

**Cerebral Palsy Alliance** is delighted to bring you this free weekly bulletin of the latest published research into cerebral palsy. Our organisation is committed to supporting cerebral palsy research worldwide - through information, education, collaboration and funding. Find out more at [cerebralpalsy.org.au/our-research](https://cerebralpalsy.org.au/our-research)

**Professor Nadia Badawi AM**  
CP Alliance Chair of Cerebral Palsy Research

[Subscribe to CP Research News](#)

## Interventions and Management

### **1. Magic-themed motor training on daily bimanual task performance in children with unilateral spastic cerebral palsy: A systematic review and meta-analysis**

No authors listed

Dev Med Child Neurol. 2024 Aug 14. doi: 10.1111/dmcn.16066. Online ahead of print.

No abstract available

PMID: [39139059](#)

### **2. The real magic of magic therapy: Improving daily bimanual task performance in children with unilateral spastic cerebral palsy**

Richard Wiseman

Dev Med Child Neurol. 2024 Aug 12. doi: 10.1111/dmcn.16052. Online ahead of print.

No abstract available

PMID: [39133785](#)

### **3. Magic-themed motor training for daily bimanual task performance in children with unilateral spastic cerebral palsy: A systematic review and meta-analysis**

Kuan-Ting Lee, Kai-Wen Cheng, Yi-Ching Yang, Wei-Li Wang

Review Dev Med Child Neurol. 2024 Aug 12. doi: 10.1111/dmcn.16054. Online ahead of print.

**Aim:** To evaluate the effectiveness of magic-themed interventions in improving daily bimanual task performance in children with unilateral spastic cerebral palsy (CP) to and elucidate the variability in outcomes. **Method:** This systematic literature review searched databases including Embase, MEDLINE, Scopus, Cochrane Central, and CINAHL. Outcome measures selected for the meta-analysis included the Children's Hand-use Experience Questionnaire, its three subscales, and the Besta subscale C. The overall efficacy of magic-themed interventions was analysed using Hedges'  $g$  as the summary measure for these outcomes. Subgroup analysis compared the efficacy of different modes of training, and a meta-regression investigated the impact of training duration. **Results:** Analyses of four studies involving 78 children showed magic-themed training significantly improved bimanual task performance (Hedges'  $g = 0.327$ , 95% confidence interval [CI] = 0.107-0.547,  $p = 0.004$ ), especially in group settings (Hedges'  $g = 0.435$ , 95% CI = 0.176-0.693,  $p = 0.001$ ), compared with non-significant gains from video interventions (Hedges'  $g = 0.041$ , 95% CI = -0.380 to 0.462,  $p = 0.850$ ). Additionally, training duration positively correlated with performance gains (coefficient = 0.0076 per hour,  $p = 0.001$ ). **Interpretation:** Magic-themed training, especially through group sessions and extended durations, enhances bimanual skills in children with unilateral spastic CP.

PMID: [39133768](#)

#### **4. Investigation of the relationship between gross motor maturation from 1 to 18 months and preschool gross motor performance in at-risk infants**

Ozge Karanlik, Gonul Acar, Semih Ayta

J Eval Clin Pract. 2024 Aug 13. doi: 10.1111/jep.14115. Online ahead of print.

Background: At-risk infants are predisposed to major and minor neurodevelopmental disorders due to various biological and environmental factors. Objective: This study aimed to investigate the relationship between gross motor maturation from 1 to 18 months and gross motor performance in the preschool period, as well as the risk of developmental coordination disorder (DCD) in at-risk infants, referred to the Family Counselling Center of the Turkish Spastic Children's Foundation (FCCTSCF) between 2014 and 2016. Methods: Fifty-seven children who had their gross motor maturation assessed between 1 and 18 months at the FCCTSCF were re-evaluated in the preschool period. The Alberta Infant Motor Scale (AIMS) was used to evaluate gross motor maturation between 1 and 18 months. In contrast, the Gross Motor Function Measure-88 and the Developmental Coordination Disorder Questionnaire were used to assess gross motor performance in the preschool period. Results: Of the at-risk infants included in the study, 45.6% were evaluated as having typical development, 21% were identified as having cerebral palsy (CP), and 33.3% were determined to be at risk for DCD. Children with CP and those at risk for DCD were found to have lower percentile ranks on the past AIMS test compared to the healthy group ( $p = 0.001$ ). A significant positive correlation was found between the Alberta Infant Motor Scale and the Gross Motor Function Measure-88 ( $p = 0.014$ ). Conclusion: In the clinical follow-up of at-risk infants, those who scored low on AIMS should be monitored for future risk of DCD and minor disorders, even if major neurological issues such as cerebral palsy are not detected.

PMID: [39138836](#)

#### **5. Assessment and Prognostic Resources for Gross Motor Development in a Child with Cerebral Palsy Related to Congenital Zika Syndrome**

Paloma A Ventura, Alessandra L de Carvalho, Cristiana M Nascimento-Carvalho

Neuropediatrics. 2024 Aug 16. doi: 10.1055/s-0044-1788983. Online ahead of print.

This article describes how the Gross Motor Ability Estimator (GMAE) software can provide important information based on the Gross Motor Function Measure (GMFM)-66 score of a child with congenital Zika syndrome. A child was assessed at 9, 17, and 25 months of age through the GMFM-66. At 2 years, the child's gross motor ability was estimated and classified according to the Gross Motor Function Classification System (GMFCS). At 2 years of age, the child in this case required assistance to roll and was unable to maintain antigravity trunk posture in sitting position, typical abilities of GMFCS level V. GMAE can be useful to guide health professionals that care for children with lifelong physical and developmental care needs. This is the first study that demonstrated how to use the GMAE in this specific population.

PMID: [39151908](#)

#### **6. Effectiveness of virtual reality training compared to balance-specific training and conventional training on balance and gross motor functions of children with cerebral palsy: A double blinded randomized controlled trial**

Hussein Ziab, Soha Saleh, Saeed Talebian, Golanreza Olyaei, Rami Mazbouh, Ahmad Rifai Sarraj, Mohamad Reza Hadian

J Pediatr Rehabil Med. 2024 Aug 16. doi: 10.3233/PRM-220120. Online ahead of print.

Purpose: The purpose of this study was to compare the clinical efficacy of a virtual reality rehabilitation-based training (VRT) with balance-specific training (BST) and conventional training (CT) on the balance and gross motor functions (GMF) of children with cerebral palsy (CwCP). Methods: This study was a double blinded, randomized controlled trial. Participants were recruited from different CP rehabilitation centers and clinics and were then randomly allocated using the block randomization method into three groups: (1) group 1 (VRT using a set of Xbox 360 games that triggered balance), (2) group 2 (BST applying a protocol of 13 exercises to enhance balance in different conditions), and (3) control group 3 (CT using traditional physiotherapy techniques). All groups received 18 sessions over six weeks, three sessions per week, each lasting 60 minutes. Participants were assessed at three timepoints (baseline, post-treatment, and follow-up) using the Pediatric Balance Scale (PBS), the Gross Motor Function Measure (GMFM D & E), the Five Times Sit-To-Stand Test, and upper and lower segments' center of mass (COM) displacement (UCOM and LCOM). Results: A total of 46 CwCP participated in this study. The repeated measures ANOVA revealed a statistically significant difference between groups in the dependent variables, except for the GMFM (D & E) and the PBS ( $p < 0.05$  and partial  $\eta^2 = 0.473$ ). The post-hoc test showed a statistically significant difference in favor of the VRT group compared to other groups in terms of right UCOM ( $p < 0.05$ ) with a large effect size of the time\*group interaction (partial  $\eta^2 = 0.87$ ). Moreover, there was a statistically significant effect of time (i.e., baseline to post-treatment and

baseline to follow-up) with  $F(18, 23) = 59.954$ ,  $p < 0.05$ , Wilks' lambda = 0.021, partial  $\eta^2 = 0.979$ . Conclusion: The findings revealed that VRT was not superior to BST in the rehabilitation of balance and GMF in CwCP aged four to 12 years. However, when compared to CT, better results were reported. Furthermore, it appears that customized programs lead to greater improvements in balance than commercial programs. Future studies are needed to assess the physiological effects of the three types of rehabilitation interventions using more advanced measurement tools, such as functional magnetic resonance imaging, following VRT protocols.

PMID: [39150837](#)

## 7. Walking on Real-world Terrain with an Ankle Exoskeleton in Cerebral Palsy

Emmanuella A Tagoe, Ying Fang, Jack R Williams, Zachary F Lerner

IEEE Trans Med Robot Bionics. 2024 Feb;6(1):202-212. doi: 10.1109/tmrb.2023.3328649. Epub 2023 Oct 31.

Despite medical treatment focused on addressing walking disability, many millions of people with neurological conditions, like cerebral palsy (CP), struggle to maintain independent mobility. Lower limb exoskeletons and exosuits may hold potential for augmenting walking ability. However, it remains unknown whether these wearable robots are safe and beneficial for use outside of highly controlled laboratory environments, the demonstration of which is necessary for clinical translation. Here, we show that a lightweight, portable, ankle exoskeleton with an adaptable one-size-works-for-all assistance controller can improve energy efficiency and walking speed for individuals with CP spanning a wide spectrum of lower limb impairment in a multi-terrain real-world environment. Tested on an outdoor walking route with level, sloped, and stair terrain, robotic assistance resulted in a 15-18% ( $p = 0.013-0.026$ ) reduction in estimated energy cost and a 7-8% ( $p = 0.001-0.004$ ) increase in average walking speed across "shorter" 6-minute and "longer" 20-minute walking durations relative to unassisted walking. This study provides evidence that wearable robots may soon improve mobility in neighborhood, school, and community settings for individuals with CP.

PMID: [39130167](#)

## 8. The effect of vibration-hinged ankle foot orthoses on gait and spasticity in children with cerebral palsy: A randomized clinical trial design

Zahra Jiryaei, Malek Amini, Mohammad Ali Sanjari, Behnam Hajiaghahi, Roozbeh Babazadeh, Maryam Jalali

Randomized Controlled Trial Prosthet Orthot Int. 2024 Aug 1;48(4):387-399. doi: 10.1097/PXR.000000000000266. Epub 2023 Sep 14.

Background: Hinged ankle foot orthoses (HAFO) are commonly prescribed for children with cerebral palsy (CP) to improve their ambulatory function. Objectives: The aim of this study was to compare the effect of vibration-HAFO with that of the same orthosis without vibration on gait, function, and spasticity in hemiplegic CP children. Study design: Randomized Control Trial Design (a pilot study). Methods: Twenty-three children with hemiplegic CP participated in this study. The control group ( $n = 12$ ) used HAFO, and the intervention group ( $n = 11$ ) used vibration-HAFO for four weeks. Pre-post three-dimensional gait analysis was done. Calf muscle spasticity and function were also measured. Results: Results showed significant differences between the two groups in the one-minute walking test ( $p = 0.023$ ) and spasticity (after intervention [ $p = 0.022$ ], after follow-up [ $p = 0.020$ ]). Also, significant differences were detected between the two groups in the step width ( $p = 0.042$ ), maximum hip abduction ( $p = 0.008$ ), stance maximum dorsiflexion ( $p = 0.036$ ) and mean pelvic tilt ( $p = 0.004$ ) in the barefoot condition. Gait cycle time ( $p = 0.005$ ), maximum hip abduction ( $p = 0.042$ ), and cadence ( $p = 0.001$ ) were different between groups in the braced condition. We couldn't find any significant within and between groups differences in knee kinematic parameters. The mean time of using vibration was 16.83 minutes per day. Conclusions: The vibration-hinged AFO is feasible, safe, and acceptable for children with hemiplegic CP to be integrated into practice. Temporospacial and clinical parameters, especially spasticity, were improved. There were slight trends toward improvement in pelvic and knee kinematics. Vibration-HAFO is of benefit to ambulatory CP children with mild and moderate spasticity. It improved the walking capacity of the children.

PMID: [39140761](#)

## 9. Effect of Foot Posture on Limits of Stability in Children With Spastic Diplegic Cerebral Palsy

Arshin Tamboli, Radha Bhattad

Clin Pediatr (Phila). 2024 Aug 14;99228241271399. doi: 10.1177/00099228241271399. Online ahead of print.

Cerebral palsy (CP) is a neurological condition that affects musculoskeletal system causing altered balance control, which is governed by constant adjustments by muscular activity and joint positioning. Since the foot is the platform upon which we stand and balance, it is important to study and characterize foot posture abnormalities in CP to better understand their possible

effect on multidirectional limits of stability (MDLS) in standing. Our aim was to find relation between foot posture and MDLS in diplegic children. Thirty diplegics (13 pes-planus and 17 pes-cavus) between the age of 6 to 14, gross motor function classification system (GMFCS) levels I and II, whose parents consented were included in this study. Diplegics unable to stand unsupported for < 2 minutes, undergone lower-limb surgeries in 6 months, having visual impairments were excluded. Foot posture was assessed with arch index, MDLS were measured by GEAMASTER stabilometer. There was significant positive correlation between foot posture and limits of stability. Diplegic children having pes-planus have better MDLS as compared with pes-cavus.

PMID: [39143672](#)

## 10. Shear modulus of lower limb muscles in school-aged children with mild hypotonia

Miran Goo, Leanne M Johnston, Kylie Tucker

Review J Biomech. 2024 Aug 8;174:112267. doi: 10.1016/j.jbiomech.2024.112267. Online ahead of print.

The objective of this study is to compare shear modulus of lower limb muscles between children with hypotonia versus typical development (TD) or developmental disorders associated with altered tone. Nineteen children with mild hypotonia (mean age  $9.4 \pm 2.3$ y, 13 male) completed assessment of resting shear modulus of rectus femoris, biceps femoris (BF), tibialis anterior (TA) and gastrocnemius lateralis (GL) at short and long lengths using shear wave elastography. Data was compared with previous data from TD children and a scoping review for children with developmental disorders. Data were collated according to Net-Longitudinal Tension Angle (Net-LTA), which is the muscle length expressed as the net proximal and distal joint angles. Effects of Net-LTA (e.g., short, neutral, long) were examined according to sex, age and body mass index (BMI). In children with hypotonia, shear modulus was: higher at longer versus shorter lengths for four muscles ( $p < 0.01$ ); correlated with age for BF-short ( $r = 0.60$ ,  $p < 0.03$ ) and GL-short ( $r = -0.54$ ,  $p < 0.03$ ), with BMI for BF-short ( $r = 0.71$ ,  $p < 0.05$ ); and not different between sexes ( $p > 0.05$ ). The shear modulus values for lower limb muscles for children with mild hypotonia were lower than those for children with Duchenne Muscular Dystrophy (TA-neutral), or Cerebral Palsy (GL-neutral), but not TD children (all four muscles). In conclusion, shear modulus increases with longer muscle length (i.e. higher Net-LTA) in mildly hypotonic children. Children with mild hypotonia have lower shear modulus than children with cerebral palsy and Duchenne muscular dystrophy.

PMID: [39141960](#)

## 11. The accumulation of physical activity and sedentary behaviour in children with cerebral palsy and their typically developing peers aged 6-12 years

Esraa Burahmah, Sivaramkumar Shanmugam, Ben Stansfield

Gait Posture. 2024 Aug 8;113:468-476. doi: 10.1016/j.gaitpost.2024.08.002. Online ahead of print.

Background: Physical activity and sedentary behaviour are usually described using daily volume indicators. However, for young children (6-12 years) and specifically those with conditions such as Cerebral Palsy, exploration of how physical behaviours are accumulated may provide valuable insight for behaviour change intervention planning. Research question: How are physical activity and sedentary behaviour accumulated by 6-12 year old children with Cerebral Palsy and is this different from their typically developing peers? Methods: A cross-sectional study of a convenience sample of ambulatory children with CP (CP) and typically developing (TD) children, 6-12 years, was recruited. Children wore a thigh worn activity monitor (activPAL4) during typical daily activities. Overall volume of daily sedentary, upright and stepping time was characterised as well as how this was accumulated in bouts of activity. Results: There were no differences ( $p < 0.05$ ) in either volume or accumulation measures of physical behaviours between TD ( $n=14$ ,  $8.2 \pm 1.8$  years) and children with CP ( $n=15$ ,  $8.6 \pm 1.4$  years). However, there was wide variation in activity accumulation patterns between individuals. The mean proportion of daily time in each physical behaviour, accumulated in bouts above set times was: Upright time: bouts >5 mins 46 % TD & CP, bouts >20 mins 9 % TD & CP; Stepping time: bouts >0.5 mins 50 % TD, 45 % CP, bouts >2 mins 10 % TD, 9 % CP; Sedentary time: bouts >5 mins 77 % TD, 76 % CP, bouts >30 mins 26 % TD, 29 % CP. Significance: Young children with CP aged 6-12 years do not appear to have different physical behaviours to their TD peers. However, for individuals, descriptors of accumulation of physical activity and sedentary behaviour bouts provides additional information over and above volume measures, giving insight into behaviour which may be used to inform intervention planning.

PMID: [39126959](#)

## 12. Predictive validity of the Standardized Infant NeuroDevelopmental Assessment (SINDA) to identify 4-5 year-old children at risk of developmental delay in a low-risk sample

Selena J Rosinda, Pieter J Hoekstra, Mijna Hadders-Algra, Annelies de Bildt, Kirsten R Heineman

Early Hum Dev. 2024 Aug 5;196:106097. doi: 10.1016/j.earlhumdev.2024.106097. Online ahead of print.

**Background:** Early detection of developmental problems is important as it allows for early intervention. Previous studies, in high-risk infants, found high predictive values of atypical scores on the Standardized Infant NeuroDevelopmental Assessment (SINDA) for later neurodevelopmental disorders (i.e., cerebral palsy, intellectual disability). **Aims:** The present study explored SINDA's predictive values to identify risk of developmental delay at 4-5 years. **Study design:** Cohort study. **Subjects:** 786 low-risk Dutch children (367 boys; median gestational age: 40 (27-42) weeks; mean birth weight: 3455 (SD 577) grams). **Outcome measures:** The SINDA was assessed at 2-12 months and risk of developmental delay was assessed using the Ages and Stages Questionnaire (ASQ) at 4-5 years. SINDA's predictive values were determined for five ASQ domains and the total ASQ score for children at risk of marked (all ASQ domains deviant) and any (one or more ASQ domains deviant) developmental delay. **Results:** Presence of one atypical SINDA scale score showed low to moderate sensitivities (12-88 %, depending on the SINDA scale and ASQ domain involved), moderate to high specificities (66-94 %), low positive predictive values (PPVs; 3-16 %), and high negative predictive values (NPVs; 95-100 %) for children at risk of marked and any developmental. Presence of multiple atypical SINDA scale scores predicted deviant ASQ domains slightly better (sensitivities = 11-62 %, specificities = 90-98 %, PPVs = 6-30 %, and NPVs = 95-100 %). **Conclusions:** In low-risk infants, SINDA's predictive value is low for detecting children at risk of marked and any developmental delay at 4-5 years, as reflected by the low sensitivities. One of the explanations is the relatively low prevalence of developmental delay in low-risk populations. This might have consequences for the application of the SINDA in general healthcare settings (e.g. child health clinics), but further studies are needed to draw this conclusion.

PMID: [39126761](#)

### **13. Correction to 'Visual, perceptual functions, and functional vision in children with unilateral cerebral palsy compared to children with neurotypical development'**

No authors listed

Published Erratum Dev Med Child Neurol. 2024 Aug 13. doi: 10.1111/dmcn.16059. Online ahead of print.

Erratum for

Visual, perceptual functions, and functional vision in children with unilateral cerebral palsy compared to children with neurotypical development. Crotti M, Ortibus E, Maillieux L, Decraene L, Kleeren L, Itzhak NB. Dev Med Child Neurol. 2024 Aug;66(8):1084-1095. doi: 10.1111/dmcn.15842. Epub 2024 Jan 25. PMID: 38269438

PMID: [39136163](#)

### **14. Prevalence of Vitamin D Deficiency in Children With Cerebral Palsy: A Meta-Analysis**

Kamel Awadh Alenazi, Ahmad Ayadah Alanezi

Pediatr Neurol. 2024 Mar 26;159:56-61. doi: 10.1016/j.pediatrneurol.2024.03.021. Online ahead of print.

**Background:** Vitamin D deficiency stands out as a significant contributor to reduced bone mineral density in children diagnosed with cerebral palsy (CP). The objective of the meta-analysis was to estimate the prevalence of vitamin D deficiency in children with CP. **Methods:** This meta-analysis adhered to Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020 guide. For children with CP aged between zero and 18 years with vitamin D deficiency, relevant articles were retrieved from PubMed, Scopus, ScienceDirect, and Cochrane. Following keywords were used: "cerebral palsy," "children," "childhood," "vitamin D," "vitamin D deficiency," "prevalence," and "frequency." Newcastle-Ottawa Scale was used to assess methodologic quality. Meta-analysis was performed using Stata 13.0. **Results:** In total, seven articles were considered suitable for inclusion in the meta-analysis of 411 articles initially identified. These studies involved a total of 430 children diagnosed with CP, ranging in age from zero to 18 years. Among the seven studies, two followed a cross-sectional approach, whereas the remaining five utilized a case-control design. Six of these studies were determined to have a low risk of bias, whereas one exhibited a moderate risk of bias. The combined prevalence of vitamin D deficiency in children with CP was determined to be 42.18% (95% confidence interval = 32.90% to 51.73%, I<sup>2</sup> = 74.41%, and P < 0.001). **Conclusions:** In conclusion, this meta-analysis reveals evidence of high prevalence of vitamin D deficiency in children with CP. This finding underscores the importance of addressing nutritional factors in the management of CP among pediatric populations.

PMID: [39137591](#)

### **15. Efficacy of a Multimodal Surgical Site Injection for Postoperative Pain Control in Pediatric Patients With Cerebral Palsy Undergoing Hip Reconstruction: A Randomized Controlled Trial**

Danielle Greig, Christina A Sun, Daniel McBride, Bailey Young, Alexandra Klomhaus, Vineeta T Swaroop, Rachel M Thompson



J Pediatr Orthop. 2024 Aug 14. doi: 10.1097/BPO.0000000000002779. Online ahead of print.

**Background:** One in 4 children with cerebral palsy (CP) will undergo orthopaedic surgery during their childhood. Despite its ubiquity, postoperative pain control has been poorly studied in this patient population. Moreover, poor pain management has been associated with adverse surgical outcomes. Multimodal analgesic injections have been well studied in the adult population, demonstrating safety and efficacy in reducing postoperative pain and narcotic consumption, but this modality has not been studied in pediatric patients undergoing similarly complex procedures. The objective of this study was to evaluate the efficacy of a multimodal surgical site injection for postoperative pain control following operative management of hip dysplasia in patients with CP. **Methods:** After obtaining IRB approval, a multicenter, randomized double-blind placebo control trial was completed. Patients below 18 years old with a diagnosis of CP who were scheduled for varus derotation osteotomy (VDRO) of the proximal femur were randomized to receive a surgical-site injection with either a combination of ropivacaine (3 mg/kg), epinephrine (0.5 mg), and ketorolac (0.5 mg/kg) (experimental group) or normal saline (control). All included patients had identical postoperative care, including immobilization, physical therapy, and standardized, multimodal postoperative pain control. Pain scores and narcotic consumption were recorded at regular intervals and compared between groups utilizing two-tailed t test or a nonparametric Mann-Whitney test for quantitative variables and a Fischer exact test for categorical variables. **Results:** Thirty-four patients were included, evenly divided between study arms. There were no significant differences in demographic variables, gross motor function classification system (GMFCS), comorbidities, preoperative radiographic parameters, or concomitant surgeries between groups. Patients in the experimental group required significantly lower narcotic medications at all postoperative time points from PACU until hospital discharge compared with controls ( $0.41 \pm 0.42$  vs.  $1.87 \pm 2.05$  total morphine mEQ/kg,  $P=0.01$ ). Similarly, patients in the experimental group were found to have significantly lower pain scores throughout their hospital stays compared with controls ( $1.0 \pm 0.6$  vs.  $2.4 \pm 1.1$  mean pain score,  $P<0.001$ ). There were no significant differences in operative time, OR time, blood transfusion requirements or hospital length of stay between groups. There were no adverse medication reactions or injection site complications in either group. **Conclusions:** In patients with CP undergoing hip reconstruction, surgical-site injection with a multimodal analgesic combination improves pain control and reduces narcotic consumption in the early postoperative period with no observed adverse effects. **Significance:** Local multimodal analgesic injections should be adopted as part of standard multimodal pain control in this patient population for all osseous surgeries. Level of evidence: Level I-therapeutic.

PMID: [39140418](#)

## 16. A case report of spastic diplegic cerebral palsy in a late preterm child with hypoplastic left heart syndrome

Alexa C Escapita, Julienne G Thomas, Tara L Johnson

Case Reports Transl Pediatr. 2024 Jul 31;13(7):1258-1265. doi: 10.21037/tp-24-57. Epub 2024 Jul 29.

**Background:** Congenital heart disease (CHD) is the most common birth defect, affecting 1% of children who are born in the United States each year. Children with hypoplastic left heart syndrome, a type of critical CHD, are at high risk for neurodevelopmental disabilities, which are conditions that can affect motor, language, and cognitive development. In children with critical CHD, the severity and prevalence of their motor delays is most pronounced in infancy. **Case description:** We present a case of a former late preterm male with hypoplastic left heart syndrome and history of hypoxic ischemic encephalopathy, who was diagnosed with spastic diplegic cerebral palsy in the setting of periventricular leukomalacia. Like many children with critical CHD, this child had gross motor delays and tone abnormalities in infancy. However, unlike many children with CHD, he continued to have neurologic differences that prompted additional evaluation through a Cardiac Neurodevelopmental Program. He was diagnosed with spastic diplegic cerebral palsy based upon clinical history and physical examination. Ancillary testing showed periventricular leukomalacia on brain magnetic resonance imaging (MRI); this finding was consistent with his clinical diagnosis. **Conclusions:** This is an interesting case report of spastic diplegic cerebral palsy in a late preterm infant with critical CHD. When making a diagnosis of cerebral palsy, it is important to consider the etiology of the motor impairment. Selective vulnerability may have played a factor in this child's condition. The most vulnerable part of the neonatal brain is the periventricular white matter; cerebral hypoxia can lead to periventricular leukomalacia. Children with CHD have brain dysmaturity beginning in-utero. Thus, it is possible that this child's brain dysmaturity may have increased his susceptibility to periventricular leukomalacia. Because most children with CHD have gross motor delays in infancy, it may be challenging to make a definitive diagnosis of cerebral palsy in an infant with critical CHD. Children with cerebral palsy have early motor delays that persist throughout life. It is the identification of persistent motor impairments through repeat evaluations that enabled this child's cerebral palsy diagnosis. This illustrates the importance of developmental surveillance in children with critical CHD.

PMID: [39144425](#)

## 17. Benefits of robotic gait assistance with ATLAS 2030 in children with cerebral palsy

Pilar Castro, María Martí, Bárbara Oliván-Blázquez, Nuria Boñar, Violeta García, Santiago Gascón-Santos, Alicia Panzano, Sara Vela, Sara Tajadura, Ana Peña, María Josefa Tris-Ara

Front Pediatr. 2024 Jul 29;12:1398044. doi: 10.3389/fped.2024.1398044. eCollection 2024.

**Objective:** This study aims to assess the impact of integrating ATLAS 2030 into the conventional therapy regimen for children with Cerebral Palsy (CP) compared to conventional therapy alone regarding gross motor function, range of motion (ROM) and spasticity. **Design:** A non-randomized controlled trial conducted in outpatient rehabilitation settings and special education schools, following the recommendations by the Consolidated Standards of Reporting Trials (CONSORT) statement. **Participants:** Thirty children with CP divided into intervention and control groups. **Intervention:** The intervention group received three months of therapy (twice per week) with the ATLAS 2030 device in addition to their standard therapy, while the control group underwent standard therapy alone. **Main outcome measure:** Gross motor function assessed using the Gross Motor Function Measure of 88 items (GMFM-88). **Secondary outcomes:** Spasticity, measured by the Modified Ashworth Scale (MAS), and ROM of the lower limbs. **Results:** Statistically significant differences were observed between groups, in favour the intervention group, in both the GMFM-88 total score and dimension A, B and D. Similar findings were noted for spasticity and ROM, demonstrating significant improvements in the intervention group. **Conclusion:** ATLAS 2030 proves to be a safe and valuable tool for the rehabilitation of children with CP, showing improvements in motor function, spasticity and ROM.

PMID: [39135857](#)

## 18. An Accurate and Rapidly Calibrating Speech Neuroprosthesis

Nicholas S Card, Maitreyee Wairagkar, Carrina Iacobacci, Xianda Hou, Tyler Singer-Clark, Francis R Willett, Erin M Kunz, Chaofei Fan, Maryam Vahdati Nia, Darrel R Deo, Aparna Srinivasan, Eun Young Choi, Matthew F Glasser, Leigh R Hochberg, Jaimie M Henderson, Kiarash Shahlaie, Sergey D Stavisky, David M Brandman

Case Reports N Engl J Med. 2024 Aug 15;391(7):609-618. doi: 10.1056/NEJMoa2314132.

**Background:** Brain-computer interfaces can enable communication for people with paralysis by transforming cortical activity associated with attempted speech into text on a computer screen. Communication with brain-computer interfaces has been restricted by extensive training requirements and limited accuracy. **Methods:** A 45-year-old man with amyotrophic lateral sclerosis (ALS) with tetraparesis and severe dysarthria underwent surgical implantation of four microelectrode arrays into his left ventral precentral gyrus 5 years after the onset of the illness; these arrays recorded neural activity from 256 intracortical electrodes. We report the results of decoding his cortical neural activity as he attempted to speak in both prompted and unstructured conversational contexts. Decoded words were displayed on a screen and then vocalized with the use of text-to-speech software designed to sound like his pre-ALS voice. **Results:** On the first day of use (25 days after surgery), the neuroprosthesis achieved 99.6% accuracy with a 50-word vocabulary. Calibration of the neuroprosthesis required 30 minutes of cortical recordings while the participant attempted to speak, followed by subsequent processing. On the second day, after 1.4 additional hours of system training, the neuroprosthesis achieved 90.2% accuracy using a 125,000-word vocabulary. With further training data, the neuroprosthesis sustained 97.5% accuracy over a period of 8.4 months after surgical implantation, and the participant used it to communicate in self-paced conversations at a rate of approximately 32 words per minute for more than 248 cumulative hours. **Conclusions:** In a person with ALS and severe dysarthria, an intracortical speech neuroprosthesis reached a level of performance suitable to restore conversational communication after brief training. (Funded by the Office of the Assistant Secretary of Defense for Health Affairs and others; BrainGate2 ClinicalTrials.gov number, NCT00912041.).

PMID: [39141853](#)

## 19. Physiotherapy-assisted overground exoskeleton use: mixed methods feasibility study protocol quantifying the user experience, as well as functional, neural, and muscular outcomes in children with mobility impairments

Stefanie S Bradley, Ledycnarf Januario de Holanda, Tom Chau, F Virginia Wright

Front Neurosci. 2024 Jul 31;18:1398459. doi: 10.3389/fnins.2024.1398459. eCollection 2024.

**Background:** Early phase research suggests that physiotherapy paired with use of robotic walking aids provides a novel opportunity for children with severe mobility challenges to experience active walking. The Trexo Plus is a pediatric lower limb exoskeleton mounted on a wheeled walker frame, and is adjustable to fit a child's positional and gait requirements. It guides and powers the child's leg movements in a way that is individualized to their movement potential and upright support needs, and can provide progressive challenges for walking within a physiotherapy-based motor learning treatment paradigm. **Methods:** This protocol outlines a single group mixed-methods study that assesses the feasibility of physiotherapy-assisted overground Trexo use in school and outpatient settings during a 6-week physiotherapy block. Children ages 3-6 years (n = 10; cerebral palsy or related disorder, Gross Motor Function Classification System level IV) will be recruited by circle of care invitations to participate. Study indicators/outcomes will focus on evaluation of: (i) clinical feasibility, safety, and acceptability of intervention; (ii) pre-post intervention motor/functional outcomes; (iii) pre-post intervention brain structure characterization and resting state brain connectivity; (iv) muscle activity characterization during Trexo-assisted gait and natural assisted gait; (v) heart rate during Trexo-assisted gait and natural assisted gait; and (vi) user experience and perceptions of physiotherapists, children, and parents. **Discussion:** This will be the first study to investigate feasibility indicators, outcomes, and experiences of Trexo-based physiotherapy in a school and outpatient context with children who have mobility challenges. It will explore the possibility of experience-dependent neuroplasticity in the context of gait rehabilitation, as well as associated functional and muscular outcomes. Finally, the study will address important questions about clinical utility and future adoption of the device

from the physiotherapists' perspective, comfort and engagement from the children's perspective, and the impressions of parents about the value of introducing this technology as an early intervention. Clinical trial registration: <https://clinicaltrials.gov/identifier/NCT05463211>.

PMID: [39145294](#)

## 20. Revitalising traditional Indian games: inclusive game adaptations for children with cerebral palsy

A Mansoor Rahman, Kavitha Raja, Jagadish Kumar

Disabil Rehabil Assist Technol. 2024 Aug 13:1-13. doi: 10.1080/17483107.2024.2389216. Online ahead of print.

Background: Children with cerebral palsy (CP) present unique challenges to physical activity due to various factors. Despite the benefits of inclusive approaches and adapted physical education, low- and middle-income countries face specific barriers including environmental, equipment, personal, policy, social and professional barriers. Traditional Indian games, with their cultural significance and potential therapeutic benefits, offer a promising avenue for inclusive adaptations. At present we couldn't find any studies that explore's the method of adaptation of traditional Indian games for children with cerebral palsy of varying functional levels. Purpose: The aim of the study was to explore the adaptation of traditional Indian games for children with CP of varying functional levels. Methods: Traditional Indian games were identified through ethnographic qualitative research, and adapted using the Delphi process involving experts from various fields. A total of 10 traditional games were selected based on their health benefits using an operationalised conceptual model. The CHANGE IT model of adapted physical activity was used to systematically adapt each game. Validation of the model was then performed on children with CP [a smaller sample size, n = 10] with different levels of functioning. Results: The games varied in playing positions, surfaces and phases. Modifications included changes in game rules, play environment, equipment and time duration. The study validation through informal interview among the parents of CP children revealed that adapted traditional game protocol shown improvements in their children's activity levels and participation. Conclusions: While this is a preliminary exploration, no firm conclusion can be drawn. The model presented in this study lays the foundation for future randomised controlled trials to validate the effects of adapted traditional Indian games on children with cerebral palsy of different functional levels.

PMID: [39136377](#)

## 21. The Relationship Between Care Burden and Spiritual Well-Being of Mothers of Children with Cerebral Palsy: A Cross-Sectional Study from Türkiye

Melike Yavas Celik, Leyla Kaya

J Relig Health. 2024 Aug 17. doi: 10.1007/s10943-024-02098-1. Online ahead of print.

This study was conducted to determine the relationship between care burden and spiritual well-being of mothers of children with cerebral palsy and the topics of support that mothers need. This study, which was conducted as a relationship seeker, was completed in approximately 7 months. Data were collected through interviews with 270 mothers of children with cerebral palsy. A questionnaire, Spiritual Well-Being Scale and Burden Interview Scale was used to collect data. It was found that mothers needed a lot of support, such as requesting an increase in physical therapy hours and the need for financial support. There was a moderate negative relationship between SWBS and BIS ( $r = -0.39$ ,  $p = 0.01$ ). According to the results of this study, we can say that spiritual well-being is related to the care burden of mothers, so nurses caring for these children should understand the burden of the mothers of these children and evaluate spiritual well-being.

PMID: [39153165](#)

## 22. Direct-to-consumer genome sequencing helps a mother take her child's diagnostic odyssey into her own hands

Meghan N Bartos, Anna C E Hurst, Caterina Abdala Villa

Am J Med Genet C Semin Med Genet. 2024 Aug 16:e32108. doi: 10.1002/ajmg.c.32108. Online ahead of print.

No abstract available

PMID: [39152635](#)

## 23. Well controlled maternal inflammatory bowel disease does not increase the risk of abnormal neurocognitive outcome screening in offspring

Ralley E Prentice, Rod W Hunt, Alicia J Spittle, Michael Ditchfield, Jeff Chen, Megan Burns, Emma K Flanagan, Emily Wright, Alyson L Ross, Rimma Goldberg, Sally J Bell



Brain Behav Immun Health. 2024 Jul 22;40:100827. doi: 10.1016/j.bbih.2024.100827. eCollection 2024 Oct.

**Background:** Exposure to maternal inflammation is associated with an increased risk of neurocognitive and developmental disorders in offspring. Early diagnosis and intervention improves childhood motor and cognitive functioning. Neonatal cerebral MRI and remote app-based generalised movement assessments (GMAs) are both predictive of adverse neurocognitive outcomes but have only been used in infants at significantly increased risk for these outcomes, rather than following in utero exposure to maternal inflammatory disorders. **Methods:** Pregnant women with inflammatory bowel disease were assessed clinically and biochemically in each trimester of pregnancy in this single centre prospective study. Neonatal cerebral MRIs were performed at 6-12 weeks post-corrected term. Two GMA videos were filmed using the 'BabyMoves' app from 12 to 16 weeks of age. MRIs and GMAs were assessed by a blinded highly qualified practitioner using validated scoring systems. **Results:** 40/53 of invited maternal-infant dyads were recruited. C-reactive protein was elevated antenatally in less than 13%. 5/37 neonatal MRIs had incidental or obstetric trauma related gross anatomical abnormalities, with none abnormal on validated gross abnormality scoring. 3/35 GMAs were abnormal, with one GMA abnormality being clinically significant. Of those with abnormal GMAs, 2/3 were in exposed to severely active IBD in-utero. **Conclusion:** Neonatal cerebral MRI and GMA for neurocognitive screening is feasible in the setting of maternal inflammatory bowel disease, where the risk of cerebral palsy is poorly defined and thus burdensome screening interventions are less appealing to parents. Larger studies are required to stratify adverse neurocognitive outcome risk in infants born to women with maternal inflammatory disorders, but these data are reassuring for women with IBD in remission antenatally.

PMID: [39149622](#)

#### **24. Religious Coping as Mediator of Sense of Competence and Post-traumatic Growth in Mothers of Children With Cerebral Palsy**

Noor Ul Ain, Anam Ali, Nazia Bashir

Child Care Health Dev. 2024 Sep;50(5):e13322. doi: 10.1111/cch.13322.

**Objectives:** The present study aimed to determine whether religious coping mediates the relationship between parenting sense of competence (PSOC) and post-traumatic growth (PTG). **Method:** Cross-sectional research design was used. A sample of 74 mothers (age range; 20-45 years) of CP children (age range; 2-9 years) was collected through purposive sampling from different physiotherapy centres and special education schools of Lahore. PSOC scale, brief RCOPE and PTG inventory were used. **Results:** Positive religious coping partially mediated ( $\beta = 0.190$ , 95% CI [0.026, 0.374],  $p < 0.05$ ) between PSOC and PTG. Partial mediation exists between PSOC and appreciation of life through pathway of positive religious coping ( $\beta = 0.040$ , 95% CI [0.007, 0.075],  $p < 0.05$ ). Full mediation exists between PSOC and personal strength through pathway of positive religious coping ( $\beta = 0.041$ , 95% CI [0.001, 0.081],  $p < 0.05$ ) and through negative religious coping ( $\beta = 0.034$ , 95% CI [0.002, 0.066],  $p < 0.05$ ). Positive religious coping fully mediated ( $\beta = 0.029$ , 95% CI [0.007, 0.058],  $p < 0.05$ ) between PSOC and spiritual change. Moreover, indirect effect of PSOC on relating to others and new possibilities through positive and negative religious coping was non-significant, indicating no mediation. **Conclusion:** Positive religious coping affected the association between PSOC and PTG, that is, mothers of CP children having high parenting competence are more likely to use positive religious coping strategies that results in more PTG.

PMID: [39143848](#)

#### **25. Healthcare Professionals' Perspectives on the Use of Standing Frames for Children Diagnosed With Cerebral Palsy: An Explanatory Mixed Methods Study**

Michaela Andersen, Lærke Hartvig Krarup, Nanna Rolving, Anders Holsgaard-Larsen, Charlotte Pawlowski, Helle Mätzke Rasmussen, Maja Husted Hubeishy

Child Care Health Dev. 2024 Sep;50(5):e13320. doi: 10.1111/cch.13320.

**Background:** Standing frames are commonly used by healthcare professionals in their practice with children with cerebral palsy (CP) who do not have an independent standing function. A better understanding of healthcare professionals' attitudes and experiences with standing frames may impact practice and rehabilitation. Therefore, this study aimed to investigate the standing frame practice among healthcare professionals and expand their attitude and experience with the use of standing frames for children with CP. **Methods:** This is an explanatory sequential mixed methods study. A cross-sectional survey was conducted, providing quantitative data on 210 healthcare professionals' use of standing frames. The quantitative data were descriptively analysed. Subsequently, the results from the survey were followed up with five focus group interviews of healthcare professionals ( $n = 14$ ). The qualitative data were analysed using thematic analysis, enabling integration between the quantitative and qualitative data. **Results:** When quantitative and qualitative data are integrated, expansion between the two datasets occurred. The quantitative dataset emphasised the use of GMFCS levels as a guideline for recommending standing frames, whereas the qualitative data showed that the healthcare professionals' recommendations were based on individual needs. Furthermore, the healthcare professionals expanded the quantitative data, showing that the healthcare professionals' considerations regarding age and dosage were based on clinical experience, and saw the standing frame as having many

benefits. Conclusion: The healthcare professionals had a child-centred approach, where the child's need for using a standing frame was assessed based on the functional level, stage of development, cognitive level and clinical assessment. All of these considerations showed that the use of standing frames for children with CP was individualised, thereby making it difficult to make unified descriptions.

PMID: [39143846](#)

## **26. Parental views on prospective consent: Experience from a pilot randomised trial recruiting extremely preterm infants during the perinatal period**

Hannah Skelton, Traci-Anne Goyen, Patricia Viola, James Marceau, Daphne D'Cruz, Rajesh Maheshwari, Dharmesh Shah, Bronwyn Edney, Melissa Luig, Pranav R Jani

J Paediatr Child Health. 2024 Aug 14. doi: 10.1111/jpc.16645. Online ahead of print.

Aim: To explore parental perceptions of the consenting process and understanding of the study in a pilot randomised controlled trial wherein extremely premature infants (<29 weeks' gestation) were recruited either antenatally or by 4 h of life. Methods: We prospectively surveyed parents who had consented, declined consent or were eligible infants in the Positioning Preterm Infants for Neuroprotection study, a low-risk intervention study in the first 72 h of life. Structured interview questions explored the process and acceptability of the consenting approach by the parents and their knowledge of the study. Additional comments made by the parents were transcribed verbatim. Results: Sixty-two parents participated in the surveys; of those, 41 had provided their consent, 8 declined consent and 13 were parents of missed eligible infants. Overall, most parents reported they understood the study well before providing their consent and approaching them for consenting did not create a burden for them. A verbal explanation of the study by the study team, especially by the medical practitioners, was viewed as beneficial. Where consent was obtained in the birthing unit (imminent births and within 4 h of birthing), it was suggested that the 4-h period for obtaining post-natal consent may be too short. A deferred consent with a follow-up opportunity for obtaining informed consent could be a suitable alternative. Conclusion: Parents found the consenting process acceptable and indicated they had sufficient understanding of the study to provide an informed consent. Deferred consent should be explored for future, low-risk intervention studies as an alternative to prospective consent where extremely preterm infants need to be recruited in the immediate neonatal period.

PMID: [39140358](#)

## **27. A manifesto for cerebral palsy**

John Coughlan, Matthieu Chatelin, Agnes Kojc

Editorial Dev Med Child Neurol. 2024 Aug 11. doi: 10.1111/dmcn.16051. Online ahead of print.

No abstract available

PMID: [39129174](#)