibiotic use were associated with increased risk of developing EoE, in a dose-response manner, and the magnitude of association was highest for exposure near the time of delivery. Increased risk was also observed with maternal and infant acid suppressant use. Exposure during early life, a period of known developmental susceptibility, may confer the greatest risk and opportunity for risk mitigation.

Detection of Messenger RNA COVID-19 Vaccines in Human Breast Milk

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Abstract

Vaccination is a cornerstone in fighting the COVID-19 pandemic. However, the initial messenger RNA (mRNA) vaccine clinical trials excluded several vulnerable groups, including young children and lactating individuals. The US Food and Drug Administration deferred the decision to authorize COVID-19 mRNA vaccines for infants younger than 6 months until more data are available because of the potential priming of the children's immune responses that may alter their immunity. The Centers for Disease Control and Prevention recommends offering the COVID-19 mRNA vaccines to breastfeeding individuals, although the possible passage of vaccine mRNAs in breast milk resulting in infants' exposure at younger than 6 months was not investigated. This study investigated whether the COVID-19 vaccine mRNA can be detected in the expressed breast milk (EBM) of lactating individuals receiving the vaccination within 6 months after delivery. **Methods:** This cohort study included 11 healthy lactating individuals who received either the Moderna mRNA-1273 vaccine (n = 5) or the Pfizer BNT162b2 vaccine (n = 6) within 6 months after delivery (Table 1). Participants were asked to collect and immediately freeze EBM samples at home until transported to the laboratory. Samples of EBM were collected before vaccination (control) and for 5 days postvaccination. A total of 131 EBM samples were collected 1 hour to 5 days after vaccine administration. Extracellular vesicles (EVs) were isolated in EBM using sequential centrifugation, and the EV concentrations were determined by ZetaView (Analytik) (eMethods in the Supplement). The presence of COVID-19 vaccine mRNA in different milk fractions (whole EBM, fat, cells, and supernatant EVs) was assayed using 2-step quantitative reverse transcriptase—polymerase chain reaction. The vaccine detection limit was 1 pg/mL of EBM (eMethods in the Supplement). **Results:** Of 11 lactating individuals enrolled, trace amounts of BNT162b2 and mRNA-1273 COVID-19 mRNA vaccines were detected in 7 samples from 5 different participants at various times up to 45 hours postvaccination (Table 2). The mean (SD) yield of EVs isolated from EBM was 9.110 (5.010) particles/mL, and the mean (SD) particle size was 110.0 (3.0) nm. The vaccine mRNA appears in higher concentrations in the EVs than in whole milk (Table 2). No vaccine mRNA was detected in prevaccination or postvaccination EBM samples beyond 48 hours of collection. Also, no COVID-19 vaccine mRNA was detected in the EBM fat fraction or the EBM cell pellets. **Discussion:** The sporadic presence and trace quantities of COVID-19 vaccine mRNA detected in EBM suggest that breastfeeding after COVID-19 mRNA vaccination is safe, particularly beyond 48 hours after vaccination. These data demonstrate for the first time to our knowledge the biodistribution of COVID-19 vaccine mRNA to mammary cells and the potential ability of tissue EVs to package the vaccine mRNA that can be transported to distant cells. Little has been reported on lipid nanoparticle biodistribution and localization in human tissues after COVID-19 mRNA vaccination. In rats, up to 3 days following intramuscular administration, low vaccine mRNA levels were detected in the heart, lung, testis, and brain tissues, indicating tissue biodistribution. We speculate that, following the vaccine administration, lipid nanoparticles containing the vaccine mRNA are carried to mammary glands via hematogenous and/or lymphatic routes. Furthermore, we speculate that vaccine mRNA released into mammary cell cytosol can be recruited into developing EVs that are later secreted in EBM.

The limitations of this study include the relatively small sample size and the lack of functional studies demonstrating whether detected vaccine mRNA is translationally active. Also, we did not test the possible cumulative vaccine mRNA exposure after frequent breastfeeding in infants. We believe it is safe to breastfeed after maternal COVID-19 vaccination. However, caution is warranted about breastfeeding children younger than 6 months in the first 48 hours after maternal vaccination until more safety studies are conducted. In addition, the potential interference of COVID-19 vaccine mRNA with the immune response to multiple routine vaccines given to infants during the first 6 months of age needs to be considered. It is critical that lactating individuals be included in future vaccination trials to better evaluate the effect of mRNA vaccines on lactation outcomes.

Physical Activity Interventions to Alleviate Depressive Symptoms in Children and Adolescents: A Systematic Review and Meta-analysis

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Abstract

Importance: Depression is the second most prevalent mental disorder among children and adolescents, yet only a small proportion seek or receive disorder-specific treatment. Physical activity interventions hold promise as an alternative or adjunctive approach to clinical treatment for depression. **Objective:** To determine the association of physical activity interventions with depressive symptoms in children and adolescents. **Data sources:** PubMed, CINAHL, PsycINFO, EMBASE, and SPORTDiscus were searched from inception to February 2022 for relevant studies written in English, Chinese, or Italian. **Study selection:** Two independent researchers selected studies that assessed the effects of physical activity interventions on depressive symptoms in children and adolescents compared with a control condition. **Data extraction and synthesis:** A random-effects meta-analysis using Hedges g was performed. Heterogeneity, risk of bias, and publication bias were assessed independently by multiple reviewers. Meta-regressions and sensitivity analyses were conducted to substantiate the overall results. The study followed the PRISMA reporting guideline. **Main outcomes and measures:** The main outcome was depressive symptoms as measured by validated depression scales at postintervention and follow-up. **Results:** Twenty-one studies involving 2441 participants (1148 [47.0%] boys; 1293 [53.0%] girls; mean [SD] age, 14 [3] years) were included. Meta-analysis of the postintervention differences revealed that physical activity interventions were associated with a reduction in depressive symptoms compared with the control condition (g = -0.29; 95% CI, -0.47 to -0.10; P = .004). Analysis of the follow-up outcomes in 4 studies revealed no differences between the physical activity and control groups (g = -0.39; 95% CI, -1.01 to 0.24; P = .14). Moderate study heterogeneity was detected (Q = 53.92; df = 20; P < .001; I2 = 62.9% [95% CI, 40.7%-76.8%]). The primary moderator analysis accounting for total physical activity volume, study design, participant health status, and allocation and/or assessment concealment did not moderate the main treatment effect. Secondary analyses demonstrated that intervention (ie, <12 weeks in duration, 3 times per week, unsupervised) and participant characteristics (ie, aged ≥13 years, with a mental illness and/or depression diagnosis) may influence the overall treatment effect. **Conclusions and relevance:** Physical activity interventions may be used to reduce depressive symptoms in children and adolescents. Greater reductions in depressive symptoms were derived from participants older than 13 years and with a mental illness and/or depression diagnosis. The association with physical activity parameters such as frequency, duration, and supervision of the sessions remains unclear and needs further investigation.

Associations Between Infant Screen Use, Electroencephalography Markers, and Cognitive Outcomes

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Abstract

Importance: Research evidence is mounting for the association between infant screen use and negative cognitive outcomes related to attention and executive functions. The nature, timing, and persistence of screen time exposure on neural functions are currently unknown. Electroencephalography (EEG) permits elucidation of the neural correlates associated with cognitive impairments. **Objective:** To examine the associations between infant screen time, EEG markers, and school-age cognitive outcomes using mediation analysis with structural equation modeling. **Design, Setting, and Participants:** This prospective maternal-child dyad cohort study included participants from the population-based study Growing Up in Singapore Toward Healthy Outcomes (GUSTO). Pregnant mothers were enrolled in their first trimester from June 2009 through December 2010. A subset of children who completed neurodevelopmental visits at ages 12 months and 9 years had EEG performed at age 18 months. Data were reported from 3 time points at ages 12 months, 18 months, and 9 years. Mediation analyses were used to investigate how neural correlates were involved in the paths from infant screen time to the latent construct of attention and executive functioning. Data for this study were collected from November 2010 to March 2020 and were analyzed between October 2021 and May 2022. **Exposures:** Parent-reported screen time at age 12 months. **Main Outcomes and Measures:** Power spectral density from EEG was collected at age 18 months. Child attention and executive functions were measured with teacher-reported questionnaires and objective laboratory-based tasks at age 9 years. **Results:** In this sample of 437 children, the mean (SD) age at follow-up was 8.84 (0.07) years, and 227 children (51.9%) were male. The mean (SD) amount of daily screen time at age 12 months

was 2.01 (1.86) hours. Screen time at age 12 months contributed to multiple 9-year attention and executive functioning measures (η2, 0.03-0.16; Cohen d, 0.35-0.87). A subset of 157 children had EEG performed at age 18 months; EEG relative theta power and theta/beta ratio at the frontocentral and parietal regions showed a graded correlation with 12-month screen use (r = 0.35-0.37). In the structural equation model accounting for household income, frontocentral and parietal theta/beta ratios partially mediated the association between infant screen time and executive functioning at school age (exposure-mediator β, 0.41; 95% CI, 0.22 to 0.59; mediator-outcome β, -0.38; 95% CI, -0.64 to -0.11), forming an indirect path that accounted for 39.4% of the association. **Conclusions and Relevance:** In this study, infant screen use was associated with altered cortical EEG activity before age 2 years; the identified EEG markers mediated the association between infant screen time and executive functions. Further efforts are urgently needed to distinguish the direct association of infant screen use compared with family factors that predispose early screen use on executive function impairments.

Association of Habitual Checking Behaviors on Social Media With Longitudinal Functional Brain Development
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Key Points
Question: Is adolescents' frequency of checking behaviors on three social media platforms (Facebook, Instagram, Snapchat) associated with longitudinal changes in functional brain development across adolescence. **Findings:** In this cohort study of 169 sixth- and seventh-grade students, participants who engaged in habitual checking behaviors showed a distinct neurodevelopmental trajectory within regions of the brain comprising the affective salience, motivational, and cognitive control networks in response to anticipating social rewards and punishments compared with those who engaged in nonhabitual checking behaviors. **Meaning:** These results suggest that habitual checking of social media in early adolescence may be longitudinally associated with changes in neural sensitivity to anticipation of social rewards and punishments, which could have implications for psychological adjustment.

Abstract
Importance: Social media platforms provide adolescents with unprecedented opportunities for social interactions during a critical developmental period when the brain is especially sensitive to social feedback. **Objective:** To explore how adolescents' frequency of checking behaviors on social media platforms is associated with longitudinal changes in functional brain development across adolescence. **Design, Setting, and Participants:** A 3-year longitudinal cohort study of functional magnetic resonance imaging (fMRI) among sixth- and seventh-grade students recruited from three public middle schools in rural North Carolina. **Exposures:** At wave 1, participants reported the frequency at which they checked Facebook, Instagram, and Snapchat. **Main Outcome or Measure:** Neural responses to the Social Incentive Delay task when anticipating receiving social feedback, measured annually using fMRI for three years. Participants saw a cue that indicated whether the social feedback (adolescent faces with emotional expressions) would be a reward, punishment, or neutral; after a delay, a target appeared and students responded by pressing a button as quickly as possible; a display of social feedback depended on trial type and reaction time. **Results:** Of 178 participants recruited at age 12 years, 169 participants (mean [SD] age, 12.89 [0.58] years; range, 11.93-14.52 years; 91 [53.8%] female; 38 [22.5%] Black, 60 [35.5%] Latinx, 50 [29.6%] White, 15 [8.9%] multiracial) met the inclusion criteria. Participants with habitual social media checking behaviors showed lower neural sensitivity to social anticipation at age 12 years compared with those with nonhabitual checking behaviors in the left amygdala, posterior insula (PI), and ventral striatum (VS; ß, -0.22; 95% CI, -0.33 to -0.11), right amygdala (ß, -0.19; 95% CI, -0.30 to -0.08), right anterior insula (AI; ß -0.23; 95% CI, -0.37 to -0.09), and left dorsolateral prefrontal cortex (DLPFC; ß, -0.29; 95% CI, -0.44 to -0.14). Among those with habitual checking behaviors, there were longitudinal increases in the left amygdala/PI/VS (ß, 0.11; 95% CI, 0.04 to 0.18), right amygdala (ß, 0.09; 95% CI, 0.02 to 0.16), right AI (ß, 0.15; 95% CI, 0.02 to 0.20), and left DLPFC (ß, 0.19; 95% CI, 0.05 to 0.25) during social anticipation, whereas among those with nonhabitual checking behaviors, longitudinal decreases were seen in the left amygdala/PI/VS (ß, -0.12; 95% CI, -0.19 to -0.06), right amygdala (ß, -0.10; 95% CI, -0.17 to -0.03), right AI (ß, -0.13; 95% CI, -0.22 to -0.04), and left DLPFC (ß, -0.10, 95% CI, -0.22 to -0.03). **Conclusions and Relevance:** The results of this cohort study suggest that social media checking behaviors in early adolescence may be associated with changes in the brain's sensitivity to social rewards and punishments. Further research examining long-term associations between social media use, adolescent neural development, and psychological adjustment is needed to understand the effects of a ubiquitous influence on development for today's adolescents.

Screen Time at Age 1 Year and Communication and Problem-Solving Developmental Delay at 2 and 4 Years

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Abstract

Importance: Whether some domains of child development are specifically associated with screen time and whether the association continues with age remain unknown. **Objective:** To examine the association between screen time exposure among children aged 1 year and 5 domains of developmental delay (communication, gross motor, fine motor, problem-solving, and personal and social skills) at age 2 and 4 years. **Design, Participants, and Setting:** This cohort study was conducted under the Tohoku Medical Megabank Project Birth and Three-Generation Cohort Study. Pregnant women at 50 obstetric clinics and hospitals in the Miyagi and Iwate prefectures in Japan were recruited into the study between July 2013 and March 2017. The information was collected prospectively, and 7097 mother-child pairs were included in the analysis. Data analysis was performed on March 20, 2023. **Exposure:** Four categories of screen time exposure were identified for children aged 1 year (<1, 1 to <2, 2 to <4, or ≥4 h/d). **Main Outcomes and Measures:** Developmental delays in the 5 domains for children aged 2 and 4 years were assessed using the Japanese version of the Ages & Stages Questionnaires, Third Edition. Each domain ranged from 0 to 60 points. Developmental delay was defined if the total score for each domain was less than 2 SDs from its mean score. **Results:** Of the 7097 children in this study, 3674 were boys (51.8%) and 3423 were girls (48.2%). With regard to screen time exposure per day, 3440 children (48.5%) had less than 1 hour, 2095 (29.5%) had 1 to less than 2 hours, 1272 (17.9%) had 2 to less than 4 hours, and 290 (4.1%) had 4 or more hours. Children's screen time was associated with a higher risk of developmental delay at age 2 years in the communication (odds ratio [OR], 1.61 [95% CI, 1.23-2.10] for 1 to <2 h/d; 2.04 [1.52-2.74] for 2 to <4 h/d; 4.78 [3.24-7.06] for ≥4 vs <1 h/d), fine motor (1.74 [1.09-2.79] for ≥4 vs <1 h/d), problem-solving (1.40 [1.02-1.92] for 2 to <4 h/d; 2.67 [1.72-4.14] for ≥4 vs <1 h/d), and personal and social skills (2.10 [1.39-3.18] for ≥4 vs <1 h/d) domains. Regarding risk of developmental delay at age 4 years, associations were identified in the communication (OR, 1.64 [95% CI, 1.20-2.25] for 2 to <4 h/d; 2.68 [1.68-4.27] for ≥4 vs <1 h/d) and problem-solving (1.91 [1.17-3.14] for ≥4 vs <1 h/d) domains. **Conclusions and Relevance:** In this study, greater screen time for children aged 1 year was associated with developmental delays in communication and problem-solving at ages 2 and 4 years. These findings suggest that domains of developmental delay should be considered separately in future discussions on screen time and child development.

Short Sleep Duration: Children's Mental, Behavioral, and Developmental Disorders and Demographic, Neighborhood, and Family Context in a Nationally Representative Sample, 2016-2019

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Abstract

Introduction: Many children and adolescents experience insufficient sleep, which poses risks for their short- and long-term health and development. This study examined the concurrent associations of contextual factors, including child, demographic, neighborhood, and family factors, with short sleep duration. **Methods:** We combined data on children aged 3 to 17 years from the 2016-2019 National Survey of Children's Health (N = 112,925) to examine the association of parent-reported child short sleep duration (ages 3-5 y, <10 h; 6-12 y, <9 h; 13-17 y, <8 h) with mental, behavioral, and developmental disorders (MBDDs); selected physical health conditions; and demographic, neighborhood, and family factors. **Results:** Overall, 34.7% of children experienced short sleep duration. The prevalence was highest among children aged 6 to 12 years (37.5%); children from racial and ethnic minority groups, especially non-Hispanic Black children (50.0%); children from low-income households (44.9%); children with an MBDD (39.6%); children experiencing negative neighborhood factors (poor conditions and lack of safety, support, and amenities, 36.5%); and family factors such as inconsistent bedtime (57.3%), poor parental mental (47.5%) and physical health (46.0%), and adverse childhood experiences (44.1%). The associations between sleep and demographic, neighborhood, and family factors, and MBDD remained significant after controlling for all other factors. **Conclusion:** This study identified several individual, family, and community factors that may contribute to children's short sleep duration and can be targeted to improve healthy development, particularly among children with an MBDD, from households with low socioeconomic status, or from racial and ethnic minority groups who are at increased risk for short sleep duration.

JOURNAL ABSTRACTS

Brain cancer after radiation exposure from CT examinations of children and young adults: results from the EPI-CT cohort study

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Abstract

Background: The European EPI-CT study aims to quantify cancer risks from CT examinations of children and young adults. Here, we assess the risk of brain cancer. **Methods:** We pooled data from nine European countries for this cohort study. Eligible participants had at least one CT examination before age 22 years documented between 1977 and 2014, had no previous diagnosis of cancer or benign brain tumour, and were alive and cancer-free at least 5 years after the first CT. Participants were identified through the Radiology Information System in 276 hospitals. Participants were linked with national or regional registries of cancer and vital status, and eligible cases were patients with brain cancers according to WHO International Classification of Diseases for Oncology. Gliomas were analysed separately to all brain cancers. Organ doses were reconstructed using historical machine settings and a large sample of CT images. Excess relative risks (ERRs) of brain cancer per 100 mGy of cumulative brain dose were calculated with linear dose-response modelling. The outcome was the first reported diagnosis of brain cancer after an exclusion period of 5 years after the first electronically recorded CT examination. **Findings:** We identified 948,174 individuals, of whom 658,752 (69%) were eligible for our study. 368,721 (56%) of 658,752 participants were male and 290,031 (44%) were female. During a median follow-up of 5-6 years (IQR 2·4-10·1), 165 brain cancers occurred, including 121 (73%) gliomas. Mean cumulative brain dose, lagged by 5 years, was 47·4 mGy (SD 60·9) among all individuals and 76·0 mGy (100·1) among people with brain cancer. A significant linear dose-response relationship was observed for all brain cancers (ERR per 100 mGy 1·27 [95% CI 0·51-2·69]) and for gliomas separately (ERR per 100 mGy 1·11 [0·36-2·59]). Results were robust when the start of follow-up was delayed beyond 5 years and when participants with possibly previously unreported cancers were excluded. **Interpretation:** The observed significant dose-response relationship between CT-related radiation exposure and brain cancer in this large, multicentre study with individual dose evaluation emphasises careful justification of paediatric CTs and use of doses as low as reasonably possible.

Longitudinal Associations Between Use of Mobile Devices for Calming and Emotional Reactivity and Executive Functioning in Children Aged 3 to 5 Years

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Abstract

Importance: Mobile devices are often used to keep young children occupied or calm, but it is not known whether this practice influences child development. **Objective:** To examine the longitudinal, bidirectional associations between the parent-reported frequency of using mobile devices to calm young children and children's executive functioning (EF) and emotional reactivity, testing moderation by child sex and temperament. **Design, Setting, and Participants:** This prospective cohort study included a community-based convenience sample of English-speaking parents of typically developing children aged 3 to 5 years. The study duration was from August 2018 to January 2020, with baseline (T1), 3-month follow-up (T2), and 6-month follow-up (T3) waves. **Exposures:** Parent-reported frequency of use of mobile devices to calm children when upset (5-point Likert scale). **Main Outcomes and Measures:** At each wave, the child's EF was assessed with the Behavior Rating Inventory of Executive Function—Preschool Version Global Executive Composite and emotional reactivity with the Child Behavior Checklist Emotional Reactivity subscale. Structural equation models were built to examine cross-lagged associations of the use of devices for calming, EF, and emotional reactivity, testing for moderation by child sex or temperament (Child Behavior Questionnaire—Very Short Form surgency score, median split). **Results:** Of 422 eligible parents with data at T1, 375 (88.9%) provided data at T2 and 366 (86.7%) at T3. At baseline, the mean (SD) age of the 422 children was 3.8 (0.5) years, the number of boys in the sample was 224 (53.1%), the number of individuals of non-Hispanic White race and ethnicity was 313 (74.2%), and among the parents, 254 (60.2%) had a college degree or higher. Among the boys, the use of devices to calm at T2 was associated with higher emotional reactivity at T3 (r [standardized regression coefficient] = 0.20; 95% CI, 0.10-0.30), while higher emotional reactivity at T2 had a nonsignificant association with increased device use for calming at T3 (r = 0.10; 95% CI, -0.01 to 0.21). Among children with high temperamental surgency, the use of devices to calm at T2 was associated with increased emotional

reactivity at T3 (r = 0.11; 95% CI, 0.01-0.22), while higher emotional reactivity at T2 was associated with increased device use for calming at T3 (r = 0.13; 95% CI, 0.02-0.24). **Conclusions and Relevance:** The findings of this study suggest that the frequent use of mobile devices for calming young children may displace their opportunities for learning emotion-regulation strategies over time; therefore, pediatric health care professionals may wish to encourage alternate calming approaches.